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Empowering Women in India : Viewpoint

DEVENDRA KOTHARI

अबला जीवन तेरी हाय यही कहानी! आंचल में है दूध और आंखों में पानी
(Woman, this is your life story Mothering your role, sadness your destiny)

—*National Poet* ***Maithili Sharan Gupt***

In the context of Atmanirbhar Bharat (Self-reliant India) vision, better utilization of the enormous unexploited or underutilized pool of female working force is crucial to stimulate productivity growth and develop human capital. Greater female labour force participation (FLFP) could boost productivity growth by increasing the labour supply, while poor use of women's potential places a significant drag on the economic growth.

The main purpose of the paper is to acquire an understanding of the status of women/girls in the 'modern' India. It also argues that there is clearly a need for policy initiatives to empower women as gender disparities are not only persisting but increasing rapidly even against the backdrop of economic growth. The paper concludes that women's empowerment is the single greatest enabler of human development and sustainable economic growth. It does not mean pitting women against men. In this context, the role of patriarchal culture must be discussed and how its impact can be minimized. For this, a strategy known as HDPlus, is proposed.

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Introduction

Empowerment of women is a necessity for the very development of a society since it enhances both the quality and the number of human resources available for sustainable development. Women Empowerment or Gender Equality, therefore, is one of the 17 Sustainable Development Goals (SDGs) that make up the UN 2030 agenda for Sustainable Development.

What is the concept of women empowerment? Empowerment can be viewed as a means of creating a societal environment in which one can make decisions and make choices either individually or collectively for self or social transformation. In other words, women's empowerment is something that needs to be viewed as a positive action towards human development. It does not mean pitting women against men.[1]

India is a country where women are given the status of a goddess. "Yatra naryastu pujyante ramante tatra Devata." (यत्र नार्यस्तु पूज्यन्ते रमन्ते तत्र देवता।) is a famous sloka taken from the old Indian scripture - Manusmrithi - which means, where women are honoured, divinity blossoms there. However, the problems they have to face in modern India just show the opposite of this concept. In general, women are abused, ill treated, and downtrodden.

The debate over the state of women in India has intensified after Thomson Reuters Foundation released The World's Most Dangerous Countries for Women, 2018 report, which declared India as the worst country for women in terms of human trafficking, including sex slavery and domestic servitude, and for customary practices such as forced marriage and female infanticide. It is clear, however, "when compared to the studies and reports of other

international organisations, Thomson Reuters Foundation ranking India the worst country in the world for women, does not look convincing".[2]

Whether we agree with the findings of Thomson Reuters Foundation or not, most Indian women are in a desperate situation. Everyone expects more and better for women from the world's largest functioning democracy. For this, empowerment is the only way out.

Here, empowerment is a set of measures designed to increase the degree of autonomy and self-determination in people/women and in communities in order to enable them to represent their interests in a responsible and self-determined way, acting on their own authority. Further, it is the process of becoming stronger and more confident, especially in controlling one's life and claiming one's rights. In other words, empowerment as action refers to the process of self-empowerment, which enables them to overcome their sense of powerlessness and lack of influence, and to recognize and use their resources.

This paper, therefore, aims to analyze the status of women in India, based on above concept, in order to suggest a workable viewpoint or framework, based on the concept of human development, for their empowerment. It is divided into three parts. Following this introductory section, the next section discusses the emerging status of women in India and the last one proposes an alternative viewpoint to women empowerment.

Emerging status of women

Gender equality is intrinsically linked to sustainable and inclusive development. The overall objective of gender equality is a society in which women and men enjoy the same opportunities, rights, and obligations in all spheres of life. So, how is women's status in India? No doubt, in many ways, today is the best time in the modern history of India to be a girl. Opportunities for a girl's successes are as unlimited as her dreams. It appears that the condition of women in India has undoubtedly improved in the last couple of decades. However, the extent of this improvement is mainly confined to the middle classes. Even among middle-class families, this change has been very slow and it has benefited only a small portion of women, mainly the educated ones and that too only in the medium-and-large cities. Let us discuss the emerging scenario in India.

