Production Efficiency Levels of the Weaver Households of the 'Mising Community' of Majuli District, Assam

A Dissertation Submitted

To

Sikkim University

In Partial Fulfilment of the Requirement for the

Degree of Master of Philosophy

By

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School of Social Sciences

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DECLARATION

I, **Gunawati Pegu,** hereby declare that the research work embodied in the dissertation titled **"Production Efficiency Levels of the Weaver Households of the 'Mising Community' of Majuli District, Assam"** submitted to **Sikkim University** for the award of the **Degree of Master of Philosophy**, is my original work and it has not been submitted earlier to this or any other University for any degree.

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This is to certify that the dissertation titled **"Production Efficiency Levels of the Weaver Households of the 'Mising Community' of Majuli District, Assam"** submitted to the **Sikkim University** for the partial fulfilment of the requirement of the degree of **Master of Philosophy** in the Department of Economics, embodied the result of bonafied research work carried out by **Miss Gunawati Pegu** under my guidance and supervision. No part of the dissertation has been submitted earlier to this or any other University for any Degree, Diploma, Association and Fellowship.

All the assistance and help received during the investigation have been duly acknowledged by her.

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"Production Efficiency Levels of the Weaver Households of the 'Mising Community' of Majuli District, Assam"

Submitted by **Gunawati Pegu** under the supervision of **Dr. Rangalal Mohapatra**, Assistant Professor, Department of Economics, School of Social Sciences, Sikkim University.

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- **Gunawati Pegu**

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Introduction

1.1 Introduction

Clothing is one of the basic necessities of human beings as much as food and shelter. When machines were not invented for the production of cloth, the handloom industry was the sole supplier of cloth for the entire need of the world (Venkateswar, 2014). Among the various cottage industries, the handloom industry is the major and aged industry in India. The art of weaving comprises the abundant and lively aspects of the cultural heritage of the country which has been traditionally performing throughout the centuries. The mainstays of India's economy is the textile and clothing industry in which the textile industry is divided into two segments, namely unorganized sector and organized sector (Kumar, 2015). The handloom is included in the unorganized sector and it is the provider of direct and indirect employment in bulkiest form which is scattered over thousands of villages and towns in the country and performs totally by the entire family labor (EXIM, 2018). On the basis of the organization of production, the handloom industry is divided into three segments: (i) co-operatives (ii) independent weavers (iii) master-weavers (Srinivasulu, 1996). The growth of institutions like master weavers, middle men, and independent weavers is determined by the growth performance of co-operatives (Dev et al., 2008). In India, 31.45 lakhs of households are occupied in handloom activities (Fourth All India Handloom Census, 2019-20). Thus there is an increase in the households occupied in handloom by 3.62 lakhs from the Third handloom Census (2009-10) which was 27.83 lakhs.

The state with highest total number of households from the distribution of handloom worker households is Assam with 12,69,506 followed by West Bengal with total households of 5,42,557 and Manipur with total households of 2,21,855. In the year 2013-14, the total production in the handloom sector of India was 7104 million square meters and this had increased to 8007 million square meters in 2016-17(Annual report, Ministry of textile, Government of India, 2018-19). In the year 2016-17, handloom sector contributes 17.4% in the cloth production of India and in 2017-18, India was the second largest exporter of handloom products with export value of US$ 353.9 million in the world (Directorate General of Commercial Intelligent of Statistics).

1.2 Evolution of Handloom Industry: A Global Perspectives

During the early stage of human civilization (Period before 9000 BC), human being started to use animal skin as cloth for their domestic needs since clothing is one of the basic needs of human being and people began to weave their cloth as substitute for the skins of wild animals. In consequences of this, the ideas of weaving and weaving yarn into fabric had developed from the art of weaving strips of mats and baskets. In Europe, South America and Asia weaving had developed during 2000 BC and started to weave cloth on simple loom during 5000-6000 BC. The four fibres which were originated in different parts of the world are cotton, wool, linen, and silk of which cotton was originated in India and Peru, woolen in Switzerland and Scandinavia, linen in Egypt, and silk in China in the 2nd millennium BC. Basic finishing treatments and methods such as shearing, bleaching, dyeing, printing, and pressing has developed by the beginning of the Christian Era (New Standard Encylopaedia, p-202). During the Middle Ages (8th century and 15th century),

Muslims had spread the farming of cotton and breeding of silkworm techniques into Europe. In this Middle Ages, the processes of handloom was developed from household occupation to specialized crafts and for handloom cloth, Byzantine, Persia, Italy, Spain and Flanders had become great centers.

1.3 Handloom Industry in India

India has a rich tradition of handloom weaving with the earliest evidence going back to the Indus Valley civilization. From the division of Egypt, the archetypal piece of handlooms of India was dug out. Subsequently in Indus valley Civilization, fabrics of finely woven cotton were discovered (Jain and Gera, 2017).There was also evidence to believe that in the ruins of these cities some dyeing vessels were found and the Indus people were practicing the art of spinning of cotton and wool and also dyeing of cloth for which historians considered India as the birth place of cotton manufacturer (Soundarapandian, 2002).

India's weaving style is also mentioned in the Vedic literature. In Rigvedic society the highly advanced occupations were spinning and weaving. Their weavers were busy weaving cotton and woolen fabrics and there were also work of dyeing and embroidering. India had occupied an important place in the early civilization of Egypt, Rome and Babylon because of everlasting color, artistic design and excellent crafts. From the wall paintings of Ajanta some details of Indian textiles of the medieval period can be studied (Encyclopedia Britannica, vol. 21, p-917). During the period of the 1st world war (1914 to 1919) the Swadeshi movement lead by Mahatma Gandhi had given a great impetus and to the textile industry some protections was granted and this change in policy led to increase in the production of cotton piece

clothes**.** For further development of the industry the Second World War (1939 to 1945) created a favorable condition and with the coming of independence there was a tremendous revival of the craft which had suffered such a crippling decline (Chopra, 1984).

1.4 Handloom Industry in Northeast India

The Northeast India is the easternmost region of India representing both a geographical and political administrative division of the country. This northeast region comprises of eight states- Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. During the primitive age, when men were hunters and warriors, women were concerned with food gatherings and sustaining agriculture and consequently started producing crafts like pot making, leather making, house building and the techniques of cordage weaving. The beginning of whole chain of great textile industry was Cordage Weaving. Therefore, for developing the physics of spinning and the mechanism of loom should be credited to women (Reed, 1970). Cloth production by family units has become a part of the decentralized sector. During the early seventies, handloom has been described as a work of art, craft as well as industry, representing one of the most aesthetic aspects of existence in the report on handloom sector of the high-powered committee under the chairperson of Mira Seth (Government of India 1974). The handloom weaving played a significant role in making the social and cultural identity, rituals and habitat. *Riha* a garment of hand woven breast cover of the family elders is used in the rituals in the tribal society of Tripura. *Gamusa*, a hand woven piece of cloth symbolizes respect and honor in Assam and at the time of marriage *Gamusa* is also presented by the bride and bridegroom to the elders for showing respect and seeking blessings from them (Devi,

2013). There is also a close relation between the design of the hand woven cloth and the rituals and habitat of the particular group or community (Devi, 2013). Girls among the tribes in the northeast region expressed their love and care for their beloved by presenting weaving products, the more intricate the design, the more love it symbolizes (Paoki, 1988). One of the criteria for selection of mate for a marriage was weaving and the important parental gifts for women in the marriage consisted of weaving tools and looms. These weaving tools and looms are given so that she can start an economic activity by weaving handloom products. The weaving of *Garo* women in Meghalaya is a full time job. The Sualkuchi villages in Assam are known for its tradition of weaving silk products.

1.5 The Present Scenario of Handloom Industry of India

The largest economic activities after agriculture providing direct and indirect employment is handloom weaving. In India, 31.45 lakhs of households are occupied in handloom activities (Fourth All India Handloom Census, 2019-20). Thus there is an increase in the households occupied in handloom by 3.62 lakhs from the Third handloom Census (2009-10) which was 27.83 lakhs.

As per the Fourth All India Handloom Census, the numbers of Scheduled Tribe's households who are occupied in handlooms are of 19.1%, Scheduled Castes households who are occupied in handlooms are of 14.3% and Other Backward Castes are of 33.6% and other households are of 33.0%. 71.9 % households having looms in their houses are in the rural areas. A total of 30.7 % of the handloom worker households do not have looms. The loomless workers are either employed in hired weaving task or involve in doing allied task of handloom. The hired weavers have to

go to other site for weaving. This site may be master weaver's premises, industry or cooperative society. The majority of the households without loom are observed in the urban areas. Most of the handloom households live in kutcha houses (60.2%) and 21.2% of the handloom households live in pucca houses and only 18.7% of the handloom households live in semi-pucca houses. The age wise distribution of the handloom workforce reveals that 3.1% of the workers are aged less than 18 years. The total percentage of the handloom workforces of the productive aged group is 70%. The distributions are 42.6 % are in the aged group of 18-35 years and 25 % are in the aged group of 36-45 years. About 23 % of the workers are in the aged group of 46-60 years while 6.3 % of the workers are aged more than 60 years. In India, there are 35 lakhs of handloom worker who are 18 years of ages and above. 72.3% of handloom workers are female and 28% of handloom workers are male. Female workers are comparatively greater than male workers. From the total number of looms of India, 3.96 lakhs of looms are found in urban areas and 27.48 lakhs of looms are found in rural areas. The percentage of the type of looms in the weaver households are 42.2 % pit looms, 31.5 % frame looms, 15% loin looms and 11.3 % other kinds of looms. As per the Fourth All India Handloom Census (2019-20), Assam reported with highest total number of handloom households with 12,69,506 followed by West Bengal with total households of 5,42,557 and Manipur with total households of 2,21,855 which is shown in the Table 1.5. In the year 2016-17, handloom sector contributes 17.4% in the cloth production of India and in 2017-18 India was the second largest exporter of handloom products with export value of US$ 353.9 million in the world (Directorate General of Commercial Intelligent of Statistics).

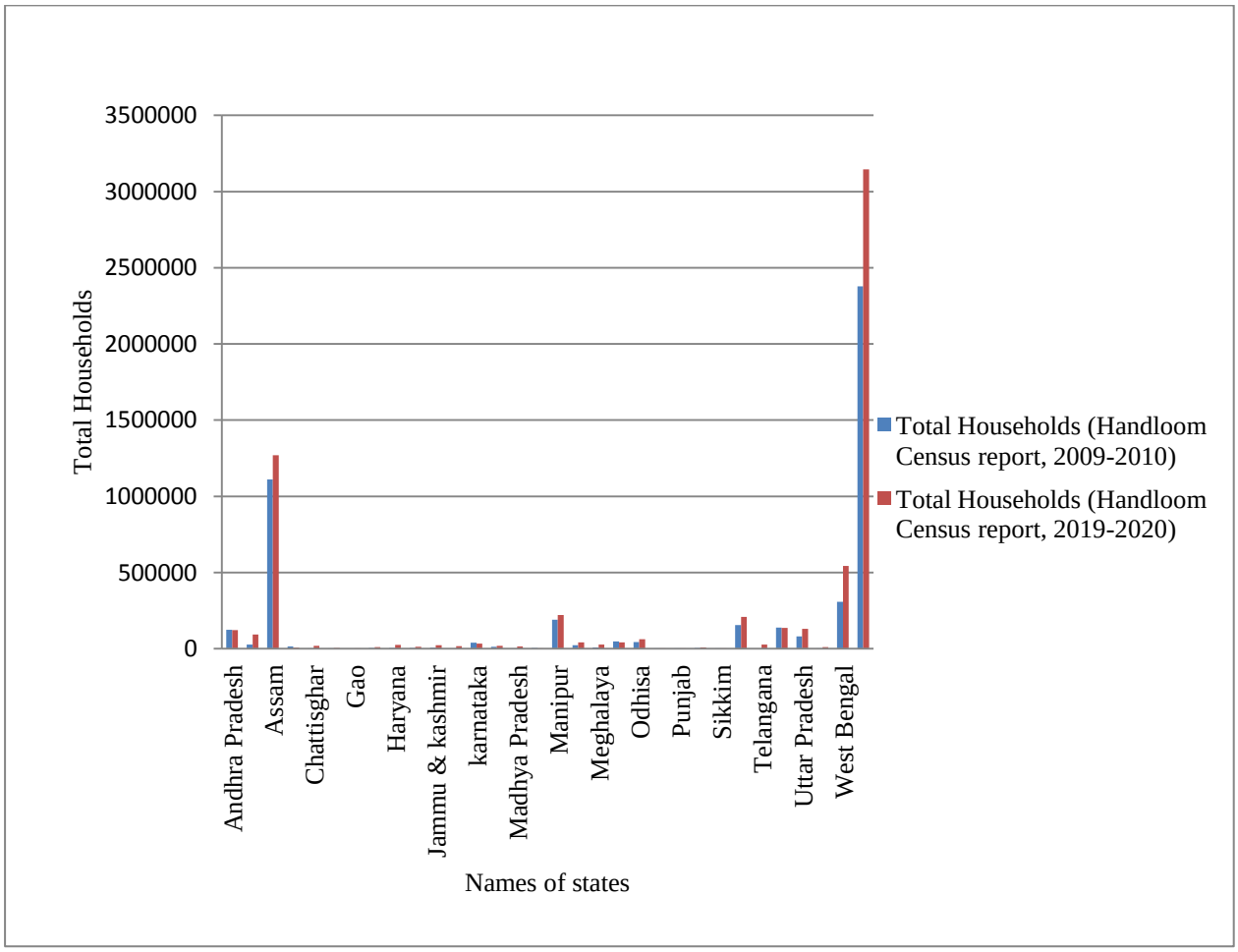
Table 1.5: State-wise Total Households (Weavers & Allied Workers)

State	Total Households (Handloom Census report, 2009-2010)	Total Households (Handloom Census report, 2019-2020)
Andhra Pradesh	1,24,714	1,22,644
Arunachal Pradesh	27,286	93,314
Assam	11,11,577	12,69,506
Bihar	14,973	6,665
Chhattisgarh	2,471	18,876
Delhi	2,560	4,053
Gao		26*
Gujarat	3,900	10,209
Haryana	4,876	25,408
Himachal Pradesh	5,578	13,572
Jammu and Kashmir	7,301	23,068
Jharkhand	2,128	16,478
Karnataka	40,488	33,677
Kerala	13,097	20,247
Madhya Pradesh	3,604	14,257
Maharashtra	4,511	3,435
Manipur	1,90,634	2,21,855
Meghalaya	8,967	42,755
Mizoram	24,136	27,402
Nagaland	47,688	42,411
Odhisa	43,652	63,223
Puducherry	1,771	1,629
Punjab	261	936
Rajasthan	5,403	8,770
Sikkim	345	697
Tamil Nadu	1,54,509	2,09,582
Telangana		27,916*
Tripura	1,39,011	1,37,455
Uttar Pradesh	80,295	1,31,120
Uttarkhand	3,766	11,096
West Bengal	3,07,829	5,42,557
All India	23,77,331	31,44,839

Sources: Third and Fourth Handloom Census of India

*indicates newly added states in the Census

Figure 1.5: State-wise Total Households (Weavers & Allied Workers)

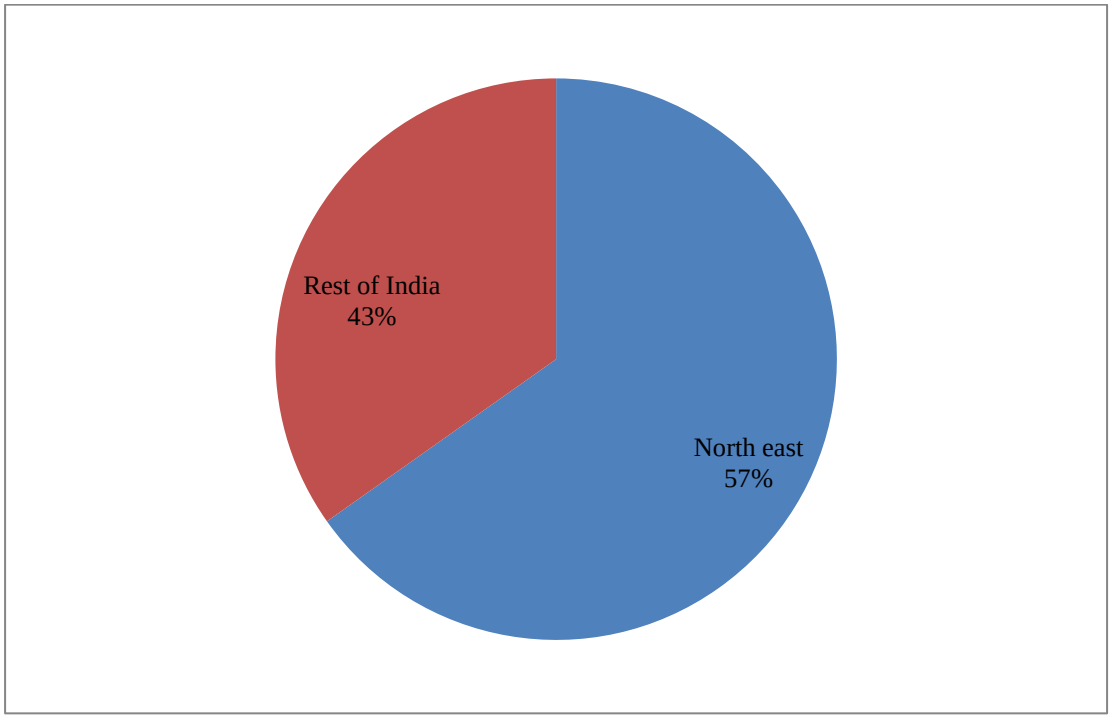


Sources: Third and Fourth Handloom Census of India

1.6 North-East Region (NER)

The North-Eastern states are considered as the reservoir of weaving skills for accounting 57% of handloom households and 90% of the households occupied in weaving activity only. Assam alone accounts for 40% of handloom households, whereas Manipur and Tripura account for 7% and 4% only (Fourth All India Handloom Census, 2019-20). The Fig. 1.6 shows the proportion of number of handloom households in North Eastern Region in India, 2019-20.