Rapid economic growth, urbanization, and demographic change in India since the early 1990s have brought significant change to the lives of Indian women, and yet the female labour force participation has stagnated at lesser than 25 per cent, and recent labour surveys even suggest a sizeable decline since 2005. According to a report of the World Bank, India's female labour force participation rate (LFPR) fell from 31.8 per cent in 2005 to merely 20.5 per cent in 2019. A totally reverse trend was observed in Bangladesh, as shown in Table 1.[3] The fall is even sharper if one looks at women in the age group of 15-24. It has fallen for other age groups as well. By comparison, the female LFPR in Sweden and China was more than 60 per cent in 2019.

The global share of women in the workforce is 47 per cent, which means India is well below average. Overall,

Table 1: Trends in Female Labour Force Participation Rate since 1990, India and Bangladesh

	FLFPR in per cent, 1990–2019	
Year	India	Bangladesh
1990	30.28	24.73
1995	30.60	25.68
2000	30.41	26.97
2005	31.79	27.86
2010	26.68	29.85
2015	21.71	32.37
2019	20.52	36.26

Source: The World Bank at: https://data.worldbank.org/indicator/SL.TLF.CACT.FE.ZS?locations=BD-CN&name_desc=false

India lags behind the world in female workforce participation and is ranked 11th from the bottom, among 131 countries.[4] And, this is happening during India's growth period, as per the study entitled "Women and Work in India" by the faculty of Harvard Kennedy School (Fletcher et al., 2017). Despite the rapid demographic change, education attainment, urbanization, and economic growth since the 1990s, the status of women measured in terms of labour participation has gone down significantly while the gender gap has increased substantially. It is a significant paradox, and puzzling.

The census data shows that the visibility of women has increased both in rural and urban areas. The number of females per thousand males (sex ratio) in the country has risen from 933 in 2001 to 940 in 2011. For rural areas, in the country as a whole, there has been an increase of only 1 point from 946 in 2001 to 947 in 2011. In urban areas, there has been an appreciable gain of 26 points from 900 in 2001 to 926 in 2011. It means some positive changes are seen in the status of females in urban areas, but the situation is improving very slowly in rural India. It is projected that the Census of India 2021 will record a slight improvement in the general sex ratio as compared to the 2011 figure; however, the child-sex ratio will further decline (Kothari, 2011).

Most of the female population of India resides in rural areas. According to the 2011 Census of India, the female population of India was 586.4 million out of the total population of 1,210.8 million. The data also indicate that around 405.1 million female population or 70 per cent of the total, in 2011 was enumerated in rural areas. Most of these females are illiterate or could not complete even their primary education. Improvement in female literacy, however, was more than males in both rural and urban areas. As a result, the gender gap in literacy has come down from 24.6 in 2001 to 19.8 in 2011 in rural areas and from 13.4 in 2001 to 9.8 in urban areas.

At the same time, childbearing patterns and women's education have changed significantly. Over the last 30 years, total fertility ratio (TFR) fell from 4.0 in 1991 to 2.2 in 2020 children per woman. It is nearing the replacement rate of 2.1, according to the Office of the Registrar General of India. Also, the TFR has more than halved in both urban and rural areas, falling even below the replacement level in the former where it is 1.7, down from 4.1 in 1971. In rural areas, the TFR has fallen from 5.4 to 2.4 during the same period. For rural areas, it varies from 1.6 in Tamil Nadu to 3.3 in Bihar. For urban areas, the variation is from 1.1 in Himachal Pradesh to 2.4 in Uttar Pradesh and Bihar. Of the 22 states, only six have a TFR of 2 or more in urban areas. There are 10 states where the TFR is below 2 in rural areas (Kothari, 2020).

Girls' primary school enrolment has reached parity with boys, and universal enrolment was achieved in 2015. Between 1994 and 2010, the fraction of women aged 15–24 attending any educational institution more than doubled (from 16 per cent to 36 per cent). Further, women in higher education show a steady rise. There are more females pursuing science and medicine at the undergraduate level. There are 99 females for every 100 males on campus. Also, women are comfortably outnumbering men among those graduating at UG, PG, PG diploma, and MPhil levels according to the All India Survey on Higher Education (AISHE) 2018–19.[5] In addition, the level of urbanization has increased. The population residing in urban areas in India, according to the 1991 census, was only 25.7 per cent. This count increased to 28.53 per cent according to the 2001 census, and crossed 30 per cent as per 2011 census, standing at 31.16 per cent. In 2017, the numbers increased to 34 per cent, according to the World Bank.

Similarly, India's economic growth story is remarkable since the 1990s.[6] According to the World Bank, India's average economic growth between 1970 and 1980 has been 4.4 per cent, which rose by 1 percentage point to 5.4 per cent between 1990 and 2000. The major structural changes of opening India's economy led to an impressive average growth of 8.8 per cent between 2000 and 2010. Between 2010 and 2017, India's economic growth has averaged at 7.1 per cent, mostly due to the global slowdown post the financial crisis of 2008. Between 1990 and 2018, the share of agriculture in GDP more than halved (from 33 to 14 per cent), while that of services increased from 24 to 60 per cent.

In sum, no doubt, rapid economic growth, educational gains, and fertility decline as discussed above, are very important components in empowering women; surprisingly, no significant impact of these was seen in promoting labour force participation and advancing gender equality in India.[7] In other words, economic growth and its related items often lead to an increase in women entering the labour force, but there has been a surprising decline on this front in India over the last 30 years.

Why is female labour force participation declining so sharply in India? There are a number of reasons for this paradox, ranging from a lack of job growth to more women

staying in education for longer, and persisting stigma surrounding the idea of women working, as noted by Smriti Sharma of Newcastle University (2019). According to her, both economic and cultural reasons explain women falling out of India's labour force. The latest evidence suggests that the number of jobs in India is on the decline. This is a significant structural problem for a country with a burgeoning young population. In particular, India has struggled to create labour-intensive manufacturing jobs, many of which favour women. This is in contrast to countries such as Bangladesh that experienced a booming export-led manufacturing sector that led to more employment opportunities for women.[8] In Bangladesh, more than 90 per cent of the garment workers are women, far ahead of India. Further, the number of women staying in education in both urban and rural areas has increased, keeping them out of the workforce for longer. Even when this is accounted for, the numbers of women working remain far below their peers: 20 per cent versus 80 per cent.

In another study, Rewriting the rules: women and work in India, Terri Chapman and Vidisha Mishra (2019) concluded: "Current research reveals four primary factors that help explain India's low—and potentially declining—FLFP rate: 1) the pervasiveness of entrenched patriarchal social norms that hinder women's agency, mobility, and freedom to work; 2) rising household incomes that create a disincentive for labour market participation among women mainly informed by the same norms in (1); 3) the disproportionate burden of unpaid work and unpaid care work on women, and 4) the lack of quality jobs for women reinforced by gendered occupational segregation and a significant gender-wage gap."

More or less similar reasons are also cited by a study carried out by ILO (2014): Why is female labour force participation declining so sharply in India? The findings in this study indicate that a number of factors were responsible for the recent sharp decline in estimated labour force participation rates among working-age women. However, "the key long-run issue is the lack of employment opportunities for India's women, owing to factors such as occupational segregation", the analysis concluded.[9]

I strongly feel, in addition to the above factors, one has to consider the psyche of women that demotivate them to enter the formal job market or withdraw after marriage. The life of working mothers in India (or anywhere in the world) tends to be harried. Regardless of whether she resides in a major metropolis or in rural India, being a working mother is no cakewalk, and work-life balance for women is as elusive as ever. Financial pressures and ancient Indian traditions, however, ensure that the working women in India find it hard to strike a healthy work-life balance. There is an opportunity cost of losing qualified women from the workforce. In sum, Indian women remain under the heavy yoke of pressure, as shown by the FLFP rate for India which declined significantly, while for most of the countries, it steadily increased.

All these developments are pushing gender gap. The gender gap is the difference between women and men as reflected in social, political, intellectual, cultural, or economic attainments or attitudes. World Economic Forum's (WEF) Global Gender Gap Index measures the extent of gender-based gaps in economic participation and opportunity, educational attainment, health and survival, and political empowerment. India has slipped to the 112th spot from its 108th position in 2018 in the World Economic Forum's Global Gender Gap Index 2019, which covered 153 economies. It ranked below countries like China (106th), Sri Lanka (102nd), Nepal (101st), Brazil (92nd), Indonesia (85th), and Bangladesh (50th) in 2019.[10] And, India's ranking in gender inequality is increasing fast.