Figure 1.6: Proportion of Number of Handloom Households in North Eastern Region in India (2019-20)



Sources: Ministry of textiles, Government of India, 2019-20

Majority of the handlooms in North Eastern Region could contribute less economically to the family income (19%) while it is 58 % in other states of India (Handloom Census, 2009-2010). The region has to increase the average working days for getting higher income. While handloom workers in the region work on an average of 140 days, other states in India work for 245 days in a year. The reason is that the North Eastern Region handloom sector is dominated by domestic production (62%) and a large portion of domestic workers work mostly on a part time basis. Other states of India are primarily engaged in commercial production of handlooms. The region also has highest proportion of idle looms in the country. As almost half (45.9%) of weavers worked in domestic production and therefore there is low productivity.

Hence contribution from handlooms to household incomes remains marginal. However, the weavers support their family by supplying clothes which are used by family members for daily wear, festivals and ceremonies. When compared to other states which are primarily engaged in commercial production the region recorded a low productivity. While half of the weavers in other states produce above two meters per day, only a few weavers in the region produce above two meters per day. Half of north-east weavers generally produce one meter per day. The Handloom Census (1988), estimated productivity among the states where there were working looms and recorded that Assam had the highest number of working looms (12.9 lakhs) but lowest productivity and Manipur fourth largest looms (2.7 lakhs) but both had productivity way below the average Indian production of 5.12 meter per loom per day. The low productivity of handlooms were on account of four factors- (1) nature of work pattern (2) technology (3) management and (4) market structure (Debi, 1994). By the distribution of handloom worker households, Assam is highest with total households of 12,69,506 followed by West Bengal with total households of 5,42,557, Manipur with total households of 2,21,855(Handloom Census, 2019-20, Ministry of textile, Government of India).

1.7 Major Interventions by the Government of India

By implementing various developmental, promotional, and welfare schemes, the Ministry of Textiles through the Office of the Development Commissioner of Handloom is working for the sustainable development of the handloom sector. Hence the development and increase in earnings may be because of the several initiatives taken by the Government of India for the welfare of the weaver community, comprising of providing financial assistance under flagship schemes such as

Handloom Weavers' Comprehensive Welfare Scheme, National Handloom Development Programme, Yarn Supply Scheme and Comprehensive Handloom Cluster Development Scheme. The components of these schemes are Block level cluster, Skill up-gradation, Hatkharga Samvardhan Sahayata (looms and accessories), Work shed, Engagement of designers, Yarn supply, MUDRA loan etc. Under these schemes, various types of government financial assistances such as provision of raw material at cheaper price, purchase of looms at subsidized rate, provision of training for up-gradation of skills for product design and innovation, as well as product diversification.

1.8 Conceptual Framework of Handloom and Weaver Household Units

The Handloom is defined as any loom other than power loom (Handloom Act, 1989). The Handloom word derives its meaning from the process of operation by hand of a country wooden structure called loom (Rao, 1991). The dictionary meaning of the word Handloom is a weaver's loom worked by hand as distinguished from a power loom. Loom is a wooden country made structure used for making cloth with the sole aid of manpower (Rayudu, 1988). Except the handlooms, all other types of looms need power for operation. The handloom industry can be divided into three segments on the basis of the organization of production: (i) co-operatives, (ii) independent weavers (iii) master-weavers (Srinivasulu, 1996).

A household is defined as an individual or a group of people, who normally resides together, take meals, use same kitchen beneath the same roof. According to the Fourth Handloom Census (2019-20), an individual or more members of the households who involve in any handloom allied activities in the last one year with or

without looms in their places is known as *household handloom units.* Even if handloom related activities are conducted at the place other than the household premises, it has been considered as household handloom unit. Those handloom units which establish and owned by master weavers, institutions, cooperative societies etc. who undertakes the handloom activities for business purposes are known as *non-household handloom* units. For the production of the handloom products, the looms and accessories can also be arranged or accommodate in work shed of the premises of non-household handloom units. The looms or other inputs for production of handlooms can also be provided in the residence of the hired or member weavers. The *Cooperative Societies* is of two fold such as apex society and primary society. Basically, the weavers are the members of the primary society and its umbrella body is the apex society. According to the Fourth Handloom census (2019-20), there are three types of Handloom households i. e. (i) Weaver households (ii) Allied worker households (iii) Master weaver households. Any individual of the households who operates a loom within the places of the residence with household loom or outside the place of the residence without household loom in the last one year is known as Weaver household. The Weaver households can be describe as the following combinations: a households who possess and operates looms in the place of their residence, a households who possess and operates loom outside the premises of their residence, a household having looms arranged in their premises but don't possess looms and involve in doing weaving activity, a households not having any loom in their premises and don't possess looms but involved in doing weaving activities outside the household premises. A weaver household may or may not involve in handloom related allied workers. The *Allied worker household* is defined as a household that has no weaver or loom, but household members take part in pre-loom

or post-loom activities either within or outside the household premises in the last one year. These *Allied workers* can also be engaged in allied activities within or even outside their household premises. In the Fourth All India handloom Census, the allied activities has been split into two major categories: Pre-loom activities like winding, warping, dyeing, tyeing, sizing, loom setting and manual card punching. Post loom activities like calendaring. In the handloom sector a *Master Weaver household* is construed as a non-household unit. But there is also a realisation that many weavers have grown to become a master weaver and are part of households that have other handloom workers (weavers and allied workers). Hence, for the Fourth Census a concise definition was used to identity such households with more than 50% of the handloom workers are hired handloom workers, construe a master weaver.

For the study, weaver households are selected for the estimation of the productive (technical) efficiency and profit efficiency of handloom weavers. In the study area it is found that there are mainly two types of weavers in the households' i. e. independent weaver and contract weaver. An independent weavers are who engages in weaving works, be it full time or part time, who purchases raw materials from the market, makes cloth and sells in the market on her/his own to earn a living. Contract weavers are weavers who weave in terms of product to product or in terms of money wage. The raw materials which is needed for the cloth is invested by the Contractor. The job of contract weavers is just to weave according to the order given by the Contractor. The Contractor can be any individual who may or may not know weaving. (The name Contract weaver is given in this study by observing and from the description given by the weavers in the study area).

1.9 Why Handloom Industry?

There has been seen an increasing trend of the cloth production using handloom. During the year 2016-17, the aggregate cloth production by the handloom sector stood at 8.01 billion square metres registering 4.8% year-on-year growth (Office of the Textile Commissioner, Government of India). Due to the global downturn, cloth production by handloom had turn down in the years succeeding 2008-09. However since 2011-12, there has been continuously increasing of the hand woven cloth production. During the year 2016-17, the share of the handloom produced cloth in the total cloth production was estimated at 17.4%. As handloom industry is primarily a rural based economic activity with a majority of handloom households residing in rural areas. There were total of 31.44 lakhs looms in the country, of which approximately 88.7% were being operated in the rural areas (Fourth Handloom Census (2019-20). This is an increase over the Third Handloom Census (2009-10), where the count was 27.83 lakhs. In India the handloom sector is considered to be the largest unorganised sector second to agriculture. The sector is majorly fragmented and decentralised, rendering it unnameable to economies of scale.

In 2017-18, India was the second largest exporter of handloom products in the world, with exports valued at US$ 353.9 million (Directorate General of Commercial Intelligent of Statistics). During the period 2013-14, the value of handloom exports stood at US$ 370.2 million recording a negative compound annual growth rate (CAGR) of (-) 1. 1 % during the period 2013-14 to 2017-18. During the year 2017-18, the US was ranked as the leading export destination for handloom products; however, its share decreased from 32.0% in 2013-14 to 26.3% in the year 2017-18 (Directorate General of Commercial Intelligent of Statistics). The UK, with a

share of 7.4%, was the second largest export destination, with exports to the country valued at US$ 26.1 million. Spain emerged as one of the important destination for exports, being ranked third as a market for Indian handloom exports in 2017-18 with a share of 6.0%. In 2017-18, the other major markets included Italy (5.1%), Germany (5.0%), UAE (4.7%), France (4.6%), the Netherlands (3.9%), Australia (3.3%) and Japan (3.3%).

During the year 2017-18, the imports of handloom products doubled to US$ 10.8 million as compared to US$ 5.4 million 2016-17 (Directorate General of Commercial Intelligent of Statistics). From 2013-14 to 2017-18, the compound annual growth rate was negative i. e. (-) 12.9% in which the imports value also got declined. Bangladesh has been the leading import source of handloom products by India. During the year 2013-14, the share of Bangladesh in India's handloom imports roses from 68.0% to 88.3% during the year 2017-18. During the period 2017-18, the sources of imports were China, Italy, Germany, Belgium, Singapore, Japan and US.

1.10 Challenges for which Exports of Handloom Products Registering a Consistent Decline

There is a considerable demand globally for handloom products but in the discerning international market India has not been able to properly positioned, reflected in exports registering a consistent downturn in each of the last five years between 2013-14 to 2017-18. In this section few challenges are discussed for which exports registering a consistent decline.

1.10.1 Scarcity of raw materials and their rising cost

The necessities of handloom industry are yarn, chemical dyes and zari. Mostly

the weavers purchase yarn from the private traders. The private traders including the transportation cost charges high cost to the weavers. The problem becomes more acute with the irregularity of the supply of the essentials of the handloom industry.

1.10.2 Competition from Power Loom

The time consumed by the handlooms in the production of cloth is largely higher as compared to the time consumed in the power loom industry. The cloth/fabric produced by the power loom industry is cheaper and the delivery is faster. Due to the higher prices of handloom products, a very limited section of the society can afford to buy the handloom produce, and a relatively larger sect ion opts for the power loom fabrics. Rapid technological up gradation and automation in the modern textile industry has led to high volume of production of a variety of quality, enjoying competitive advantage over their handloom counterparts.

1.10.3 Shortage of Credit Availability

For the provision of credit, approximately 44.6% of the weavers relied on the master weaver and nearly 13.4% depended on the money lenders (Third handloom census, 2009-10). It was specified that only 14.8% of the handloom weavers had access to institutionalised sources of credit. The reasons in which the banks being constrained to lend to the sector include lack of recognition regarding the potential of the handloom produce and also the lack of awareness associated with the schemes for the welfare of the weavers.

1.10.4 Technological Backwardness

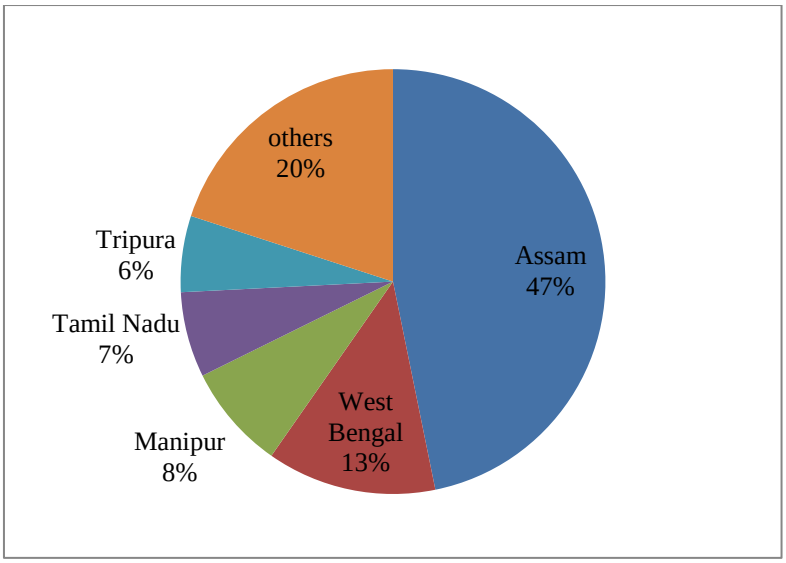
The handloom weavers are still largely practising the traditional methods of

weaving along with worn out and unproductive looms. Therefore it is crucial for the handloom weavers to adopt new looms of technology. This adoption of technology which can increase labour productivity can resolve the price competitiveness of handloom products, thereby boosting their sale.

1.11 Why Assam?

The handloom industry is primarily a rural based economic activity with a vast majority of handloom households residing in rural areas. As per the Third Handloom Census, there were a total of 23.77 lakhs looms in the country, of which approximately 87% were being operated in the rural areas. In terms of proportion of handlooms, 65% of the total handlooms in the country were being operated in the north eastern states (Ministry of textile, Government of India 2009-10). Accounting nearly 46.8% of the aggregate number of handlooms, Assam was the leading state in India. The other major states were West Bengal with 12.9% of handlooms, Manipur with 8.0%, Tamil Nadu with 6.5% and Tripura with 5.8%. which is shown below in the Fig. 1.11. By the distribution of handloom worker household, Assam is still highest with total households of 12, 69,506 followed by West Bengal with total households of 5,42,557, Manipur with total households of 2,21,855(Handloom Census, 2019-20).

Figure 1.11: Top 5 States in Number of Handlooms (2009-10)



Sources: Ministry of textiles, Government of India, 2009-10

Despite, vast majority of handlooms located and operated in the North east region of India and Assam being the major state in number of handlooms but the productivity is found to be low. Majority of the handlooms in NE region could contribute less economically to the family income (19 per cent only) while it is 58 per cent in other states of India (Handloom Census 2009-2010). The reason is that the NE region handloom sector is dominated by domestic production (62 per cent) and a large portion of domestic workers work mostly on a part time basis. Other states of India are primarily engaged in commercial production of handlooms. As almost half (45.9 per cent) of weavers worked in domestic production and therefore there is low productivity. The condition did not improve after two decades because the handloom census 1988 estimated productivity among the states where there were working looms and recorded that Assam had the highest number of working looms (12.9 lakhs) but lowest productivity and Manipur fourth largest looms (2.7 lakhs) but both had productivity way below the average Indian production of 5.12 meter per loom per

day. The four factors which account for the low productivity of handlooms were - (1) nature of work pattern (2) technology (3) management and (4) market structure (Debi, 1994). By the distribution of handloom worker household, Assam is highest with total households of 12, 69,506 followed by West Bengal with total households of 5,42,557, Manipur with total households of 2,21,855 (Handloom Census, 2019-20, Ministry of textile, Government of India).

1.12 Why Majuli District?

The reason for selecting Majuli district is that it is the largest river island in the world, situated on the Brahmaputra River in Northeastern. In severe floods and also in normal floods Majuli gets submerged. The summer-monsoon season is the main flooding season for Majuli Island which leads to soil erosion and land degradation that decreases the agriculture productivity and livestock of the island. And these have also greatly affected the demographic pattern, ecology, environment, social structure and economic growth of the Majuli Island. Therefore most of the population has shifted their occupation to Handloom weaving. The major occupation among the distaff population of the village is handloom (Nath, 2009).

1.13 Why *Mising Community?*

The population of Majuli comprises of tribal population, non-tribal population, and the scheduled caste population. The tribal communities include the *Misings*, the *Deoris* and the *Sonowal Kacharis*. The '*Misings'* are one of the offshoots of Mongoloid stock and the second largest populated tribal community in Assam who immigrated from Arunachal Pradesh centuries ago (Pegu, 2013). In shaping the cultural identity of '*Misings'* weaving culture has played an important role among the

several cultural practices and without which the culture and traditions of '*Misings'* is incomplete (Doley, 2014). Basically in this community weaving is confined to women part of the society. According to tradition, the primary qualification of a girl for wedding was her "skill to weave" and also *Mising* women weave in advance at least 5 to 10 sets of Mekhela-Chaddar (*Ege-gasor)* for marriage. The different types of traditional garments woven by the *Mising* folks are Mekhela (*Ege)* (a lower garment, worn from the waist to ankle level), Chaddar (*gasor)* (an upper garment worn with *Ege*), *Gero* (used to tie around the waist and chest on the top of *Ege*), *Ri:bi*: (an woolen cloth woven with different stripes such as red, yellow, black and white), *Mi:bu Galuk* (front opening sleeveless jacket worn by male folks on special occasions or festivals), *Erpok* (muffler woven in red color with different colors of stripes). *Gonro ugon* (woven on white color with traditional design and is worn on socio-cultural and religious functions). A *Mising* woman, despite being engaged in myriad household activities throughout the day, is likely to spend some time on her loom every day. Earlier, weaving in the *Mising Community* was to meet the requirements of members of their family. But nowadays, with the impact of modernization weaving is carried out more or less on a commercial basis (Chutia & Sharma, 2015).

1.14 Research Problem

In the background of handloom sector in India as well as in Northeast India in general and Assam in particular, the *'Mising'* tribes of Assam draws the attention due to their own social, economic, cultural and traditional practices. Among various cultural practices, weaving culture has played an important role in shaping the cultural identity of '*Mising'* and without which the culture and tradition of '*Mising'* is incomplete. Earlier, weaving in the *Mising* community was to meet the requirements

of members of their family. But nowadays with the impact of modernization weaving is carried out more or less on a commercial basis. However weaving sector of the '*Mising Community'* is also confronted with various problems in production, cost, and marketing leading to inefficiency in productions, costs and profits. The problems related to production process are like working capital, loom, labor, work shed, electricity, design etc. They produce different types of products. Though they use same type of inputs like family labor, hired labor, yarn, loom but all of them do not produce same output. There observed a difference in output, revenue and profit which could be attributed to many factors including inefficiency. However, out of all issues, input cost, price of output, availability of inputs like yarn and capital are external to the producer, hence they do not have control on these factors. But definitely, they have full control over the use of inputs such as labor power, looms, work shed, type of yarn etc. Hence, the problem settles down to inefficiency in production arising out of inefficient use of inputs while producing a given quantity of output. Similarly, high production cost may lead to low profit. Therefore the study aims at focusing on the production efficiency levels of the weavers with respect to Mekhela-Chaddar (MC) of different yarn i. e. Zero-ply[1] , Tussar[2] and Eri[3] and the factors influencing the levels of inefficiency among the weaver households of the '*Mising Community'* of the Majuli district.