The WEF had published its first gender gap report in 2006 when India was ranked relatively higher at 98th place. Since then, India's rank has worsened on three of four metrics used for the overall ranking. While India has improved to 18th place on political empowerment, it has slipped to 150th on health and survival, to 149th in terms of economic participation and opportunity, and to 112th place for educational attainment.[11]

Why this pathetic situation? Unchallenged cultures of male dominance (patriarchal), as reflected by gender inequality, lead to the subordination and even exclusion of many women who do not conform to 'hegemonic' forms of masculinity. And, deteriorating job market and poor governance have added fuel to the fire; and this in turn, has pushed violence against women (VAW). While there are many barriers to empowerment, VAW is the main cause as well as the consequence of gender inequality. VAW is a national phenomenon that cuts across boundaries of age, socioeconomic status, education, and geography. This creates a sense of powerlessness.

VAW also has an impact on the lives of many women beyond the survivors. "In many places, gender-based violence is reinforced by discriminatory laws and exclusionary social norms that undermine women's and girl's

opportunities for education, income, and independence. Sometimes VAW accompanies shifting power relations within households and communities, especially when there is resentment against women who move away from conventional roles", as noted by Selim Jahan, Director of UNDP Human Development Report Office (2018).

In patriarchal societies, the activities of girls and women are closely monitored. A woman can be targeted for murder for a variety of other reasons, including refusing to enter into an arranged marriage or seeking a divorce or separation–even from an abusive husband. The mere suspicion that a woman has acted in a manner that could damage her family's name may trigger an attack; these assumptions are generally based on men's feelings and perceptions rather than on objective truth. Ironically, female relatives often defend the killings and occasionally help set them up. Victims of honour killings, usually, are alleged to have engaged in "sexually immoral" actions, ranging from openly conversing with men who are not related to them to having sex outside of marriage.

In short, honour killing or shame killing is the murder of a member of a family, due to the perpetrators' belief that the victim has brought shame or dishonour upon the family, or has violated the principles of a community or a religion with an honour culture. Honour killing,[12] is most often, the murder of a woman or girl by male family members. The killers justify their actions by claiming that the victim has brought dishonour upon the family name or prestige. And, all these have increased in the recent years due to deteriorating economic conditions coupled with degenerating law and order.

Also, the phenomenon of 'missing girls' has played its role in aggravating the VAW. A key finding in the Economic Survey 2017–18 updates the Amartya Sen (1990) estimate of 40 million missing women in India (nearly 100 million women were missing in the world) to 63 million (GoI, 2018). The phenomenon of missing girls will be discussed in the next section.

Are women any safer in India today?

Too often, India makes international headlines for frightening crimes against women including rapes. Since 2014, crimes against women are on an upward trend, at least according to the statistics provided by the National Crime Records Bureau (NCRB) 2018.[13] It is reported that every 20 minutes, a woman is raped in India, making rapes the commonest crime in the country. According to NCRB, 98 per cent of the rapes in the country are committed by someone known to the victim. The rate of rape convictions in India is low, which stands at 25.5 per cent. According to NCRB, only one in four cases of rape are convicted. In sum, there has been no sign that crimes against women are abating. According to government figures, police registered 33,658 cases of rape in India in 2017, an average of 92 rapes every day, and this figure has doubled in the last 17 years, as per the NCRB.

Instances of brutal rape and violence against the women who report it have given India the dismal reputation of being one of the worst places in the world to be female. Some horrifying examples are:

December 16, 2012: A 23-year-old student is beaten and gang-raped on a moving bus in the national capital-New Delhi, and later dies of her injuries. The crime sparked large-scale protests and led thousands of women across India to break their silence over sexual violence that often goes unreported. July 2019: A young woman—who accused Uttar Pradesh state lawmaker Kuldeep Singh Sengar of raping her in 2017—and her lawyer are critically injured in a highway collision, when a truck hit the car in which they were travelling. The woman's two aunts, who were also in the car, were killed. November 28, 2019: The charred remains of a female veterinarian are found under a flyover near Hyderabad. Four men were arrested on suspicions of gang rape and murder. December 5, 2019: A 23-year-old rape victim is set ablaze by a gang of men, including the alleged rapist, as she made her way to court to attend a hearing in the case, in Unnao district of Uttar Pradesh, police said. (Source: National Crime Bureau.)[14]

In addition to the rape cases, in recent years, we have seen a spate of honour killings in the country. Honour killing is different from the dowry deaths that are also a very common practice in India, especially in North India. According to the official data, between 2001 and 2015, love/marriage was the main recorded reason for such murders, suicides, abducting women, and culpable homicide cases. On average, there are seven murder cases, 14 suicides, and 47 kidnapping cases (mostly because somebody eloped with kith and kin or others) every day.

An unexpected consequence of increased VAW in India has been forcing people, especially females, to change their perception about the birth of a girl child. Within the country, especially in the rural communities, girl children are regarded as liabilities, and preference is given

to male children. In other words, an increasing number of females do not want to give birth to girls.

This obsession with sons has witnessed an alarming increase in the missing girls in India. Based on the 2011 Census, it is estimated that during 2001–11, on an average, the number of girls that were missing in India was 300,000 per year or 820 per day. The number of missing girls for consecutive census periods of 1981–91 and 1991–2001 were 0.5 million and 2 million, respectively. India is thus among the countries with the worst child sex ratios in the world. The 2011 Census showed that the child sex ratio, i.e., the number of girls per 1,000 boys between the ages 0–6, has dipped from 945 girls in 1991 to 919 girls in 2011. The next census may record the child sex ratio of fewer than 900 girls (Kothari, 2014).

The increasing incidence of missing girls is not only a result of infanticide but a well-thought decision by the would-be parents. As a result, the pace of incidences of infanticide might have gone down in the last few years, but the rate of missing girls has increased.

To understand the rising phenomenon of missing girls, one has to analyze the complex calculus that the Indian would-be parents go through when to have a child, how many, and boy or girl. A survey conducted in 2010, by the Forum for Population Action, an NGO, working on population and development issues, in a community inhabited by the middle and lower classes including slum dwellers in Jaipur, India, revealed some interesting facts (see Table 2). The main objective of the survey was to understand fertility preferences and contraceptive uses. Around 200 couples were selected randomly with the help of the local telephone directory who married between 1990 and 1995. Though the sample size is small, findings indicate a strong preference for sons as well as of the small family norms. The survey findings clearly indicate that Indian women with son(s) are more likely to stop having children than those with daughters, thus, the strong relationship between family size and the proportion of female children in a family.

Also, the findings clearly show that the sex ratio is poor when women have one or two children, but gets better as they have more children. Two factors are at play here. One is sex-selective abortions and the other is sex-selective 'stopping practices', which is stopping having children based on the sex of those born. It is observed that women stop childbearing if the first one or two births are sons and even girls.

The findings of the latest National Family Health Survey (NFHS-4: 2015–16) support this trend. The survey showed that almost 30 per cent women with one child had got sterilized, suggesting that they had decided they did not want any more. Almost 84 per cent of women with

Table 2: Distribution of Couples by Number of Children, Jaipur, India 2010

Couple with:	Number of Couples	Per cent of Total Couples
No children	3	1.5
One son	16	8
Two sons	21	10.5
One daughter	5	2.5
Two daughters	14	7
One son and one daughter	39	19.5
One daughter and one son	42	21
More than two children	58	29
Did not answer	2	1
All	200	100

Source: Kothari, Devendra. 2010. "Fertility preferences in an urban locality, Rajasthan: An analysis of survey data". FPA Occasional Paper 8, Forum for Population Action, Jaipur, India.

two children had got sterilized. This was the case for 77 per cent of the poorest women who had two children and almost 89 per cent of women in the highest wealth quintile with two kids. This indicates that even the poor do not want more children.

Now, a question arises why the would-be-parents wish to avoid the birth of a girl child. It is widely observed that growing up as a girl in India in the prevailing environment, is a challenge in itself. Girl/woman is made to feel like it is all her fault. It is just like that when investigating crimes of passion, the French Police are said to use the mantra – 'cherchez la femme' (find the woman) in establishing a motive. This preconceived notion that whatever the ills afflicting us, from crime to unemployment, girls/women must be at the root of them is gaining ground in India's male-oriented society.

Much of this trend is due to cultural beliefs and social norms, which have become more pronounced in the deteriorating governance or law and order, as noted earlier. Girls are raped, beaten, dumped even in the metros like New Delhi. Raising a girl child in such a situation is very difficult. One can ask questions: Save girl child for what? Eve-teasing? Dowry? Rapes? Domestic violence? This is what we have in store for girls? This is why we want to save them? Such questions were posed by females during the survey conducted by the author (Kothari, 2010).

The reason behind the widespread emerging phenomenon of the antipathy for the girl child in India is well summarized by Taslima Nasreen, a Bangladeshi-Swedish writer and feminist when she writes: "The women who support female foeticide also say, 'why should we let them live? We do not want any girl. Should we let girls be born so that they suffer the way we are suffering? They say, what good does being alive do to us? It is better than an insufferable life ends before it can begin. It is better to go straight to heaven than stay alive and endure the kicks and blows of the world. Are they wrong in saying this?" (Nasreen, 2012).