For the purpose of this study, we limit our analysis to technical efficiency and profit efficiency of the independent and the contract weavers of the households of the *Mising Community* of Majuli district.

[1] It is a synthetic threads known as zero-ply or triple zero or padmini threads.
[2] It is a silk produced from larvae of several species of silkworm belonging to the moth genus.
[3] It is a kind of non-mulberry silk produced from the silkworm.

1.15 Research Objectives of the Study

- To study the socio-economic structure of the weaver households of the *Mising Community* of Majuli district.
- To estimate the technical efficiency of the weaver households of the *Mising Community* of Majuli district with respect to Mekhela-Chaddar of different yarn i. e. *Zero-ply , Tussar* and *Eri* .
- To estimate the profit efficiency of the weaver households of the *Mising Community* of Majuli district with respect to Mekhela-Chaddar of different yarn i. e. *Zero-ply, Tussar* and *Eri*
- To study the factors influencing the inefficiency levels of the weaver households of the *Mising Community* of Majuli district.

1.16 Research Questions of the Study

- Whether weaver households of the *Mising Community* of Majuli district are technically efficient or not?
- Whether weaver households of the *Mising Community* of Majuli district are profit efficient or not?
- Whether there any differences in technical efficiency levels observed among the weaver households of the *Mising Community* of Majuli district with respect to Mekhela-Chaddar of different yarn i. e. *Zero-ply, Tussar* and *Eri*?
- What are the factors affecting the technical and profit efficiency of the Mekhela-Chaddar weaver households of the *Mising Community* of Majuli district?

1.17 Research Hypotheses of the Study

- The productions of the Mekhela-Chaddar of the weaver households are not fully technically efficient and the variation is not caused by statistical or random error but due to technical inefficiency.
- The production of the Mekhela-Chaddar of the weaver households are not fully profit efficient and the variation in the profit is due to profit inefficiency.
- There is no difference in technical efficiency among the weaver households with respect to Mekhela-Chaddar of different yarn i.e. *Zero-ply, Tussar* and *Eri.*

1.18 Literature Review

The survey of literature plays an important role in establishing backdrop for any research work in social sciences. It is felt that justification of the present study can be clarified by reviewing literature on the subject. Therefore an attempt has been made to review the available literature on the subject to find the research gaps.

1.18.1 Concept of Efficiency

For the first time Farrell (1957) explored the framework of productive efficiency and proposed three components of a firm's efficiency resulted in a better understanding of the concept of efficiency. These three components are technical, allocative and economic efficiency. The overall productive efficiency is disintegrated into technical & allocative efficiency (Farrell, 1957). After the seminal work of Farrell (1957) on the efficiency measurement, there were many analysts who impart opinions to numerous alternatives of estimating efficiency and productive analysis. Among all the analysts, the two pioneering contributions were done by Aigner, Lovell

and Schimdt (1977) and Meeusen and Broeck (1977).

1.18.2 Types of Efficiency

Basically, the inclusive productive efficiency is disintegrated into technical and allocative efficiency (Farrell, 1957). The distinction between technical efficiency and allocative efficiency is that the former measures success of firms' in choosing an optimal set of input, the latter its success in producing maximal output from a given set of input (Farrell, 1957). With a specified technology and environmental situations Shand and Kalirajan (1994) defined technical efficiency as the ability and willingness of firms to produce the maximum possible output and allocative efficiency is defined as the ability and willingness to use the quantity of inputs that will maximise net revenue (profit), given the prevailing conditions of factor supply and market demand. The constitutes of both technical efficiency and allocative efficiency is economic efficiency (Bashir, 2005). Economic or profit efficiency shows success of a farm enterprise as it indicates the ability of a farm to obtain maximum profit from a given level of input and output prices including the level of fixed factors of production in the farm (Farrell, 1957).

1.18.3 Measurement of Efficiency

The efficiency measurement of the seminal article of Farrell (1957) led to the development of several approaches to efficiency and productivity analysis. Succeeding these works of estimating the production frontier and efficiencies, many researcher tried different techniques. These techniques can be divided in two major groups.

- Parametric Techniques and
- Non-Parametric Techniques

The Parametric techniques requires a functional form and the population also requires to be approximately normal or by using normal distribution the population can be approximate after invoking the central limit theorem. In the Parametric techniques random disturbances are also allowed and the usual tests of significance can be performed in these models. Non-parametric techniques, on the other hand, do not require a functional form and they do not allow for random factors, and all deviations from the frontier are taken as inefficiencies. Moreover, in non-parametric techniques, tests of significance cannot be performed and any assumptions of normality for the population studies are not required.

The parametric techniques for estimating the production frontier and efficiencies are the stochastic frontier analysis, the thick frontier approach, and the distribution-free approach. Whereas, among non-parametric techniques, data envelopment analysis and free disposal hull are used. The most recognised means for estimation of efficiency amongst the analysts are the Parametric Stochastic Frontier Analysis and Non Parametric Data Envelopment Analysis.

The techniques which has a remarkable contribution to the econometric modelling of production and the estimation of technical, allocative and economic (profit) efficiency using maximum likelihood estimation is the stochastic frontier analysis which was independently put forward by Aigner, lovell, and Schmidth (1977) and Meeusen and Broeck (1977) . Meeusen and Broeck (1977) along with Aigner, Lovell and Schimdt (1977) also done the development in Farrell's methodology and also introduced stochastic production function simultaneously and

applied Corrected form of Ordinary Least Squares (COLS) to estimate productive efficiency. In stochastic frontier analysis an appropriate specification of the disturbance term is provided. According to Aigner, Lovell and Schimdt (1977) and Meeusen and Broeck (1977), the disturbance from the frontier in the production are not only from human errors but some disturbances are from inefficiency which occurs because of randomness and measurement errors. In the Stochastic Frontier Analysis there is a measurement of efficiency by separating the error components. The aggregate of the random variables of the symmetric normal and negative half-normal is described as a disturbance term (Aigner, Lovell and Schimdt, 1977). SFA is also called composed error model because of postulation of error term. The two types of error components are random error which is one sided ($\varepsilon_i \leqq 0$) positive symmetric error and non-positive error. It is presume that the positive error is independently and identically distributed. The non-positive error is also presumes to be distributed independently of the positive error component. The non-positive error is also presumes to be less than or equal to 0 (Aigner, Lovell and Schimdt, 1977).

Considering the stochastic production frontier identified by Aigner, Lovell and Schimdt (1977) and Meeusen and Broeck (1977) is written as,

$$\boldsymbol{y_i = f(X_i, \beta) e^{\varepsilon}} \qquad \boldsymbol{i = 1, \dots, N} \qquad (\boldsymbol{A})$$

Where $\boldsymbol{y_i}$ indicates the output of the i^{th} firm, $\boldsymbol{x_i}$ indicates the vector of functions of k inputs (or cost of inputs), β indicates the vector of k unknown parameters to be estimated, $\boldsymbol{\varepsilon_i}$ indicates the error term. The error term comprises of two distinct types of disturbances

i. e.

$$\varepsilon_i = v_i + u_i \qquad i=1,\ldots,N \qquad (B)$$

The Stochastic Frontier Analysis has also been introduced for the cross sectional data. The data collected for this study will be cross-sectional in nature. Therefore in this study we will be using SFA model which is developed by Aigner, Lovell and Schimdt (1957) and Meeusen and Broeck (1957).

On the other hand, the non-parametric technique developed by Charnes, Cooper and Rhodes (1978) is the Data Envelopment Analysis (DEA) model which estimates the efficiency of every unit respective to the frontier. In the DEA model the frontier is approximated by a piecewise linear facets. The Data Envelopment Analysis (DEA) have been use in evaluations of "management" and "program" efficiencies of decision making units (DMUs) of a not-for-profit variety such as schools, hospitals, etc (Banker, Charnes and Cooper, 1984). Data Envelopment Analysis (DEA) model considers multiple inputs and outputs to measure the production efficiency of a firm (Joshi and Singh, 2009) and this model can be either input or output oriented (Charnes, Cooper and Rhodes, 1978). In the output orientation the efficiency scores corresponds to the enormous suitable proportional increase in outputs for fixed inputs. The efficiency scores in the input orientation relates to the largest suitable proportional minimising inputs for fixed outputs. The Data Envelopment Analysis (DEA) model of Charnes, Cooper and Rhodes (1978) assumes Constant Returns to Scale (CRS) but Banker, Charnes and Cooper (1984) extended Constant Returns to Scale to variable returns to scale (VRS).

The non-parametric DEA model does not require a functional form and do not

consider any disturbance either measurement error or statistical noise. In the DEA model, the disturbance or errors is restricted because it can affect the shape and position of the frontier. Furthermore in non-parametric DEA model all the variation from the production frontier is ascribed to inefficiency. In addition, tests of significance cannot be performed in non-parametric DEA model. On the other hand the parametric stochastic frontier analysis requires a functional form and allows random disturbance in the model. Therefore in this study parametric stochastic frontier analysis model with Cobb-Douglass form of production function is applied.

1.18.4 Empirical Outcomes

In India and around the world there are many intellectuals who have researched on the efficiency estimation of different sectors. The research done by the intellectuals on the efficiency of manufacturing field are Krishna & Sahota (1991), Jaforullah (1996), Avarez & crespi (2003), Mahnood et. al (2006), Ikhsan-Modjo (2006), Salim (2006), Tripathy (2006), Daiz & Sachez (2008). There are also researches done on the efficiency of agriculture sector by different intellectuals like Akpan et. al (2013); Ali and Flinn (1989); Abedullah et. al (2007); Daadi et. al (2014); Ogundari (2008); Battese and Coelli (1992, 1995); Belbase and Grabowski (1985) and Adeyemo et. al (2010). In the textile industry efficiency studies have been done by the following Pitt and Lee (1981), Manonmani (2013), Chowdhury and Latiff (1989), Samad and Patwary (2003), Hashim (2005), Bhandari (2007), Joshi and Singh (2009), Mahmood (2012), and in service sector studies have been done by Dumas (1976), Perelman and Pestieau (1994), Majumdar (1997), Sharma et. al (1997) Ng and Seabright (2001).

From the various techniques of measurement of efficiency, the most common techniques used by the these intellectuals is parametric stochastic frontier analysis (Pitt and Lee, 1981; Belbase and Grabowski, 1985; Kumbhakar and Summa, 1989; Ali and Flinn, 1989; Battese and Coelli, 1992, 1995; Jaforullah, 1996; Patwary and Samad, 2003; Mahmood, Ghani and Din, 2006; Ikhsan-Modjo, 2006; Abedullah et al., 2007; Ogundari, 2008; Adeyemo et al., 2010; Akpan et al., 2013; Manonmani, 2013; Daadi et al., 2014) and non-parametric data envelopment analysis (Alvarez and crespsi, 2003; Haas, 2003; Joshi and Singh, 2009; Khalil, 2011; Mahmood, 2012). Tripathy (2006) has used from both the parametric techniques and non-parametric techniques i. e. stochastic frontier analysis and data envelopment analysis.

Pitt and Lee, 1981; Belbase and Grabowski, 1985; Kumbhakar and Summa, 1989; Battese and Coelli, 1992; Battese and Coelli, 1995; Jaforullah, 1996; Avarez and crespi (2003); Mahnood, Ghani and Din (2006); Abedullah et al., 2007; Mahmood, 2012; Manonmani, 2013 and Daadi et al., 2014 have studied on technical efficiency on various fields and Zaleski, 1997; Singh and Joshi, 2009; Salim, 2006 and Haas, 2003 have studied on productive efficiency and Ali and Flinn, (1989); Kolawole, (2006); Adeyemo et al., (2010) and Akpan et al, (2013) have studied on economic or profit efficiency.

Since our concern in this study is efficiency of weaver households which comes under the textile industry, therefore more concern has been given about the research done in the textile industry. The input variables used in the measurement of efficiencies in the textile industry were the number of stitching machines and number of machines and number of operators (Singh and Joshi, 2009), capital, labor, raw materials, energy, industrial costs and non-industrial costs (Mahmood , 2012;

Manonmani, 2013), total fixed assets, total number of persons engaged, and cost of raw material and packaging (Samad and Patwary, 2003). Capital includes were land, building, plant and machinery. The home workers, wage-earner, family worker, working manager were incorporate as Labor. Raw materials include raw and semi-finished materials, assembling parts, chemicals, lubricants and packing materials. Energy is obtained by adding cost on fuel and cost on electricity. An industrial cost includes cost of the raw materials. The cost that is included in the non-industrial cost were premium, transport expenses, royalties, promotion expenses, revenue stamp and telephone (Mahmood , 2012; Manonmani, 2013). Pitt and Lee (1981) to measure the sources of inefficiency of a firm age, size and ownership were used.

The results of the available studies in efficiency of textile industry shows that the firms have not produced the maximum attainable output using the available inputs and technology and due to both inefficient scale-size and resource utilizations and most of the firms are found to operate under the decreasing returns to scale which leads to technical inefficiency (Singh and Joshi, 2009). Mahmood (2012) found that the proportions of machinery in total capital and dummy for imported raw material are found to have positive effect on technical efficiencies, while non-industrial costs as a proportion of total cost have negative effects. The proportion of electricity to total energy does not seem to play any significant role on efficiencies (Mahmood, 2012). Manonmani (2013) found that capital inputs were positive and statistically significant to productive efficiency. Pitt and Lee (1981) found that the age, size of the firm is significant because larger firms are more efficient than smaller firms and younger firms are more efficient than older firms. The firms with the lowest of technical efficiency are believed to use very low level of indigenous technology (Samad and

Patwary, 2003).

1.18.5 Studies on Handloom Industry

The handloom industry is facing a very pitiable condition in almost every facet of development (Das, 2015; Venkateswaram, 2014; Boruah and Kaur, 2015). By using primary data and secondary data it is found that handloom weavers are traditionally weaving, owing to poor socio-economic conditions. Majority of them are wage weavers working for more than 8hours a day accompanied by the entire family. Majority weavers working under the control of master weavers (Das, 2015; Venkateswaram, 2014). The situation of the weavers was worrying due to illiteracy, financial constraints, health problems and poor government support (Venkateswaram, 2014). Boruah and Kaur (2015) found handloom sector is in crisis due to low productivity, outdated technologies, powerloom rivalry, random production system, inefficiency in production, unorganized production system etc.

For the survival of handloom industry and its workers, there are several issues that need attention both in the form of policy intervention and ground level implementation (Aman, 2017; Srinivasulu, 1996). There are issues of providing education, training for skill up-gradation to the handloom workers, design and product development, investment, R&D, bringing in new and useful technology and innovations in weaving pattern (Aman , 2017). Through secondary data it is pointed out that the handloom sector is critically threatened by the rivalry of the powerlooms (Srinivasulu, 1996) and by the sharp rise in prices of yarn, dyes and chemicals. The results of the economic reform programme's all out emphasis on pushing up exports unmindful of the domestic economic and social crisis. The periodic crisis in 1991-92

was of the export promotion strategy of the government, whose principal concern has been to increase its foreign exchange reserves, has contributed to the scarcity and rise in prices of dyes (Srinivasulu, 1996). The field-based research and analysis can form an important basis for building theoretical models as well as strategies for action for the Indian handloom industry (Niranjan, (2001).

The performance of the Handloom Co-operative society is affected by internal and external factors (Dharmaraju, 2006; Dev et. al, 2008). The internal and external affecting factors which lead to poor performance of the co-operative society include lack of autonomy, problems in decision-making, lack of infrastructure facilities etc. The failure of the state cooperative society led to stockpiling and greater sickness among handloom co-operatives. By using primary data it is found that handloom production and marketing are generally organized under co-operatives and master weavers (Dev et. al, 2008). The growth performance of co-operatives determine the growth of the master weaver, middlemen and independent weavers and also well performing co-operatives were found to be best safeguard for the handloom sector (Dev et. al, 2008).

The marketing in Handloom Co-operatives by using secondary data found that over the decade experience of handloom co-operatives has been a mixed one (Dharmaraju, 2006). The important factor that played an important role in the whole process was the readiness of the weavers working in the society to incorporate new techniques and designs into the production process and there would be no problems of working capital, stockpiling and slump in the production (Dharmaraju, 2006). Boro (2017) in his study of marketing practices of tribal handloom weavers using primary data found that most of the handloom weaver female respondents play an important

role in weaving sector and in all development blocks. The maximum numbers of weavers are selling their products in weekly markets. The handloom weavers are rare in case of financial loan taken from banks and NGO's. Nikhil (2006) in his study found that the handloom weavers initially tried to market and sell their products through the traditional channels. However, after considering the margins of the various players in the channel like the wholesalers and retailers they found that the price of their products would go beyond the consumer's willingness to pay. They therefore choose direct sales strategies like exhibitions, home-based retailers and bulk institutional orders (Nikhil, 2006).

There are also changes in the pattern and composition of demand and supply for textiles (Goswami, 1985). By using secondary data the author found that the share of the mill sector in the total cloth output has declined. Among the composite mills, two-third or more of the units are indubitably sick and have been incurring cash losses. Only power loom sector and the pure spinning units were doing well. Consumption of cotton textiles in per capita as well as in terms of households has definitely fallen over time. Goswami (1990) found that handlooms are outcompeted by power looms across comparable sorts. They survive because of products specialization and massive subsidies on inputs as well as on output. Any reduction in these subsidies would only accelerate the decline of this sector.