India cannot uphold or continue this situation further. There is clearly an urgent need for policy initiatives to empower women since gender inequality is increasing in spite of rapid socio-economic growth, as discussed above. India has to think out of the box.

It is interesting to note that where the Economic Survey 2017–18 begins its chapter, 'Gender and Son Meta-Preference: Is Development Itself an Antidote?' By quoting IMF chief Christine Lagarde telling Davos that women's participation in the workforce to the level of men can boost the Indian economy by 27 per cent (GoI, 2018).

Hence, its conclusion that just as India has committed to moving up the ranks in the ease of doing business indicators; it should do so on gender outcomes too. In particular, India must mend the meta-preference for sons and low employment levels of women.

Agenda for women empowerment:

The female's *abhivyakti* (expression), *khwaab* (dream), or *kalpana* (fantasy) frightens the patriarchal society like India. The patriarchal way of life wants to regulate it by hook and crook. It appears "women are not born, but made". What better than India to exemplify this statement by Simone de Beauvoir, made some 70 years ago. One has to recognize that high GDP or economic growth alone does not automatically empower women nor does it reduce gender inequality.

In my earlier paper, "Empowering Women in India: Need for a Feminist Agenda", it is argued that there is an urgent need to formulating a feminist agenda to empower women living in highly patriarchal and traditional surroundings with several obstacles (Kothari, 2014). The 'agenda' is based on the premise that no doubt efficient policing, stringent punishments, and legal measures would reduce the incidences of crime against women but these cannot eliminate growing gender inequality in India unless and until the mindset of the society is changed. The paper suggested that women-centred reproductive health care along with enlarged education and employment opportunities for females may alter patriarchal constructs despite strong structural resistance. And, this feminist agenda would contribute significantly towards women's empowerment and reduce gender gap significantly. But the question persists on how to change the 'patriarchal mindset'.

What do we do then? No doubt, expanding education and employment opportunities will help to achieve gender equality but that may take more time. To expedite the process, "we need men to be allies", as argued by the co-chairman of the Bill and Melinda Gates Foundation, Melinda Gates, in her article, "Women Transform Societies", based on Indian experiences (Gates, 2016). Expanding her argument, she writes: "women's empowerment can't be just about women; it also has to be about men the fathers,

brothers, husbands, and sons – with whom they live their lives". But, she does not suggest a way out as to how to achieve it on the ground.

My policy article - Nurturing Human Development: A Strategy for New India - suggests that women empowerment can be achieved by systematic but deliberate human development interventions at the household level to change the mindset (Kothari, 2019). Men and women do what they see in their own families and surroundings. People question the government's inability, but it would require reforms in child rearing as well as education in primary schools regarding gender equity respecting women and their dignity. Mothers need to learn to treat daughters equally as they do for their sons. It means one has to work at the family or household level. And here, the HD Plus strategy, as elaborated in the article, with the help of grassroots workers like ASHA and Anganwadi could be a great help in inculcating such values among young ones. These workers could be trained to change the minds of young and adult as well as old alike, about everything from the age at which girls should be married to whether men and boys should help with housework. In fact, there is a great need to de-feminisation of unpaid work and care giving. On an average, 65 per cent of the work done by Indian women is unpaid, compared to 12 per cent of men's. With regard to unpaid care work, women in India spend on average 297 minutes a day on tasks such as taking care of the children, the elderly, and the sick; in comparison, men spend 31 minutes a day.[15] The implementation of the proposed HD Plus strategy will drive home a point that girls are to be treated equally and celebrated.

The HD Plus strategy, based on a 'whole child' concept, argues that the school-going child and his/her family (that is HD Plus family) should be the fulcrum of women empowerment efforts. The concept is being described by policies, practices, and relationships, which ensure that each child is healthy, educated, engaged, supported and encouraged. For this, integrating the child and his or her family more deeply into the day-to-day life of school and home activities represents an untapped instrument, not only for raising the overall productivity but also for changing the mindset regarding patriarchal values and women's status. In other words, creating an enabling environment at family and school levels is the way to change the mindset of people to initiate the process of women empowerment.

The proposed agenda, based on the HD Plus strategy, to empower women must be appended with the following pathways to make it more effective:

- Promoting co-education,
- Shedding the ghoonghat (veil), and
- Enhancing employment by balancing maternity and family responsibilities with work

Discussion and Conclusion

Based on the review of the available literature and the empirical studies, female labour force participation rate in India tended to be stagnant and has been declining since 2005. There are several factors that have affected women's entry in employment. But our policy makers and experts are not keen in analysing this unusual development in the face of economic growth. We generally hide such issues under the carpet to avoid embarrassment.

For example, "India's Daughter" is a documentary film directed by Leslee Udwin and produced by BBC. It was planned to be broadcast on International Women's Day, 8 March 2015, in India. But the Indian government blocked its broadcast by obtaining a court order on 4 March 2015. It highlights prevailing horrifying mindsets against females in India and shows the urgent necessity of changing those mindsets.

Simply shoving them under the carpet and pretending that they do not exist, provides ideal conditions for them to fester and grow, provoking more crimes and violence against women in the future, as noted by Times of India in its editorial – Let's Talk About Rape. Professor Rajiv Kumar, then a senior fellow at Centre for Policy Research, New Delhi and now Vice-Chairman NITI Aayog is also right when he argued that "rather than ban Nirbhaya documentary, we must address issues raised by it" (Kumar, 2015).

The increasing violence against women is creating an environment of fearfulness, which is not an ideal condition for women empowerment. The documentary is clearly pointing out that such incidents are growing due to the patriarchal outlook. That may be one of the significant reasons why women, even after getting higher education, are withdrawing from the formal labour force, as discussed in the paper. As a result, the FLFP rate for India has declined significantly, while for most of the countries, it is steadily increasing (Joshi, 2018; Sorsa et al., 2015).

Better utilization of the enormous untapped or underutilized pool of female labour is crucial to stimulate productivity, growth and develop human capital. Greater female labour force participation could boost productivity growth by increasing the labour supply, while poor use of women's potential places a significant drag on aggregate productivity, which is not good for achieving the vision of 'self-reliant India'.

The paper concludes that there are several factors that have adversely affected women's entry in employment. The employment scarcity and growing patriarchal mindsets are preventing women from entering into the formal employment. Generally, women enter the labour market because they want to generate an income.

No amount of legislation, CCTV cameras or added security measures are going to really change things. The paper reasons that we have to look deep inside, change our core positions or attitudes, and we have to bring up a whole new young generation who are free of the patriarchal mindset. There is an urgent need to work at the micro-level or family level in promoting gender sensitization if we are serious about exorcising our society of abuses against women. Perhaps it is time to move beyond the hypocrisy about the situation of females in India and change the society's horrifying mindsets.

Today, women are more eager to learn new things in their workplace. They have proved to be more sincere. And they know how to mobilize resources to complete an assigned task. Hence, we have to create an enabling environment where women can chase big dreams and contribute to the country's welfare and development. Here, the state and society have to swing to their side. For this, this paper suggests a way out, which is based on the HD Plus strategy to change the patriarchal mindset from the childhood.

We have to recognize that women do not need patronage; they need an enabling environment for elevating themselves. And, the proposed strategy can contribute significantly to achieve that goal.

I will like to conclude by quoting former IMF chief Christine Lagarde telling Davos "women's participation in the workforce to the level of men can boost the Indian economy by 27 per cent". Hence my conclusion that, just as India has committed to moving up the ranks in the ease of doing business indicators; it should do so on gender outcomes too. In particular, India must mend the meta-preference for sons (mainly due to the patriarchal culture) and low employment levels of women.

Hope India's policymakers, as well as the public at large, understand the feelings of an oppressed gender.

Notes:

[1] Read more at: https://www.uah.edu/woolf/feminism_kinds.htm

[2] Refer article: Fact Check: Is India really no country for women? India Today, June 27, 2018 at: https://www.indiatoday.in/fact-check/story/fact-check-india-no-country-women-thomson-reuters-foundation-report-poll-true-false-1271690-2018-06-27

[3] The World Bank provides data for India and other countries from 1990 to 2019 at: https://data.worldbank.org/indicator/SL.TLF.CACT.FE.ZS?locations=BD-IN&name_desc=false

[4] Read more at: https://www.livemint.com/Opinion/v80I9EwDz6oyklST8ebqMM/Reversing-womens-decline-in-the-Indian-labour-force.html