1.19 Research Gap in the Literature

From the above literature review it is found that many researchers have studied about socio-economic conditions, marketing practices, challenges, comparative study and economics of weavers' cooperative societies of handloom

industry of India and efficiency in many fields around the world. There is a research work done in efficiency in games, postal services, energy, swine industry, military industrial firms, telecommunication industry, airline industry, large-scale manufacturing industry and also in textile industry. In the textile industry efficiency studies are done in inter-firms and inter-industry but study in efficiency of the weaver households of the textile industry which is also prominent issue for the future development of textile industry and also prominent issue in discussion on the regional diversity of output and employment growth in the industrial sector in developing countries like India. Without improving the technology and efficiency, however the growth performance of the manufacturing sector as of the other sectors of an economy is likely to be limited. Despite work on efficiency aspects on various sectors, no study has made on efficiency analysis of the weaver households using primary data and further there is no study on *Mising Community* of Assam. Thus, an attempt has been made to fill up the recognized research gap on the mentioned topic.

1.20 Background of the study Area

Handloom weaving is an integral part of Assamese culture and society. Handloom is playing a major role in the rural economy inspite of being a cultural and social element. Because of the growing demand in the global scenario handloom is a most promising sector in the development perspective especially in the rural areas of India. Majuli is situated in the middle course of Brahmaputra and it is the largest river island in the world. In the year, 2016 it became the first island to be made a district in India and it's headquarter is Garamur. At the beginning of the 20th century, the island had an area of 880km^2 (340sq mi) (Census of India, 2011). But due to erosion it covers 352 square kilometers as at 2014. The total population of Majuli island is

1,67,304 and population density is 190/km^2(Census of India, 2011). The time zone of Majuli district is UTC+05:30(IST) and vehicle registration is AS-29. In Majuli district there is 1 Sub-division, 2 Revenue circle, 2 Development block, 3 Mouza and 20 Gaon Panchayat. Majuli is currently listed as the world's largest river island in the Guiness Book of World Records. The island is formed by the Brahmaputra River in the south and Kherkuatia Xuti, an anabranch of the Brahmaputra, joined by the Subansiri River in the north. The Island is accessible by ferries from the city of Jorhat. The island is about 300- 400 kilometres (186-249mi) east from the state's largest city-Guwahati. It is formed due to course changes by the Brahmaputra and its tributaries, mainly the Lohit. Majuli is the abode of the Assamese neo-Vaishnavite. The population of Majuli comprises of tribals, non-tribals, and the scheduled castes. The tribal communities include the *Mising*, *Deori* and *Sonowal Kachari*. The *Mising Community* has the largest population in the island. Paddy being the chief crop, the main industry of Majuli island is agriculture. Fishing, dairying, pottery and weaving are the important economic activities. Handloom weaving is a major occupation among the distaff population of the village. Although largely a non-commercial, it keeps many of the inhabitants occupied. Weaving with the use of a variety of colours and textures of cotton and silk, especially Muga silk is beautiful and magnificent. For the Study *Mising* dominated villages of the district are taken.

1.21 Research Design

1.21.1 Data Sources

The data used for the study is primary data and secondary data. For the estimation of the efficiency levels of the weaver households primary data have been

collected through questionnaires and observations along with a field survey of the sampled households in the Majuli district of Assam. To study the present scenario of the Handloom Industry secondary data have been used. Secondary data have been collected from the reports of the Ministry of textiles, Government of India, EXIM reports, various journals and websites.

1.21.2 Sample Techniques and Design

The study has been conducted in Majuli district of Assam in which the sample design is shown below in the Fig. 1.21.2. The sample technique of the data is collected on the basis of the following flow chart given below in the figure. As per the figure the multi-stage sampling and purposive sampling technique is used for the primary data collection. The procedure of multi-stage sampling involves several stages like at first there is a selection of Majuli district of Assam. From the district, 2 development blocks is selected. Thereafter 6 gaon panchayats is selected from the development blocks. And from the selected 6 gaon panchayats 1 each village is selected with 25 respondents on the basis of purposive sampling. The preferred sample size is consists of 25 respondents in each village and hence the sample size is 150.

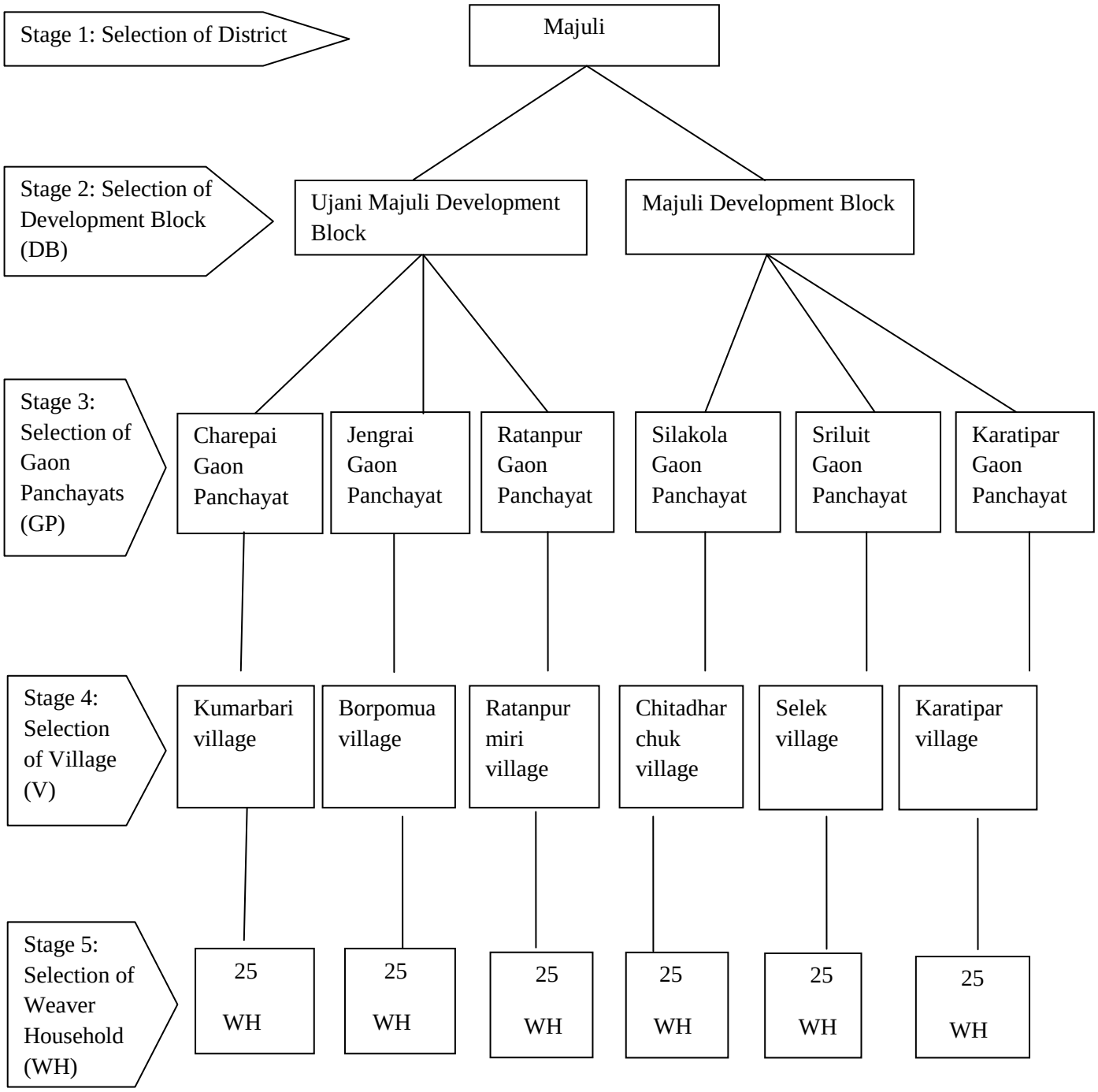


Figure 1. 21.2: Sample Design

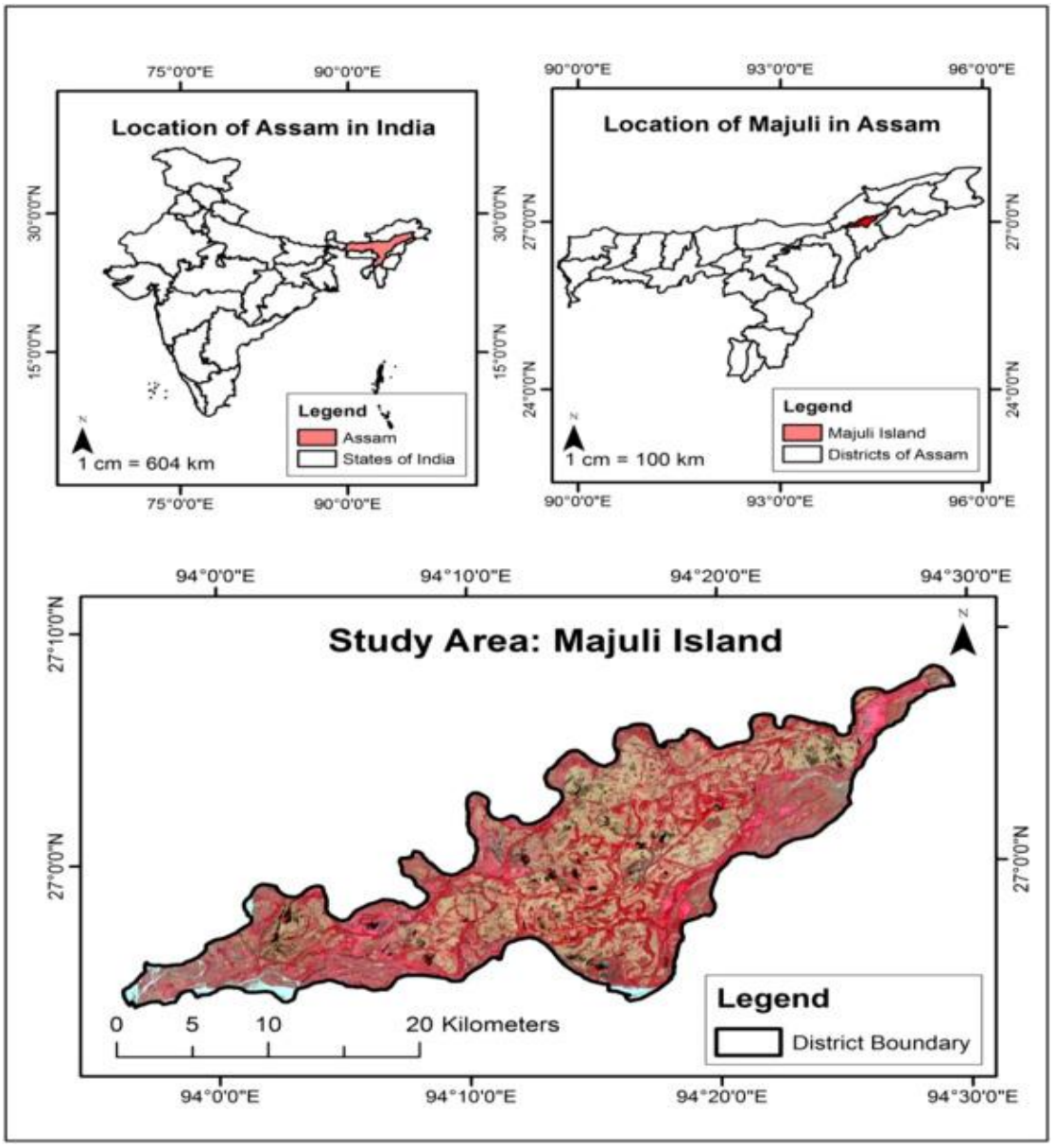
1. 21.3 Sample Size

Out of the population the estimated sample size is 150.

1.21.4 Study Area

Majuli is situated in the middle course of the river Brahmaputra in the state of Assam. It is the largest and the most populous river island in the world (Kotoky et. al, 2003). At the beginning of the 20th century, Majuli had an area of 880 km^2 (340sq mi) but having due to erosion it covers 352 km^2 (136 sq. mi) as at 2014. In the figure 1.21.4 the map of Majuli Island is shown. The island is formed by the Brahmaputra River in the south and Kherkuatia Xuti or river Luhit (an anabranch of the Brahmaputra) in the north east, joined by the Subansiri River in the north. The Island is accessible by ferries from the city of Jorhat and it is about 300- 400 kilometres east from the state's largest city-Guwahati. It is formed due to course changes by the Brahmaputra and its tributaries, mainly the Luhit. Total population of Majuli is 1,67,304 and population density is 190 km^2 (Census of India, 2011). In Majuli district there is 1 Sub- division, 2 Revenue circle, 2 Development block, 3 Mouza and 20 Gaon Panchayat.

Figure 1.21.4: Map of Majuli Island, Assam (India)



Source: Roy, Pandey & Rani, 2020

1.21.5 Classification of the Data

- Socio-economic components of the weaver households

Information regarding the weaver households the type of family member is taken. Along with this information the weaver households' religion, main occupation,

type of dwelling unit, annual income, and land holdings is taken.

- Weavers' profile of the weaver households

Information regarding the weavers' profile of the weaver household the total number of family member engaged in weaving activities. Along with this information age of the weaver, years of education, basic trainer of weaving, advance training facility, total number of possession of looms, types of looms, procurement of looms, weaving place, type of weaver households, type of engagement of the weaver and annual income from weaving.

- Inputs used in production of Mekhela-Chaddar

Information regarding production of Mekhela-Chaddar taken in this study is types of labor used, type of yarn used for the Mekhela-Chaddar, sources of yarn, total quantity of yarn used for the completion of Mekhela-Chaddar, cost of the total quantity of the yarn used, type of yarn used for the design of the Mekhela-Chaddar, sources of the yarn used for design, total quantity of design yarn used for the completion of Mekhela-Chaddar, total number of days taken to complete the Mekhela-Chaddar, wage, replacement cost, source of sale of the Mekhela-Chaddar, selling price of the Mekhela-Chaddar, basic training for weaving, advance training and facilities from government is taken.

Chapter 2

Theoretical Developments

2.1 Introduction

In this chapter, the importance of measuring efficiency, concepts and types of efficiency, and techniques used for measuring efficiency will be discussed in details. Along with this, different approaches of measuring efficiency, basic characteristics of commonly used methods of measuring efficiency are discussed. More concern is given to the analysis of stochastic frontier analysis (SFA) and in this study as per the objectives SFA is being used.

2.2 Importance of Measuring Efficiency

The precondition for competitiveness in the new liberalised world market is the maintenance and enhancement of productive efficiency and measurement of productive efficiency has received considerable attention from theoretical and applied economists in recent years, particularly after the 'globalisation' and 'restructuring' of many centrally planned and developing economies. If economic planning is to be concern itself with particular industries and the theoretical arguments as to the relative efficiency of different economic systems are to be subjected to empirical testing, it is crucial to recognise the possibility of an industry can be expected to maximise its output by directly increasing its efficiency, without involving additional resources and it is required to make actual measurements of efficiency. The composition of the productive efficiency has been explored for the first time by Farrell, 1957. The concept of production, cost, revenue and profit frontiers of any firm has a deep

relation with the concept of efficiency. A firm can attain to a maximum production and profits by using limited resources efficiently along with minimising the costs. On the other hand inefficient usage of the limited resources of any firm or industry attributes to increase costs that lowers the productions and profits. As a result the measurement of efficiency helps us to recognise the efficiency levels of particular firm or an industry. Furthermore, the efficiency measurement also helps us to identify the factors which affect the efficiency level of any firm or an industry. Therefore if inefficiency occurs then with the help of suitable measures enhancement of efficiency can be done. Since all inputs are scarce therefore it is important to preserve them while maintaining an acceptable level of output for which efficiency become an important attributes. Therefore, either it is an agriculture farm or an industrial unit or textile industry efficiency of a management firm is very important.

2.3 Concept of Efficiency

Efficiency refers to a level of performance that uses the minimum amount of inputs to achieve the maximum amount of output. The definition of efficiency differs from one emerging field to another (Charnes, Cooper and Rhodes, 1978). Generally, the meaning of efficiency of firm is its success in producing maximum possible outcome from a given sets of inputs (Farrell, 1957). The term efficiency is described as the maximum output attainable from utilising the available inputs (Manonmani, 2013). The production is said to be efficient if it cannot improve any of its inputs or outputs without worsening some of its other inputs or outputs. According to Alias Radam et al. (2010), the efficiency can be increased by minimising inputs while holding output constant or by maximising output while holding inputs constant or a combination of both may increase efficiency. In production analysis, the concept of

efficiency is associated with productivity which analyses the output from a given input and also compares the possibility of maximum attainable output with given input set (Daadi et. al, 2014). On that account the efficiency of an individual producer may be measured as the ratio of least cost to actual cost in order to produce a unit level of output (Farrell, 1957). Economists observed efficiency as a relationship between ends and means and when they say a situation is inefficient, it implies they could achieve the desired ends with less means, or the means to employ could produce more of the desired ends, whereby "less" and "more" necessarily refer to value (Heyne, 2008). Therefore efficiency is an estimation of how effectively the production process is executed and how appropriately a firm or a company utilises its resources to produce goods and services (Daadi et. al, 2014).

2.4 Types of Efficiency

For the first time Farrell (1957) identified the framework of productive efficiency and proposed three components of a firm's efficiency resulted in a better understanding of the concept of efficiency. These three components are technical, allocative and economic efficiency. Farrell (1957) disintegrate overall productive efficiency into allocative & technical efficiency. In addition, the outcome of technical & allocative efficiency is the final economic efficiency (Herdt and Mandac, 1981). Generally, the meaning of efficiency of firm is its success in producing maximum possible outcome from a given sets of inputs (Farrell, 1957). The distinction between technical efficiency and allocative efficiency according to Farrell (1957) is that the former measures success of firms's in choosing an optimal sets of input, the latter its success in producing maximal output from a given set of input. In the production process of a firm or an industry, the capability to attain utmost output from a given

input vectors or the capability to lessen input use of a given output vector is known as technical efficiency (Kumbhakar and Lovell, 2003). Technical efficiency can also be defined as the ability of a decision making unit (e.g. a farm) to produce maximum output given a set of inputs and technology (Abedullah et. al, 2007). Measures of the efficiency of any firm is obtained as the maximum of a ratio of weighted outputs to weighted inputs subject to the condition that the similar ratios for every firm be less than refine firm is the one which produces on its frontier production function to obtain the maximum possible output which is feasible using current technology (Kalirajan and Tse, 1989). In terms of an output oriented manner, technical efficiency is measured as a ratio of realised output to the potential output (Karagiannis and Tzouvelekas, 2009). Generally, it is assumed that the potential output is obtained by following the best practice methods, given the technology which implies that the potential output is determined by the underlying production frontier, given the level of inputs. A firm is said to be technically efficient, if it is able to realise the full potential of its technology with a given set of inputs (Kalirajan and Shand, 1999). Production is considered efficient if it cannot improve any of its inputs or outputs without worsening some of its other inputs or outputs. Efficiency can be increased by minimising inputs while holding output constant or by maximising output while holding inputs constant or a combination of both may increase efficiency (Alias Radam et. al, 2010). Therefore, the efficiency of an individual producer may be measured as the ratio of least cost to actual cost in order to produce a unit level of output (Farrell, 1957). Furthermore, the success of firm’s in producing utmost output from a specified set of inputs is defined as allocative efficiency or price efficiency (Farrell, 1957). Given the prevailing conditions of factor supply and market demand, allocative efficiency is defined as the ability and willingness to use the

quantity of inputs that will maximise net revenue (Shand and Kalirajan, 1994). According to Belbase and Gabowski (1985), when marginal revenue of every single input becomes equal to the marginal cost of their input is called allocative efficiency. The constitute of both technical efficiency and allocative efficiency is economic efficiency. Economic or profit efficiency shows success of a farm enterprise as it indicates the ability of a farm to obtain maximum profit from a given level of input and output prices including the level of fixed factors of production in the farm (Farrell, 1957).

2.5 Approaches of Measuring Efficiency

There are different approaches of measuring efficiency. The most commonly used method of measuring efficiency is parametric stochastic frontier analysis & non-parametric data envelopment analysis. The stochastic frontier analysis used econometric approach and on the other hand data envelopment analysis used mathematical programming. The founder of the different approaches of the efficiency measurement are Pareto's approach, followed by Koopman's (1951) and Farrell's (1957) approach. These approaches were developed to measure efficiency long before the development of the most commonly used methods.

2.5.1 Pareto's Approach

The efficiency measurement of this approach is called "Pareto Optimality or Pareto Efficiency" used in "Welfare Economics" which was named after Vilfredo Pareto, an Italian engineer and economist. An allocation is Pareto efficient if it is impossible to, from that point, make someone better off without making someone else worse off and an outcome is said to be Pareto inefficient if it is possible to make at

least one agent better off without making any other agent worse off. In production behaviour, a production bundle is said to be Pareto efficient if it is impossible to increase a producer's production of one good without decreasing the producer's production of some other good. But in this approach inter-personal comparison is not allowed.

2.5.2 Koopmans' Approach

The "efficiency price" has been introduced by Tjalling C. Koopmans' (1951). With the help of the "efficiency price" Koopmans' extended the concept of efficiency to "production economics" which will help the firm or an industry to regulate production and exchange that are close to Pareto Optimum. The usage of Koopmans' approach is found in different research studies of data envelopment analysis and is called as Pareto Koopmans' definition of efficiency. Moreover, the Pareto-Koopmans' definition of efficiency explains that a decision making unit (DMU) is fully efficient if and only if it is not possible to improve any input or output without worsening some other input or output. According to Tjalling C. Koopman a vector of feasible input-output is efficient when it is technologically impracticable to increase any output and/or to decrease any input without simultaneously reducing other outputs and /or increasing other inputs (Fare, Lovell and Zieschang, 1983).

2.5.3 Farrell's Approach

Farrell (1957) for the first time explored the framework of productive efficiency Generally, the meaning of efficiency of firm is its success in producing maximum possible outcome from a given sets of inputs (Farrell, 1957). Farrell (1957) decomposed overall productive efficiency into technical efficiency and allocative

efficiency. The distinction between technical efficiency and allocative efficiency according to Farrell (1957) is that the former measures success of firms's in choosing an optimal sets of input, the latter its success in producing maximal output from a given sets of input. Farrell (1957) explains his approach of efficiency measurement in two cases such as single output-single input case with constant returns to scale and with multiple inputs and multiple outputs with variable returns to scale. He used linear programming techniques for estimating efficiency and not an econometric approach.

2.6 Origin of Stochastic Frontier Analysis

Empirically, Farrell (1957) was the first to measure productive efficiency. The theoretical literature of the productive efficiency directly influences the development of Stochastic Frontier Analysis (SFA). SFA was originated by the works of Aigner, Lovel and Schimdt (1977) and Meeusen and Broeck (1977 and is shown as $y = f(x;\ \beta)$ exp $(v - u)$, where, y indicates a scalar output, x indicates a vector of inputs, and β is a vector of unknown parameter to be estimated and where v represents symmetric disturbance or capture the effects of statistical noise and u represents inefficiency components which is assumed to be distributed independently of v. In other words, these original SFA models shared the composed error structure and each was developed in a production frontier context and the producer operates on or beneath their production frontier. The composed error are of two error components in which one error expresses the impact of statistical noise, second error component expresses the impact of inefficiency. The second error component with inefficiency is negatively skewed and statistical efficiency requires that the model be estimated by maximum likelihood estimation method.

2.6.1 Developments in Stochastic Frontier Analysis

Forsund, Lovell and Schmidt (1980) found the main weakness of the Stochastic frontier model from the early survey of various approaches of frontier analysis and efficiency measurement. The weakness of the model was that it was not able to decompose the error component into their two components as a result it was not possible to estimate technical inefficiency by observation. It was Jondrow et al. (1982) who provide the estimation of every producer's technical inefficiency either by the mean or mode of the conditional distribution [ui |vi-ui]. Therefore the appeal of stochastic frontier analysis has been considerably enhanced by the probability of attaining producer specific estimates of efficiency. There was also another enhancement of more flexible two parameter distribution from the single parameter half-normal and exponential distribution which was assigned to one-sided inefficiency error component. It was Greene (1980) and Stevenson (1980) who developed another more flexible two parameter distributions for the inefficiency error component. Greene (1980) proposed a Gamma distribution and Stevenson (1980) proposed Gamma and truncated normal distributions. Followed by Lee (1983) who proposed four-parameter Pearson family of distributions. Hence, in the larger number of experimental work the two original single-parameter distributions remains popularly used.

Then there is a conversion of the stochastic production frontier model to a stochastic cost frontier model by changing the sign of the inefficiency error component which intended to capture the cost of technical and allocative inefficiency. After that there was the problem of disintegration of the estimation of inefficiency error component into estimate of the separate cost of technical and allocative

inefficiency. Thus, Schimdt and Lovell (1979) for the case of Cobb-Douglass, accomplished the decomposition of estimation of inefficiency error components into cost of technical efficiency and allocative inefficiency and later for case of translog production function, Koop and Diewart (1982) also examined the same decomposition.

In the SFA, Cross-sectional data were used. This data was providing a snapshot of producers and their efficiency. Hoch (1962) and Mundlak (1961) used panel data in agricultural economics to estimate technical efficiency but Mundlak called it as management bias. By using the fixed and random effects procedure to the efficiency estimation problem, Schmidt and Sickles (1984) extended the pioneering work of Hoch and Mundlak, where the effects are one-sided. The panel data were based on the assumption of time-invariant efficiency and later this assumption was relaxed by Cornwell, Schmidt and Sickler (1990), Kumbhakar (1990) and Battese and Coelli (1992).

When efficiency varies across producers then it becomes natural to seek determinants of efficiency variation. The earlier empirical studies adopted a two stage estimation in which the first stage involves the specification and inefficiency estimation of the producers and the second stage involves the analysis of the variation of inefficiency of the individual producers. Battese & Coelli (1995), Huang and Liu (1994) & Kumbhakar, et al. (1991) later used a single-stage approach in which explanatory variables are integrated directly into the inefficiency error component.

2.6.2 Basic Characteristics

Stochastic Frontier Analysis (SFA) is originated independently by the works of Aigner, Lovell and Schmidt (1977) and Meeusen and Broeck (1977). SFA used econometric process of estimation. In this model stochastic production, cost or profit frontier is used and efficiencies are estimated with reference to their frontier along with the inefficiency estimation which causes variation in the production function from the optimal frontier. SFA is composed of error term with inefficiency error component and traditional random error component. In the frontier of production, revenue and profit frontier, the inefficiency component is negatively skewed and in case of cost frontier with zero means, the inefficiency component is positively skewed. When the production, cost, revenue and profit frontier is estimated by using one-sided inefficicney error component is referred as parametric stochastic frontier analysis (Lama, 2016).

The SFA model originated by Aigner, Lovell and Schimdt (1977) and Meeusen and Broeck (1977) is written as,

$$\boldsymbol{y_i = f(X_i, \beta)e^{\varepsilon}} \qquad \mathbf{i = 1, \dots, N} \qquad (\mathbf{1})$$

Where,

y_i = indicates the output of the i^{th} firm,

X_i = indicates the vector of functions of k inputs,

β = indicates the vector of k unknown parameters to be estimated,

ε_i = indicates the error term,

The error term comprises of two distinct types of disturbances i. e.

$$\varepsilon_i = v_i + u_i \qquad i = 1, \dots, N \qquad (2)$$

Where, v_i is the error term which is assumed to be normally distributed with $N(0,\sigma_v^2)$. But u_i is the one sided inefficiency term follows a half normal distribution.

2.7 Data Envelopment Analysis

Data Envelopment Analysis (DEA) is the most commonly used non-parametric techniques of efficiency measurement which is originated by Charnes, Cooper and Rhode (1978) and farther progressed by Banker, Charnes and Cooper (1984). For the frontier estimation, the DEA technique use mathematical programming approach and do not require any functional form or any parametric specification of the production frontier. The DEA estimates the efficiency of every unit respective to the frontier in which the frontier is approximated by a piecewise linear facets. This model considers multiple inputs and outputs to measure the production efficiency of a firm and can be either input or output oriented. The non-parametric DEA model do not consider any disturbance either measurement error or statistical noise. In this model, the disturbance or errors is restricted because it can affect the shape and position of the frontier. Furthermore in non-parametric DEA model all the variation from the production frontier is ascribed to inefficiency and inefficiencies are expected to be higher than those in parametric techniques. In the output orientation the efficiency scores corresponds to the enormous suitable proportional increase in outputs for fixed inputs. The efficiency scores in the input orientation relates to the largest suitable proportional minimising inputs for fixed outputs. The Data Envelopment Analysis (DEA) model of Charnes, Cooper and

Rhodes (1978) assumes Constant Returns to Scale (CRS) but later Banker, Charnes and Cooper (1984) extended Constant Returns to Scale to variable returns to scale (VRS). On the other hand parametric Stochastic Frontier Analysis (SFA) has the advantage of handling random errors and test of significance can be performed in this model. Since this study is on production of the Mekhela-Chaddar of the weaver households in which random errors have chances to occur. Using of DEA may not be appropriate in this study. Therefore, for the estimation of the production efficiency levels of the weaver households of Majuli district, the Parametric Stochastic Frontier Analysis is have been.

Chapter 3

Socio-Economic Structures of the Study Area

In this chapter, a very detailed analysis is given on the socio-economic of weaver households of the Majuli district. The study brings out the real living socio-economic conditions of the weaver households of the study area The selected socio-economic variables such as size of family, type of dwelling unit of the households, main occupation of the households, annual income of the weaver households, land holdings of the households, marital status of the weavers, number of weavers in the family, type of engagement of the weavers, annual earnings from weaving by the weaver households, basic training for weaving, advance training, procurement of loom set, facilities from government, weaving shed and sources of sale.

3. 1 Type of Family of the Weavers' Household

Table 3. 1: Type of Family of the Weaver's Household

Family Type	Percent (of the sample)
Joint Family	23.33
Nuclear family	76.67
Total	100.0

Source: Field Survey

The important issue in the study of social and economic conditions of any respondents is the type of family or size of family. In the Indian society, families are broadly grouped into nuclear and joint family. Traditionally, joint family were more popular in the society whereas nuclear family are widely prevalent in the present

society and are mainly found in the urban areas. Gradually, this trend is also extending to the rural areas and nuclear families have turned out to be the general social norm. The same situation is also found among the study of weaver household respondents. Of the total, 76.67per cent of the respondents are organised as nuclear families and 23.33 percent of the respondents are organised as joint family. Though the respondents are maintaining nuclear families, the size of the family is larger, up to eight members. However, majority of the respondents have only up to five members as their family size.

3.2 Type of Religion of the Weaver's Household

Table 3. 2: Type of Religion of the Weaver's Household

Type of religion	Percent (of the sample)
Hindu	79
Christian	21
Muslim	Nill
Others	Nill
Total	100

Source: Field Survey

Religion plays an important role in the social structure and to a great extent people are influenced by religion. However, every religion has its own norms and customs, which in turn influence the social fabric of the society. As per the Fourth All-India Handloom Census, 74.8 percent of the handloom worker households are Hindu by religion and it is also evident from the present study area that 79 percent of

the weaver household respondents belong to Hindu followed by Christian with 21 percent. There are no persons belonging to other religions in the study area.

3. 3 Type of Dwelling unit of the Weaver's Household

Table 3. 3: Type of Dwelling unit of the Weaver's Household

Type of dwelling unit	Percent (of the sample)
Kutcha Stilt house	44
Semi Pucca Stilt house	35
Pucca non-Stilt house	21
Total	100

Source: Field Survey

Housing is one of the basic needs of human beings, which constitutes the protective base for any individual and his family. The housing requirement will be more in case of weaving community. The weaving activity is usually carried out at their residence along with assistance of his/her family members. Further, tools needed for weaving also occupy a significant portion of the house. According to the Fourth Handloom Census (2019-20), vast majority of the handloom worker households i.e. 85 per cent live in kutcha houses and 21.2 percent of the handloom worker households have pucca houses and 18.7 percent of the handloom worker households have semi-pucca houses. The present study shows a different picture altogether. As per the information collected through the survey, of the 150 respondents, 44 per cent are living in Kutcha stilt houses, 35 per cent are living in semi pucca stilt houses and 21 percent are only living in pucca non-stilt houses

From the table it is found that percentage of Stilt house is higher than the non-stilt house. Traditionally, people of *Mising community* lives in the river banks and for which they built stilt houses from protection of flood. In this research, the study area is in the river island of Brahmaputra and there is recurrent flood and erosion due to which stilt house is built. Therefore in this study area the percentage of stilt house is more than the pucca non- stilt house and stilt house also provide a weaving shed for the weavers, provide shelter for animals that every household rears and also for other household activities.

3. 4 Total Land holdings of the Weaver's Household

Table 3. 4: Total Land holdings of the Weaver's Household

Total Land holdings of the Weaver's Household	Percent (of the sample)
0.5 to 2 hectare	49
2 hectare to 3 hectare	37
3 hectare to 4 hectare	9
More than 4 hectare	5
Total	100.0

Source: Field Survey

In the study area 0.5 to 2 hectare land holding of the weavers household has maximum share of 49 percentage and more than 4 hectare land holding has minimum share of 5 percent.

3. 5 Main Occupation of the Weaver's Household

Table 3. 5: Main Occupation of the Weaver's Household

Main Occupation	Percent (of the sample)
Service	19
Agriculture	81
Total	100

Source: Field Survey

From the table it is seen that the 81 percent of the weaver household's main occupation is agriculture and 19 percent of the weaver household's main occupation is service. Since maximum percentage share of the main occupation is agriculture but due to recurrent flood agriculture crops gets damaged and equally damaged the livestock grazing areas. Therefore female proportion of the households engaged themselves in weaving on commercial basis.

3. 6 Annual Income of the Weaver's Household

Table 3. 6: Annual Income of the Weaver's Household

Annual income of the Weaver's Household	Percent (of the sample)
Rs. 90,000-2,00,000	62
Rs. 2,00,000-4,00,000	18
Rs. 4,00,000-6,00,000	20
Total	100.0

Source: Field Survey

In this study area 62 percent of the weaver households has annual income between Rs 90,000-2,00,00 and 18 percent of the weaver households has annual income between Rs 2,00,00-4,00,000 and 20 percent of the weaver households has annual income between Rs 4,00,000-6,00,000. The maximum annual income percentage share is between Rs 90-000-2,00,000 and minimum share of annual income percentage share is between Rs 4,00,000-6,00,000.

3. 7 Education Level of the Weaver's in the family

Table 3.7: Education Level of the Weaver's in the family

Level of Education	Percent (of the sample)
Primary	Nill
Upper primary	23
High School	21
High Secondary	30
Degree level	15
No education	11
Total	100

Source: Field Survey

Social status of individuals can also be understood from the education level of the weaver's. Therefore an attempt has been made to find out the education levels of weavers of the study area. Out of the 150 respondents, 30 per cent of weaver's education is to higher secondary level, 23 percent of weaver's education is to upper primary level, 21 percent of weaver's education is to high school and 11 percent of the weaver's education is to degree level. Lastly, 11 percent of the weaver's do not have education.

3. 8 Marital Status of the Weaver's in the family

Table 3. 8: Marital Status of the Weaver's in the family

Marital Status of the Weaver's	Percent (of the sample)
Married Weaver	87
Unmarried Weaver	3
Mixed of Married and Unmarried Weaver	10
Total	100.0

Source: Field Survey

From the study it is found that 87 percent of weaver households have married weavers and 3 percent is of unmarried weavers and 10 percent of the weaver households have mixed of married and unmarried weavers. Here married weavers have a maximum share because as per the data maximum percentage of the households occupation is agriculture therefore married women in order to run family prefer to engage in weaving.

3. 9 Numbers of Weavers in the family

Table 3. 9: Total numbers of Weavers in the family

Number of weavers in the family	Percent (of the sample)
One weaver	73
Two weaver	23
Three weaver	4
Total	100.0

Source: Field Survey

From the table it is seen that 73% of the weaver households have one weaver because from the study area it is found that 76 percent of the weaver households are nuclear family. Therefore because of the nuclear family type number of weaver has been found mostly one.

3. 10 Type of Engagement of Weaver's of the Households

Table 3. 10: Type of Engagement of Weaver's of the Households

Type of engagement of weavers	Percent (of the sample)
Independent weavers	68
Contract weavers	25
Mixed of Independent and contract weavers	7
Total	100.0

Source: Field Survey

From the study it is found that 68 percent of the households are independent weavers and 25 percent of the households weave as contract weavers and 7 percent of the households are of mixed of independent and contract weavers. Maximum percent

of the households weave independently. From the study it is found that financially weaker weavers weave as contract weaver. This finding is different from the studies of Das, 2015 & Venkateswaram, 2014, where majority of weavers are working under the control of master weaver.

3. 11 Annual Earnings from Waving in the Family

Table 3. 11: Annual Earnings from Weaving in the Family

Annual earnings from weaving	Percent (of the sample)
Rs 3,700-10,000	24
Rs 10,000-20,000	50
Rs 20,000-30,000	15
Rs 30,000-40,000	11
Total	100.0

Source: Field Survey

From the study it is found that maximum percentage of annual earnings from weaving is between Rs 10,000-20,000 and minimum percentage of annual earnings from weaving between Rs 30,000-40,000.

3.12 Basic Training for Weaving

Table 3.12: Basic Training for Weaving

Basic Trainer	Percent (of the sample)
Mother	49
Siblings	19
Neighbours	11
Own imitation	21
Government	0
Total	100.0

Source: Field Survey

From the study it is found that 49% of the basic training for weaving is given by mother and there is no government role in giving basic training for weaving.

3. 13 Advance Training of Weaving related Activity

Table 3. 13: Advance Training of Weaving related Activity

Training	Percent(of the sample)
Dyeing yarn	14
Eri and Mulberry Silkworm rearing	3
Power loom weaving	5
No	78
Total	100.0

Source: Field Survey

From the study it is found that 14 percent of the weaver households have got dyeing yarn training and 3 percent of the weaver household have got Eri and Mulberry silkworm rearing training and 5 percent of the weaver households have got power loom weaving training. In the study area 78% of the weaver households do not avail any advance training.

3. 14 Facilities availability from Government

Table 3. 14: Facilities from Government

Name of facilities from Government	Percent (of the sample)
Yarn from MAC	30
Handloom from textile office	4
Materials for rearing eri from sericulture department	2
No facilities	64
Total	100.0

Source: Field Survey

From the table it is found that 30 percent of the weaver households have got yarn from Mising Autonomous Council (MAC) and 4 percent of the weaver households have got Handloom from Textile office of Majuli district and 2 percent of the weaver households have got materials for rearing Eri from sericulture department of the district. 64% of the weaver households have not availed any facilities from government. This finding is similar to the studies of Venkateswaram, 2014, where the situation of the weavers was worrying due to financial constraints and poor government support.

3. 15 Procurement of Loom set.

Table 3.15: Procurement of Loom set

Procurement of weaving Looms set	Percent (of the sample)
Purchased	5
Partially self-made and partially purchased	54
Traditionally gifted by parents	37
Assistance from Government	4
Total	100.0

Source: Field Survey

From the study it is found that 54% of weaver households loom set is partially self-made and partially purchased and 4% of weaver households loom set is provided by government. 37 percent of the weaver households loom sets is traditionally gifted by parents and 5 percent of the weaver households loom set is purchased.

3. 16 Weaving place

Table 3.16: Weaving place

Weaving place	Percent (of the sample)
In the house	15
Under the house	80
Industry	5
Total	100.0

Source: Field Survey

From the table it is seen that 15 percent of the weaver households weave in the house and 80 percent of the weaver households weave under the house and 5 percent of the weaver households weave in the Industry. From the study it is found that maximum percentage of the weaver households weave under the house. Assam Chief Minister Sarbananda Sonowal launched a project to set up handloom model village at Majuli in the year 2019. It is also found that Chitadharchuk village of Silakola Gaon Panchayat has been selected for the handloom model village and selected weaver households were provided weaving shed with power loom but the construction and instalment of the weaving shed and power loom is not yet completed.

3. 17 Sources of Sale

Table 3. 17: Sources of Sale

Sources of sales	Percent (of the sample)
Local and relatives	71
Retail shop	5
Trade fair, Tourists etc	9
Social media like facebook, whatsapp	15
Total	100

Source: Field Survey

From the study it is found that 71% weavers sell their product in the local people and relatives and 5% percent of the weavers sell their product in retail shop, 9% of the weavers sell their product in trade fair and tourists, 15% of the weavers sell their product through social media like facebook, whatsapp etc.

Chapter 4

Estimation of Technical Efficiency and Profit Efficiency of the Weaver Households

4.1 Introduction

This chapter discusses about the estimation of technical and profit efficiency and the factors influencing the inefficiency levels of the weaver households with respect to different yarns of Mekhela-Chaddar i.e. *Zero-ply, Tussar and Eri*. The estimation of both the efficiency levels of the weaver households is done by using Stochastic Frontier Analysis (SFA) method and after estimation analysis of the results of the weaver households with respect to different yarns of Mekhela-Chaddar of Majuli district is done.

4.2 Analytical Framework

On the basis of the primary data collected from the weaver households of Majuli district of Assam both Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA) has been made. In SFA the Cobb-Douglas production function has been utilised for both technical efficiency & profit efficiency calculation. The maximum likelihood estimates of the parameter of the C-D production have been estimated along with the inefficiency components. The inefficiency components are engagement type, type of yarn, age, education, family size, family type, designing yarn and sources of sale.

Considering the stochastic production frontier identified by Aigner, Lovell and Schimdt (1977) and Meeusen and Broeck (1977) is written as

$$y_i = f(X_i;\ \beta)exp^{(v_i - u_i)} \qquad i = 1, \dots, n \qquad (3)$$

Where,

y_i = indicates the output of Mekhela-Chaddar of the i[th] household.

X_i = indicates the vector of functions of k inputs (cost of inputs) used by the i[th] household.

β = indicates the vector of unknown parameters.

v_i is the error term which is assumed to be normally distributed with N(0,σ_v^2).

u_i is the one sided inefficiency term follows a half normal distribution.

The Cobb-Douglas production function in a log form is expressed as given below-

$$lny_i = ln\beta_0 + \sum_{J=1}^{N} \beta j\ lnx_{ij} + v_i - u_i \qquad (4)$$

Technical Efficiency (TE_i) is the ratio of actual output (y_i) to the estimated output (y_i^*)

$$TE_i = \frac{y_i}{y_i^*} = exp(-u_i) \qquad (5)$$

For estimating the profit efficiency of the weavers, the profit frontier of Cobb-Douglas functional form is stated as-

$$\Pi^* = \frac{\Pi}{P} = f(q_i Z)exp(v_i - u_i) \qquad i = 1, \dots, n \qquad (6)$$

Where,

$\prod^*$ = normalised profit of the i[th] weaver households

$\frac{\prod}{P}$ = description of the normalised profit

q_i = vector of the normalised price of inputs

Z = vector of fixed inputs

P = output price used to normalised variables in the model

$\prod$ = weaver's profit defined as the total revenue minus total cost of production (total variable cost only). (In this study weaver household's revenue consist of returns from the sales of Mekhela-Chaddar directly by the weavers; while the total cost consist of the yarn cost, designing yarn cost, depreciation cost and wage rate).

The profit efficiency $(\prod^*)$ is expressed as the ratio of predicted actual profit ($\prod$) to the predicted maximum profit ($\prod^{max}$) for a best-practiced weaver households and this is expressed as follows:

Profit efficiency$(\prod^*) = \frac{\prod}{\prod^{max}} = \frac{f(p_i Z)\, exp(v_i - u_i)}{f(p_i Z) exp\,(v_i)} = exp(-u_i) \quad i = 1, \ldots, n$ (7)

The total variance σ^2 consists of σ_v^2 and σ_u^2

Thus, $\sigma^2 = \sigma_v^2 + \sigma_u^2$ (8)

The gamma (γ) is the ratio of the error variance to the total variance

$$\gamma = \frac{\sigma_u^2}{\sigma^2} \quad (9)$$

And γ indicates the variability of v_i & u_i which causes variation in output & profit from the frontier. u_i is the dominant error if σ_v^2 tends to 0, then $\gamma = 1$. On the other hand v_i is the dominant error if σ_u^2 tends to 0, then γ will be tending to 0.

In the equation (10) i. e. the inefficiency model shows the relationship between the technical inefficiency levels of the weaver households and profit inefficiency levels of the weavers and the factors affecting them is expressed below-

$$u_i = \delta_0 + \sum_{i=1}^{N} \delta_i(W_i) \qquad i = 1, \dots, n \qquad (10)$$

Where,

u_i = indicates the inefficiency of the ith weaver.

W_i = indicates the factors affecting inefficiency of the ith weaver.

In order to test the absence of inefficiency effects from the frontier the Generalised Likelihood –Ratio statistics is used. The Generalised Likelihood –Ratio is calculated to be

$$LR = -2\{LR\ of\ unrestricted\ model - LR\ of\ restricted\ model\} \qquad (11)$$

At 10% level of significance in the model of the study, the null hypothesis of absence of inefficiency effects is rejected if the estimated value is higher than the Table value.

4.3 Empirical Analysis of the Stochastic Frontier C-D Production Function and Technical Efficiency:

The empirical specification of the Cobb-Douglas(C-D) stochastic production frontier for estimation of technical efficiency is expressed in equation (12)

$$lny_i = \beta_0 + \beta_1 ln(LAB)_i + \beta_2 ln(CAP)_i + v_i - u_i \quad i = 1, \dots, 150 \qquad (12)$$

Where,

y_i = total Mekhela-Chaddar produced by the ith weaver households per year.

LAB_i = annual labour days of the ith weaver households (days / Mekhela-Chaddar)

CAP_i = annual use of capital by the ith weaver households (rupees/ Mekhela-Chaddar). (Capital includes yarn cost, designing cost and replacement cost)

The equation of technical inefficiency effects of u_i along with the variables are expressed below-

$$u_i = \delta_0 + \delta_1(\text{ENGAGEMENTT 1})_i + \delta_2(\text{ENGAGEMENTT 2})_i + \delta_3(\text{YARNT 1})_i + \delta_4(\text{YARNT 2})_i + \delta_5(\text{AGE})_i + \delta_6(\text{EDU})_i + \delta_7(\text{FAMSIZE})_i + \delta_8(\text{FAMTYP})_i \quad i = 1, \dots, 150 \qquad (13)$$

Where,

ENGAGEMENTT 1_i = dummy for type of engagement 1of weaver (0: All independent weaver, 1: All contract weaver and mixed of independent and contract weaver)

ENGAGEMENTT 2_i = dummy for type of engagement 2 of weaver (0: All contract weaver, 1: All independent weaver and mixed of independent and contract weaver)

$YARNT\ 1_i$ = dummy for using type of yarn 1 for Mekhela-Chaddar (0: *Zero-ply*, 1: *Tussar* and *Eri*)

$YARNT\ 2_i$ = dummy for using type of yarn 2 for the Mekhela-Chaddar (0: *Tussar*, 1: *Zero-ply* and *Eri*)

AGE_i = Average age of the i^{th} weaver

EDU_i = Average education of the i^{th} weaver

$FAMSIZE_i$ = number of member in the family of the i^{th} weaver households

$FAMTYP_i$ = dummy for type of family of the i^{th} weaver households (0: Nuclear family, 1: Joint family)

The inefficiency variables used in the equation (13) are engagement type 1, engagement type 2, yarn type 1, yarn type 2, age, education, family size and type of family. The reason behind choosing the variables engagement type 1 and engagement type 2 is that in the study area there are two types of engagement of weavers is found i. e. independent weaver and contract weaver. An independent weavers are who engages in weaving works in full time or part time and purchases raw materials from the market, weave and sells in the market on her/his own to earn a living. On the other hand contract weavers are who engages in weaving in full time or part time in terms of money wage or product to product. In contract weaver, the raw materials are purchase by the contractor who deals for weaving. The job of the contract weaver is just to weave only. An independent weaver can weave in his/her own time span but contract weavers have to weave according to the contractor's or ordered time span.

These affects the efficiency levels of the weavers. Therefore type of engagement is included as an inefficiency variable in the estimation model.

In the inefficiency model the variable yarn 1 and yarn 2 is used for estimating inefficiency. In this model yarn 1 and yarn 2 implies using of different types of yarn i.e. *Zero-ply*, *Tussar* and *Eri* to make the Mekhela-Chaddar. There is difference in the price and durability of the yarn, thick and thinness of the yarn, difference in smoothness and managing of weaving of the type of yarn in which weavers make a difference in selecting of weaving of this type of yarn. These differences can lead to inefficiency of the weavers. Therefore type of yarn is included as an inefficiency variable in the inefficiency estimation model.

In the literature survey section it has been found that labour and capital have a positive effect on increasing technical efficiencies of the textile industry as these variables are essential for production process and production activity (Mahmood, 2012). Therefore, capital and labour is included in the model. In the studies of Pitt and Lee (1981) inefficiency variables such as age, size of the firm has been used and found significant as stated in the literature survey. Pitt and Lee (1981) found that larger firms are more efficient than smaller firms and younger firms are more efficient than older firms. Therefore to test the effect of age, size on technical inefficiency of the weaver households of the study area these variables have been included as an inefficiency variable in the model. As per the analytical explanation, u_i in this study follows half-normal distribution. With the help of Frontier 4.1, the maximum likelihood estimation method has been ustilised to estimate the stochastic frontier production function and the inefficiency effects (Coelli, 1991).

The data for this study is collected from 150 weaver households of Majuli district of Assam and the nature of the data is cross-sectional. The input and output variables used for the production of Mekhela-Chaddar is shown in a descriptive statistics in the Table 4.1. From the descriptive statistics it is found that the maximum number of annual production of Mekhela-Chaddar is 18 and minimum is 2 and average number of production is 7.66. The maximum number of production of *Zero-ply* yarn Mekhela-Chaddar is 18 with costs of Rs. 9450 and minimum number of production is 4 with costs of Rs. 1960 and average number of production is 8.25 with costs of Rs. 4241.12. The maximum number of production of *Tussar* yarn Mekhela-Chaddar is 8 with costs of Rs. 19,200 and minimum number of production is 3 with costs of Rs 7,200 and average number of production is 6.41 with costs of Rs. 15,406. The maximum number of production of *Eri* yarn Mekhela-Chaddar is 5 with cost of Rs. 12,500 and minimum number of production is 2 with costs of Rs. 5000 and the average number of production is 3.85 with cost of Rs. 9642.85. In the production of Mekhela-Chaddar maximum of labour days of weaving is 360 days and minimum labour days is 40 days. The maximum cost of designing yarn used in the production of maximum number of Mekhela-Chaddar is Rs. 10,800 and minimum cost of designing yarn used in the production of minimum number of Mekhela-Chaddar is Rs. 400. In the production of Mekhela-Chaddar there is also a depreciation cost. The maximum annual depreciation cost in the maximum number of production of Mekhela-Chaddar is Rs. 1,440 and minimum depreciation cost is Rs. 160 and average depreciation cost is Rs. 688. The maximum age of weavers of the production of Mekhela-Chaddar is 55 years and minimum age of the weavers is 24 years and average age of the weavers is 36.26 years. The maximum years of schooling of the weavers is 15 years and minimum years of schooling is zero and average years of schooling is 9.8 years. The

maximum family members of the weavers households is 13 and minimum members is 3.

In the estimation of the study, in order to test the null hypothesis of absence of inefficiency in the Mekhela-Chaddar production from the frontier, first estimation of Ordinary Least Square (OLS) without restriction assuming $u_i = 0$ is done and secondly estimation of Maximum Likelihood Estimates (MLE) with restrictions assuming $u_i \neq 0$ and by including inefficiency variables into the model is done. After that Generalised Likelihood Ratio test of the model of both the estimation of technical efficiency and inefficiency is done. From the estimation result when the degree of freedom is 10 and the estimated value is 109, the value of LR test is found to be significant at 1% level of significance which implies that the inefficiency effects are not present or variations in the Mekhela-Chaddar of the weavers of Majuli district is completely because of random factors like technology, weather, health etc and statistical error or the effects of the inefficiency are absent.

Table 4.1: Input - Output Descriptive Statistics on Mekhela-Chaddar

Variables			Number of Observations	Minimum	Maximum	Mean	Standard deviation
Output (MC/year)			150	2.00	18.00	7.66	2.67
Types of yarn	*Zero-ply*	Output(MC/year)	112	4.00	18.00	8.25	2.66
		Average Yarn cost(Rs)		1960.00	9450.00	4241.12	1343.02
	Tussar	Output(MC/year)	31	3.00	8.00	6.41	1.62
		Avearge Yarn cost(Rs)		7200.00	19200.00	15406.45	3908.10
	Eri	Output(MC/year)	7	2.00	5.00	3.85	1.069
		Average Yarn cost(Rs)		5000.00	12500.00	9642.85	2672.61
Average Labour(Weaving days/year)			150	40.00	360.00	190.62	60.16
Average Designing yarn cost(Rs/year)			150	400.00	10800.00	3047.13	1795.51
Average Depreciation cost(Rs/year)			150	160.00	1440.00	688.53	237.19
Engagement 1 (All Contract Weaver and Mixed Weaver)			150	.00	1.00	. 32	. 46
Engagement 2 (All Independent Weaver and Mixed Weaver)			150	.00	1.00	.74	. 43
Average Age (Years)			150	24	55.00	36.26	6.88
Average Education (Years of schooling)			150	.00	15.00	9.18	4.14
Family Size (Number of members)			150	3.00	13.00	6.28	2.43
Family Type (Joint family)			150	.00	1.00	. 22	. 41

Table 4.2: Maximum Likelihood Estimates (MLE) of the Parameters of Stochastic Frontier C-D Production Function

Variables	Beta Coefficient	t-Statistic
Frontier Production Function		
Constant	-1.087	-23.533
LABOUR (in days)	0.535*	9.102
CAPITAL (yarn cost, design cost and depreciation cost/rupees)	0.221*	5.447
Inefficiency Model		
Constant	0.246	2.613
ENGAGEMENT 1 (0: All Independent weaver 1: All Contract weaver and mixed weaver)	-0.081*	-4.009
ENGAGEMENT 2 (0: All Contract weaver 1: All Independent weaver and mixed weaver)	0.016	-0.753
YARN 1 (0: *Zero-ply* ; 1: *Tussar* and *Eri*)	0.166*	4.730
YARN 2 (0: *Tussar*; 1: *Zero-ply* and *Eri*)	-0.028	-0.964
AGE(years)	-0.001***	-1.808
EDUCATION(years of schooling)	-0.001	-1.213
FAMILY SIZE(number of members)	-0.003	-0.935
TYPE OF FAMILY(0: Nuclear Family, 1: Joint Family)	-0.012	-0.622
Sigma Squared (σ)	0.003*	8.818
Gamma (γ)	0.031	0.193
Log likelihood Functions		221.34
LR Test		109.65
Mean Technical Efficiency		0.87
N		150

Note: *=significant at 1% level, **=significant at 5% level, ***=significant at 10% level.

The Table no.4.2 shows the MLE results of the stochastic frontier production function of the Mekhela-Chaddar weaver households in Majuli district of Assam. Both the independent variables Labour and Capital have been found to have statistically significant and positive impact on the production of Mekhela-Chaddar by the weaver households. The results also shows that the impact of one percent increase in labour days on the production of Mekhela-Chaddar by the weaver household is higher (0.53) than the impact of one percent increase in capital (0.22). This results is unsurprising because of the fact that the Mekhela-Chaddar production is highly labour intensive and the use of capital in the production process is usually found only in the initial stage of the production (for buying raw materials) and after that the main production process is run manually using physical labour. The result of the capital is found similar to the results of the studies of Manonmani (2013).

From the inefficiency model of the MLE results of the stochastic frontier production function of the Mekhela-Chaddar weaver households it is found that the coefficient value of -0.081 for Engagement 1(all contract weavers and mixed of independent and contract weavers category) and 0.016 for Engagement 2(all independent weavers and mixed of independent and contract weaver category) which implies that in case of Engagement 1, the Mekhela-Chaddar weaver household's inefficiency is 8% less than Engagement 2. It is also found that engagement 1 has a significant impact on the inefficiency level in the production of Mekhela-Chaddar while Engagement 2 do not have significant impact on the inefficiency level in the production of Mekhela-Chaddar. The inefficiency levels of Engagement 1 is less because in case of a contract weaver category, weaving of Mekhela-Chaddar, its raw materials, design of the Mekhela-Chaddar and the time to be taken to complete the weaving of the Mekhela-Chaddar is deal with the contractor and the weaver. In case

of contract weaver there is a time limit of completion of the weaving of the Mekhela-Chaddar and there is also less chances of shortage of the raw materials for which their inefficiency levels reduces. The contract weaver weaves in terms of money wage or product to product. The contractor can be any individual who may or may not know weaving. Another reason of reducing inefficiency levels of the all contract weavers category is that may be the contract weaver households are economically weaker households and financially weak to buy the raw materials for weaving and for which they weave on a contract basis and also in order to fulfil the needs of the household expenses like the monthly educational expenses of children, groceries etc which leads the weavers to complete the weaving of Mekhela-Chaddar in expeditiously and these increases their efficiency level. The inefficiency level of Engagement 2 is higher because the independent weavers do not have time limit of compulsion of weaving ordered by other person. The independent weaver weaves according to their willingness, needs or leisure time which may lessens their efficiency level. Therefore the result implies that the contract weaver engagement is more favourable for reducing the inefficiency of the Mekhela-Chaddar weaver households while all independent category of engagement is the least favourable for the same.

The coefficient value of 0.166 for dummy variable Yarn 1(*Tussar* and *Eri*) and -0.028 for dummy variable Yarn 2(*Zero-ply* and *Eri*) which implies that the inefficiency level of the Mekhela-Chaddar weaver households for the categories using *Tussar* and *Eri* yarn is higher than the category of weavers using *Zero-ply* yarn but Yarn 1 is found to have statistically significant on the inefficiency level of the weavers of the Mekhela-Chaddar and Yarn 2 do not have significant impact on the inefficiency level of the weavers of the Mekhela-Chaddar. The reason of higher inefficiency in using yarn of *Tussar* and *Eri* is that its yarn quality is very high and is

also very costly. The *Tussar* yarn is very thin and it is very difficult to manage while weaving. Therefore only a skill and experienced weavers fond of weaving *Tussar* yarn Mekhela-Chaddar. Generally, *Tussar* and *Eri* Mekhela-Chaddar are worn only on festivals and ceremonies but *Zero-ply* yarn Mekhela-Chaddar is worn on daily basis, festivals and ceremonies. *Zero-ply* is very much cheaper than *Tussar* and *Eri* and the quality and durability of *Zero-ply* yarn is also good. As the price of *Tussar* and *Eri* yarn is very high so economically weaker family cannot afford even to start it as a business and also because of the high price of the *Tussar* and *Eri* Mekhela-Chaddar its market demand is less as compared to Zero-ply. The result implies that the *Zero-ply* yarn type is the most favourable in case of increasing the efficiency of the weavers. Hence the null hypothesis of difference in technical efficiency among the weaver households with respect to Mekhela-Chaddar of diifererent yarn i. e. *Zero-ply, Tussar* and *Eri* is rejected.

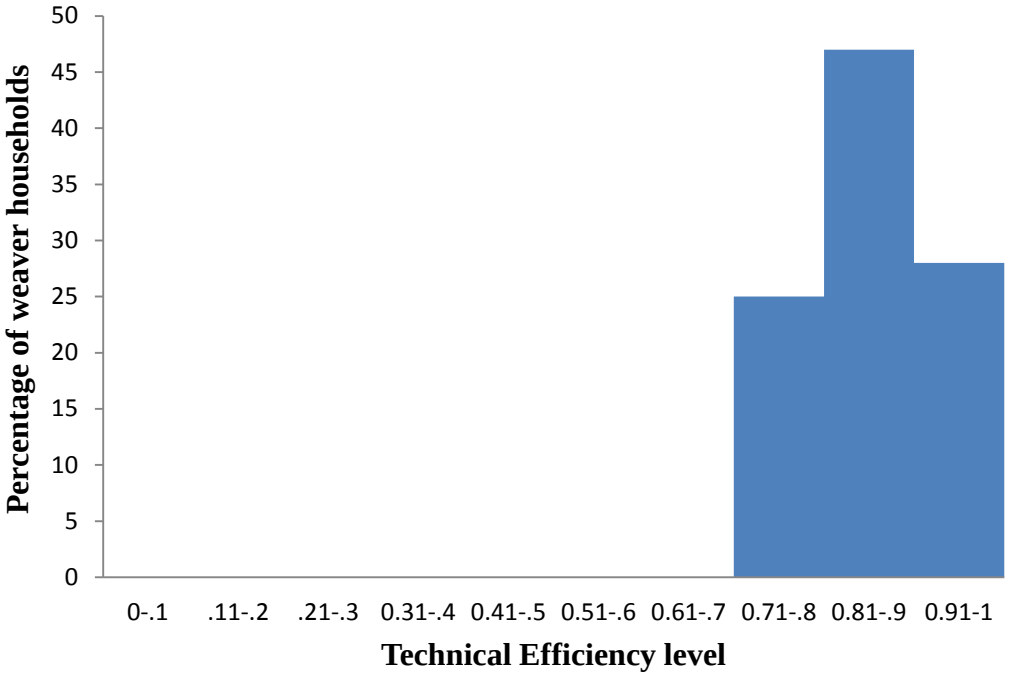
The other inefficiency variables are average age, average education, family size and type of family. In this inefficiency model of the MLE results of the stochastic frontier production function of the Mekhela-Chaddar weaver households it is seen that average age has a significant impact on the inefficiency level of the Mekhela-Chaddar weaver household. This result is found similar to the results of studies of Pitt and Lee (1981). The coefficient value of age is -0.0014. In this research work the minimum age of weaver is 24 and maximum age is 55. The coefficient value is of -0.0014 implies that as the weaver's age increases the weaving experiences also increases in maintaining the yarns and other parts of the looms for smooth weaving which leads to good quality cloth and hence the inefficiency level reduces.

The coefficient values of average education, family size and type of family are negative but insignificant. Average education has a negative relation and insignificant with the technical inefficiency levels of the weaver households because weavers in the study area use traditional fly shuttle loom which is made of bamboo stilt and no technology is used while weaving and weaving till today is learned from mothers, siblings and neighbours only. Therefore average educations do not have a significant impact on the inefficiency level of the weavers. Family size and type of family also has a negative impact on inefficiency levels but it is also found insignificant. With the increases of family members, though there can be helping hand in the weaving process in the production of the Mekhela-Chaddar but there can also a conflicting role in household activities and weaving between the weavers for which the result in the estimation is found insignificant.

The mean technical efficiency shown in the results is 87% and there is chance of improving by 13% in order to make them fully efficient. From the inefficiency model of the MLE results of the stochastic frontier production function of the Mekhela-Chaddar it is also shown that value of sigma squared (σ) is 0.003 and gamma (γ) is 0.031 and the sigma squared is found to be significant at 1% level with a degrees of freedom equal to 10 and gamma is found to be insignificant. This implies that (γ=0.031) 3% the total variations in the output of the weavers of Majuli district is solely because of random factors like technology, weather, health etc and statistical error rather than inefficiency variables. Hence the null hypothesis of technical efficient and its inefficiency effects of the Mekhela-Chaddar weaver households of the *Mising community* of Majuli district are rejected.

From the results of the technical efficiency levels of the weaver households, it is found that 25% of the weaver household's technical efficiency levels are between 71%-80%, 47% of the weaver household's technical efficiency are between 81%-90% and 28% of the weaver household's technical efficiency are between 91%-100% which is shown in the Figure 4.1.

Figure 4.1: Frequency Distributions of Weaver Households based on their Technical Efficiency levels



4.4 Empirical Analysis of Stochastic Frontier Profit Function and Profit Efficiency:

The stochastic frontier profit function for the estimation of profit efficiency of weaver households is as follows-

$$ln\Pi_i^* = \alpha_0 + \alpha_1 lnYARN_i^* + \alpha_2 lnDYARN_i^* + \alpha_3 lnLAB_i^* + \alpha_4 lnDEPREC_i^* + v_i - u_i \qquad i = 1, \dots, 150 \qquad (14)$$

Where,

Π_i^* = normalised profit of the i[th] weaver households.

$YARN_i^*$ = normalised average cost of yarn per Mekhela-Chaddar

$DYARN_i^*$ = normalised average cost of yarn used for designing per Mekhela-Chaddar

LAB_i^* = normalised average cost of labour per Mekhela-Chaddar

$DEPREC_i^*$ = normalised average cost of depreciation per Mekhela-Chaddar

For the evaluation of profit efficiency of the weaver household's, the inefficiency variables used were given in the equation (15)-

$$u_i = \delta_0 + \delta_1(YARN\ 1)_i + \delta_2(YARN\ 2)_i + \delta_3(DYARN\ 1)_i + \delta_4(DYARN\ 2)_i + \delta_5(SSALE\ 1)_i + \delta_6(SSALE\ 2)_i + \delta_7(\text{SSALE 3})_i + \delta_8(\text{AGE})_i + \delta_9(\text{EDU})_i + \delta_{10}(\text{FAMSIZE})_i$$

$$i = 1, \dots, 150 \qquad (15)$$

$YARN\ 1_i$ = dummy for using type of yarn 1 of the i[th] weaver (0: *Tussar* and *Eri*; 1: *Zero-ply*)

$YARN\ 2_i$ = dummy for using type of yarn 2 of the i[th] weaver (0: *Eri* and *Zero-ply*; 1: *Tussar*)

$DYARN\ 1_i$ = dummy for using yarn for designing 1 of the i[th] weaver (0: Dansi; 1: Two-ply and Doli)

$DYARN\ 2_i$ = dummy for using yarn for designing 2 of the ith weaver (0: Two-ply; 1: Doli and Dansi)

$SSALE\ 1_i$ = dummy for source of sale 1 of the ith weaver (0: others; 1: Social media)

$SSALE\ 2_i$ = dummy for source of sale 1 of the ith weaver (0: others; 1: Local Area)

$SSALE\ 3_i$ = dummy for source of sale 1 of the ith weaver (0: others; 1: Retail shop)

AGE_i = average age of the ith weaver

EDU_i = average education of the ith weaver

$FAMSIZE_i$ = dummy for family size of the ith weaver (0: Nuclear family, 1: Joint Family)

Table 4.3: Descriptive Statistics of Variables for the Estimation of Profit Frontier Model of Mekhela-Chaddar

Variables		Total Obs	Minimum	Mean	Maximum	Standard deviation
Profit(Rs/MC)		150	180	1324.80	4140.00	1131.01
Average yarn cost(Rs/MC)		150	455.00	2500.00	996.96	831.25
Average designing yarn cost (Rs/MC)		150	80.00	600.00	399.96	184.49
Type of yarn(Rs/Mc)	Zero-ply	150	455.00	560.00	514.68	25.14
	Tussar		2400.00	2400.00	2400.00	.00
	Eri		2500.00	2500.00	2500.00	.00
Type of yarn for designing(Rs/Mc)	Doli	150	360.00	600.00	498.48	71.53
	Dansi		320.00	600.00	499.46	74.36
	Two-ply		80.00	100.00	97.83	6.29
Average wage (Rs/MC)		150	26.09	110.20	47.2547	12.10130
Average depreciation cost (Rs/Mc)		150	70.00	100.00	90.2667	10.67813

Table 4.4: Maximum Likelihood Estimates (MLE) of the Stochastic Frontier C-D Profit Function

Variables	Beta Coefficient	t-Statistic
Frontier Profit Function		
Constant	-1.830*	-38.829
YARN(Rs/MC)	-0.693*	-24.836
DYARN(Rs/MC)	-0.288*	-30.838
WAGE (Rs/MC)	-0.898*	-15.448
DEPREC(Rs/MC)	-0.076**	-2.795
Inefficiency Model		
Constant	-1.382*	-4.038
YARN 1 (0: *Tussar* and *Eri*, 1: *Zero-ply*)	-0.077	-0.845
YARN 2 (0: *Eri* and *Zero-ply*, 1: *Tussar*)	-0.431*	-6.269
DYARN 1 (0: Dansi; 1: Two-ply and Doli)	0.521*	5.309
DYARN 2 (0: Two-ply; 1: Doli and Dansi)	0.933*	4.939
SSALE 1 (0: others; 1: Social media)	-0.107***	-1.813
SSALE 2 (0: others; 1:Local Area)	-0.063	-1.406
SSALE 3 (0: others; 1:Retail shop)	0.110	1.468
AGE(years)	0.006**	2.835
EDUCATION(years of schooling)	-0.024*	-4.811
FAMILY SIZE(number of members)	0.004	0.836
Sigma Squared (σ)	0.019*	7.556
Gamma (γ)	0.999*	7943.603
Log likelihood Functions		306.376
LR Test		177.460
Mean Technical Efficiency		0.94
N		150

Note: *=significant at 1% level, **=significant at 5% level, ***=significant at 10% level.

The Table no.4.4 shows the MLE results of the stochastic frontier profit function of the Mekhela-Chaddar weaver households of the Majuli district of Assam. The result reveals that the coefficient of the average cost of yarn, designing yarn, depreciation and wage have significant and negative effect at 1%, 1%, 5% and 1% level on the profit level of Mekhela-Chaddar weaver households of Majuli district of Assam. This implies that, increase in these variables would result to the reduction of profit level in the production of Mekhela-Chaddar weaver households of the study area.

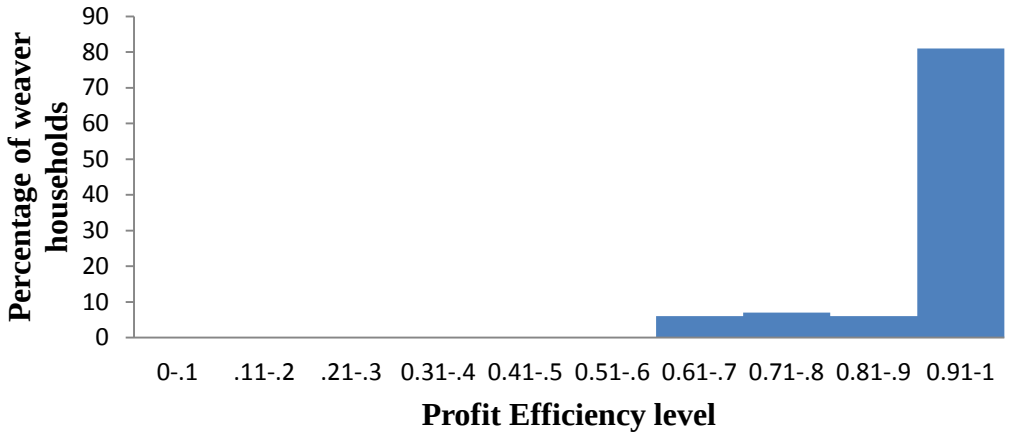
From the inefficiency model of the maximum likelihood estimates of the stochastic frontier profit function revealed that the coefficients of using designing yarn 1, designing yarn 2 and coefficients of age is found to have a positive significant effect at 1%, 1% and 5% level on the profit efficiency of the Mekhela-Chaddar weaver households of the study area. The result indicates that, increase in aforementioned variables would result in increase in the profit efficiency and decrease in profit inefficiency among the weaver households of the study area. The coefficient 0.933 of designing yarn 2 i. e. doli and dansi is higher than the coefficient 0.521 of designing yarn 1 i. e. two-ply and doli because the designing yarn doli and dansi is a better quality in terms of beauty and price. The more design of the Mekhela-Chaddar the more used is the design yarn which upsurge the price of the output and profit of the level of the weaver. The age of the weaver is also found to have positive and significant effect on the profit efficiency. This implies that as age of the weaver increases the experience of management of the loom for weaving, smoothening the yarn for weaving and speed of weaving increases which reduces the labour days of weaving and increases the smoothness of the Mekhela-Chaddar and subsequent reduction in variable cost and upsurge the profit level of the weaver.

It is also found that the coefficients for the yarn 2, source of sale 1 and education have a significant but negative effect at 1%, 10% and 1% level respectively. This implies that, increase in these variables would result to the reduction of profit level and increase in profit inefficiency among the weaver households of the study area. The reason for the decrease in profit efficiency and increase in profit inefficiency of the variables of yarn 2 i. e. *Tussar* because of its high price of yarn and for which the output of this *Tussar* yarn is also high. Because of this high price of yarn economically weaker households unable to commercialise this type of Mekhela-Chaddar. The market demand of this output is low as compared to output of *Zero-ply* yarn because Mekhela-Chaddar of *Tussar* yarn is worn occasionally on festivals, marriage etc but not on daily outing and office. Hence, because of the low market demand and for quick sale may be the price of this product is lessen for which its profit decreases. The source of sale 1 i. e. Social media is shown to have a negative effect on the profit efficiency because usually the output price of handloom products is high as compared to power loom products and there is also availability of substitution product of handloom product at cheaper price. Customers who fond of handloom products find difficult to identify the handloom woven products image through social media and get difficult to build trust on social media for which they hesitate to buy the woven product from social media at the given price. This may leads to lower the price of the product which have a direct effect on decreasing profit efficiency. The coefficient of education is also shown negative effect on the profit efficiency. The result implies that as weavers' education level increases the time spent on weaving may decrease for which the weavers labour days increases that leads to increase in its variable cost and subsequent decrease in the profit level of the weaver.

The results of the MLE of the stochastic frontier profit function of the Mekhela-Chaddar weaver households of the study area showed a sigma squared (σ) and gamma (γ) coefficient 0.01 and 0.99 that is statistically significant at 1% level. This implies that the weaver households profit lies below the efficiency frontier. There is presence of profit inefficiency effects among the weaver households. There is one-sided random inefficiency components strongly dominates the measurements error and other random disturbance indicating that about 99 percent of the variation in actual profit from the maximum (profit frontier) between weaver households mainly arose from differences in type of yarn, amount of yarn and technological practices rather than random variability. Hence the second hypothesis of the study is accepted. The mean efficiency is 94 percent and this result indicates that still profit efficiency can be increased by 6% using the selective inputs and improving the technology.

Based on the results of the profit efficiency of the weaver households it is found that 6% of the weaver household's profit efficiency ranges between 61%-70% and 7% of the weaver household's profit efficiency ranges between 71%-80%. And 6% of the weaver household's profit efficiency ranges between 81%-90% and 81% of the weaver households profit efficiency ranges between 91%-100% which is shown in the Figure. 4.2.

Figure 4.2: Frequency Distributions of Weaver Households based on their Profit Efficiency levels



Chapter 5

Summary, Conclusion and Suggestions

5.1 Summary and Conclusions

The present study has made an attempt to study the production efficiency levels of the weaver households of the *Mising* Community of the Majuli district of Assam. For the purpose of this study, the limit of analysis is to technical efficiency and profit efficiency of the independent and the contract weavers of the households of the *Mising Community* of Majuli district. As per the study, the research objectives undertaken were: (i) To study the socio-economic structure of the weaver households of the *Mising Community* of Majuli district. (ii) To estimate the technical efficiency of the weaver households of the *Mising Community* of Majuli district with respect to Mekhela-Chaddar (MC) of different yarn i. e. Zero-ply, Tussar and Eri. (iii) To estimate the profit efficiency of the weaver households of the *Mising Community* of Majuli district with respect to Mekhela-Chaddar (MC) of different yarn i. e. Zero-ply, Tussar and Eri. (iv) To study the factors influencing the inefficiency levels of the weaver households of the *Mising Community* of Majuli district.

To study the socio-economic structure of the weaver households of the *Mising Community* of Majuli district with respect to MC of different yarn i. e. *Zero-ply*, *Tussar* and *Eri* , the variable used were size of family, type of dwelling unit of the households, main occupation of the households, annual income of the weaver households, land holdings of the households, marital status of the weavers, number of weavers in the family, type of engagement of the weavers, annual earnings from weaving by the weaver households, basic training for weaving, advance training of

weaving related activity, procurement of weaving loom sets, facilities from government, weaving places and sources of sales. From the study it is found that the percentage of weaver households of nuclear family is higher than the joint family which is 76.67 percent. 79 percent of the weaver households are Hindu in religion. Kutcha stilt house dwellers has maximum of 44 percent followed by semi pucca stilt house dwellers and pucca non-stilt house dwellers. 81 percent of the weaver household's main occupation is agriculture and 62 percent of the weaver household's annual income is between Rs 90,000-2,00,000. 49 percent of the weaver household's have landholdings between 0.5 hectares and 2 hectares and 37 percent of the weaver household's have landholdings between 2 hectares and 3 hectares. 87% of the weavers are married weaver and 68% of the weavers are independent weavers. 50 percent of the weaver's annual earnings from weaving are between Rs 10,000-20,000. 49 percent of the weavers basic training for weaving is provided by mothers followed by 21 percent of own imitation. 80 percent of the weavers weave under the kutcha stilt house.78 percent of the weavers do not have any advance training on weaving and 14 percent of the weavers had training of dyeing yarn. 64 percent of the weaver households do not avail any facilities from government and 30 percent of the weaver households had avail yarn from MAC (Mising Autonomous Council). 54 percent of the weavers loom sets are partially self-made and partially purchased and 37 percent of the loom sets are traditionally gifted by parents and 4 percent are assistances from government. 71 percent of the weaver's sources of sales are found to be local and relatives.

To estimate the technical efficiency of the weaver households of the *Mising Community* of Majuli district with respect to MC of different yarn i. e. *Zero-ply, Tussar* and *Eri,* the variables used were type of engagement of the weavers, type of

yarn used by the weavers, average age, average education, family size and type of family. From the study it is found that the contract weaver engagement is more favourable for reducing the inefficiency of the MC weaver household while all independent weaver engagement is the least favourable for the same. Here the difference between the types of engagement of weavers is found in the time limitation of completion of the MC and availability of raw materials for the MC. In case of contract weaver the time limit of completion of the weaving of the MC is bounded by the Contractor and raw materials is also provided by the Contractor whereas the Independent weavers has his own freedom of duration of completion of weaving and raw materials is also self-financed for which their efficiency level differs. Therefore the main reason of choosing the type of engagement of weaving depends upon their economic condition of the individual weavers or the households. It is also found that the *Zero-ply* yarn is most favourable in case of increasing the efficiency of the weavers. The difference between the efficiency level of the yarn of *Zero-ply*, *Tussar* and *Eri* is found mainly due to the price of the yarn and its casual use of its product or the MC. *Zero-ply* yarn is very much cheaper than *Tussar* and *Eri* yarn and the quality and durability of *Zero-ply* yarn is also good. As the price of *Tussar* and *Eri* yarn is very high so economically weaker family cannot afford even to start it as a business purpose and also because of the high price of the MC of *Tussar* and *Eri* yarn its market demand is less as compared to. Average age is found to have a significant impact on the inefficiency level of the weavers in which with the increase of the age of the weavers, weaving experiences of maintaining the yarns and other parts of the looms for smooth weaving increases which leads to good quality cloth and hence the inefficiency level reduces. Average education, family size and type of family are found to be insignificant. Average education is found to be insignificant in technical

inefficiency levels of the weaver households because weavers in the study area are found to use only traditional fly shuttle loom which is made of bamboo and no technology is used while weaving and weaving till today is learned from mothers, siblings and neighbours only. Therefore average educations do not have a significant impact on the inefficiency level of the weavers.

To estimate the profit efficiency of the weaver households of the *Mising Community* of Majuli district with respect to MC of different yarn i. e. *Zero-ply, Tussar* and *Eri,* the variables used were average yarn costs, average design yarn costs, average depreciation costs, average wages, sources of sale of the MC, main occupation of the household, average age of the weaver and average education of the weaver. From the study it is found that the average costs of yarn, designing yarn, depreciation and wages have significant and negative effect on the profit level of MC weaver households of Majuli district of Assam. This implies that, increase in these variables would result to the reduction of profit level in the production of MC weaver households of the study area. It is also found that using of designing yarn1 (Two-ply and Doli), designing yarn2 (Doli and Dansi) and age is found to have a positive significant effect on the profit efficiency of the MC weaver households of the study area. This result indicates that, increase in aforementioned variables would result in increase in the profit efficiency and decrease in profit inefficiency among the weaver households of the study area. Yarn 2 (tussar), source of sale 1(social media) and education have a significant but negative effect which implies that, increase in these variables would result to the reduction of profit level and increase in profit inefficiency among the weaver households of the study area. The reason for the differences in the profit inefficiency among the product of yarn is due to its price differences of the yarn. The price of the yarn of tussar yarn is very high because of

which the output of this yarn is also high. Therefore economically weaker households unable to commercialise this type of MC and the market demand of this output is low as compared to output of *Zero-ply* yarn because MC of tussar yarn is worn occasionally on festivals, marriage etc but not casual. Hence, because of the low market demand and for quick sale may be the price of this product is lessen for which its profit decreases. The sources of sale 1(Social media) is found to have a negative effect on the profit efficiency. Because of the differences between the price of handloom product and power loom product, and difficulty in identification of products between handloom and power loom through social media which get difficult to build trust on social media for which they hesitate to buy the hand woven product from social media at the given price. This may leads to lower the price of the product which have a direct impact on decreasing profit efficiency. Education is also found to have negative effect on the profit efficiency which implies that as weavers education level increases the time spent on weaving may decrease in which the weavers labour days increases that leads to increase in its variable costs and subsequent decreases in the profit level of the weavers.

5.2 Suggestions for Improving Technical Efficiency

The contract weaver weave in terms of money wage or product to product but independent weaver weave in his own self-finance. From the study it is found that the contract weaver engagement is more favourable for reducing the inefficiency of the MC weaver household while independent weaver engagement is the least favourable for the same. In this case if the money wage of the contract weaver increases then many weavers will prefer to weave on contract basis which will reduce inefficiency and increase technical efficiency. Increases of Contractor of weaving or Master

Weaver along with the increase of wage would increase technical efficiency from the side of type of engagement in the present study area.

It is also found that the *Zero-ply* yarn type is most favourable in case of increasing the efficiency of the weavers. Since the difference between the technical efficiency level of the yarn of *Zero-ply*, *Tussar* and *Eri* is found mainly due to the price of the yarn and its casual use of the MC. There is vast difference between the price of *Zero-ply* yarn and both *Tussar* and *Eri.* From the study it is found that maximum of the weavers are using *Zero-ply* yarn than *Tussar* and *Eri* because of its high market demand of the product of *Zero-ply* and its casual wear especially for women of Assam. *Zero-ply* yarn is very much cheaper than *Tussar* and *Eri* yarn and the quality and durability of *Zero-ply* yarn is good and easily washable. Therefore, if the price of *Zero-ply* yarn is supplied at subsidised rate it would be better for the upliftment of the weavers'. As the price of *Tussar* and *Eri* yarn is very high so economically weaker family cannot afford even to start it as a business and also because of the high price of MC of Tussar and *Eri* yarn its market demand is less as compared to *Zero-ply*. Therefore price hike of yarn is also one factor problem of production and technical efficiency and the government has to give concern on lowering the price of yarn. In the study area the weavers are using traditional throw shuttle loom. To increase the technical efficiency the most important factor along with the type of engagement and type of yarn is the use of modern technical loom with work shed attached with home.

In the present study family size and type of family is found to be insignificant but it can also play a significant role in increasing technical efficiency. If there remains mutual understanding among the family members about weaving as a

sources of income and by helping in the household activities so that weavers can get full time for weaving which in turn leads to increasing efficiency. This increasing efficiency will lead to increase in production.

5.3 Suggestions for Reducing Profit Inefficiency

It is also found that using of designing yarn1 (Two-ply and Doli), designing yarn2 (Doli and Dansi) and age is found to have a positive significant effect on the profit efficiency of the MC weaver households of the study area. The result indicates that, increase in aforementioned variables would result in increase in the profit efficiency and decrease in profit inefficiency among the weaver households of the study area because profit mainly depends on the type of design yarn and design height. Therefore in order to reduce profit inefficiency the weavers are better to use doli and must innovate designs and also increase the height of the design.

Tussar yarn and education is found to be significant but negative effect which implies that, increase in these variables would result to the reduction of profit level and increase in profit inefficiency among the weaver households of the study. Therefore in order to reduce profit inefficiency the MC must not be extra length or breadth in size and it must be in the perfect size since the price of *Tussar* yarn is very high. Especially in the case of *Tussar* yarn, profit inefficiency can be reduced by smooth weaving. Though education has found to have negative effect but education can also have a positive effect in increasing profit efficiency. It is seen that government has introduce technical or designing course of handloom sector mostly in the urban areas but if the same is done in the rural areas because handloom weaving is practice mainly in the rural areas. This will benefit the handloom weavers from the

designing side to upgrade their quality of the handloom product and will reduce profit inefficiency.

5.4 Suggestions for Government Policies

From the socio-economic study it is found that 80% of the weavers weave under the kutcha stilt house which indirectly implies that the weavers are not benefitted from Government intervention of construction of individual work shed envisage providing a workspace for the entire weaver family close to their home. From the study area only one village from one gaon panchayat is availing the provision of work sheds close to their home but it is found to be in ongoing process and not yet completed. From the interaction it is also found that since weavers are married weavers and they keep busy themselves in myriad activities together with weaving therefore if the work shed provision is constructed attached to their house other than close to their house which would be better and will smoothen their household work together with their weaving. Weaving under the stilt house or under the house creates a hinder in the production of handloom products because during nights the weavers get difficult to weave along with electricity problems and mosquito problems. Therefore provision of construction of work shed is very much needed in action for the upliftment and enhancement of the production of the handloom product.

From the socio-economic study it is also found that 30% percent of the weaver households only has avail one bundle of cotton yarn from MAC (Mising Autonomous Council) one time in that year. The cotton yarn which was provided by MAC was not at subsided rate but at free. There is a government intervention on yarn supply at mill gate price and 10% price subsidy on hank yarn i. e. Yarn Supply Scheme but from the survey interaction it is found that they buy yarn from the market

and those who cannot afford to buy yarn they weave as contract weaver. Therefore from the study it is found that 25% of the weaver households weave as contract weaver. For weaving the first and foremost input needed is yarn and loom. Although there is yarn supply scheme but the weavers in the study area are lagging behind the availment of the government yarn supply scheme therefore the government must monitor the success or progress of the scheme. Hatkharga Samvardhan Sahayata (looms and accessories) is a government intervention under which 90% of the cost of looms and accessories is borne by the government of India but the implementation is done with the full involvement of respective State Government. But in the study area the weavers are using traditional throw shuttle loom that is partially self-made and purchased and partially traditionally gifted by parents. Therefore if the government provide the weavers with a technically upgraded loom along with the work shed then there would be better for the enhancement in the production of the handloom products and there would be a better living among the weaver households like other professions.

From the estimation of profit efficiency it is found that designing yarn plays an important role in increasing profit efficiency and also depends on the height of the design. From the study it is found that 78 percent of the weavers do not have any advance training activity. 14 percent of the weavers had training of dyeing yarn and 3 percent of the weavers had Eri and Mulberry worm rearing training and 5 percent of the weavers had power loom weaving training. Though 5 percent of the weavers had training of power loom weaving but the weavers do not have the power loom so the weavers are not benefitted from the training. Training of dyeing and training of Eri and Mulberry worm rearing is benefitted. There are government interventions like Skill up-gradation for learning new weaving techniques, adaption of new technology,

development of new designs and colours, learning about new types of eco-friendly dyes and dyeing practices etc. Therefore in order to increase technical efficiency and profit efficiency the government should introduce Skill up-gradation in the rural school or colleges with the formal education because handloom weaving is practice mainly in the rural area which will benefit the weaver community to upgrade their quality of the weaving product.

At last it is observed from the study that weavers are ignorant about the various government schemes implemented for their welfare, which is playing an important deterring factor for the development of this sector. Therefore, awareness programme of the various facilities of textile industry, availing yarn from yarn supply scheme, providing work shed, providing modern technology loom along with training of using the modern technology and monitoring of the implementation of various schemes by the government are the most important factor for the upliftment of the weavers towards production and self-employment through weaving.

5.5 Limitations of the Study

In the present study only one community and only one district from Assam has been selected for studying the technical and profit efficiency levels of the weaver households. Further there is a scope for studying inter-communities product's profit efficiency levels of the weaver households. The present study is concentrated on independent and contract weaver of the households but further study can be done on master weaver or cooperative society weaver. In this study only SFA method and cross sectional data has been used to estimate the efficiency levels of the weaver households but for further study different method and panel data can also be used for the estimation.

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