[5] Read more at:http://timesofindia.indiatimes.com/articleshow/71267870.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

[6] Read more at: https://www.financialexpress.com/economy/indias-economic-growth-story-remarkable-since-1990s-never-mind-quarterly-fluctuations-world-bank/1098628/

[7] As per the World Bank, the average value for female labour force participation in India during the 1990–2019 period was 25.4 per cent with a minimum of 20.52 per cent in 2019 and a maximum of 31.79 per cent in 2005. On the other hand, the male average value during that period was 82.14 percent with a minimum of 79.57 percent in 2019 and a maximum of 85.01 percent in 1990. The labour force participation rate is the percent of the male population aged 15 and above who are economically active.

[8] The World Bank provides data for Bangladesh from 1990 to 2019. The average value for Bangladesh during that period was 28.41 percent with a minimum of 23.62 percent in 1990 and a maximum of 36.14 percent in 2019. The latest value from 2019 is 36.14 percent.

[9] Read more at: https://www.sdgfund.org/why-female-labour-force-participation-declining-so-sharply-india

[10] Read more at: https://www.thehindu.com/news/national/india-slips-to-112th-place-on-gender-gap-world-economic-forum-report/article30326228.ece

[11] Read more at: https://www.thehindu.com/news/national/india-slips-to-112th-place-on-gender-gap-world-economic-forum-report/article30326228.ece

[12] The honour killing is defined as a death that is awarded to a woman of the family for marrying against the parent's wishes, having extramarital and premarital relationships, marrying within the same gotra (clan), or outside one's caste, etc.

[13] Refer: Crime In India-2018: The National Crime Records Bureau at: https://ncrb.gov.in/crime-india

[14] Refer: Sexual violence pandemic in India: Rape cases doubled in last 17 years, India Today, December 13, 2019 at: https://www.indiatoday.in/diu/story/sexual-violence-pandemic-india-rape-cases-doubled-seventeen-years-1628143-2019-12-13

[15] Refer OECD Database, Employment: Time spent in paid and unpaid work by sex, *OECD. Stats at:* https://stats.oecd.org/index.aspx?queryid=54757

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"If you want something said, ask a man; if you want something done, ask a woman."

– Margaret Thatcher

Women Empowerment through Self Help Groups in HP: An Analysis

SHYAM L. KAUSHAL AND NIVEDITA SHARMA

Women empowerment is a buzzword around the globe including India. Here, many initiatives are taken for this purpose and among those, Self Help Groups (SHGs) have emerged as one of the important options. Basically, empowerment refers to social and political succession that is dependent on economic empowerment. It consists of income and livelihood on one side, and freedom to spend income and control over resources on the other. Review of literature witnessed that education, access to resources, nutritional food, health care facilities, decision-making power and self-employment are the basic tenets and the Self Help Group movement paved the way to empower women in India. Further, the studies show direct relationship between growth of SHGs and women empowerment. But women empowerment in a patriarchal society remains a critical challenge in reality, and time to time attracts academicians and policy makers to debate the issue. The present paper is an endeavour to study the women empowerment through SHGs by examining its growth pattern in HP. The data and information were collected from primary and secondary sources like books, magazines, journals, newspapers, websites and MIS/offices circulars etc. The collected data was analysed with suitable statistical tools.

From the data analysis, it is concluded that SHGs are spreading throughout the country including HP but their formation and growth prototype is uneven. However, upward trend clearly hint that SHGs are helping significantly in financial inclusion of poor women. In consequence to their association with SHG movement, women have started saving small amounts of money for their future needs, linked themselves with formal banking system and availed micro credit on easy terms. Thus, it demonstrates that SHGs are not only solving their routine problems but also improving their decision-making and risk-taking habits. However, its growth pattern was not same in all areas in the country. In the same vein, in Himachal Pradesh where 33 per cent SHGs were formed in two districts of the state could be a pointer to prevalent irritants and bottlenecks in other regions. However, the fact is that need-based training capsules and access to economic resources at affordable rates motivate women to start new economic units collectively under the ownership of SHGs, which improved their confidence levels, moral strengths, leadership qualities, managerial and entrepreneurial skills and decision-making skills. Yet, a need has been felt to educate women about government policies, training programmes, banking system and interest rates for attaining real objectives of SHGs and consequently achieving the cherished goal of women empowerment in reality. But from the analysis, it can be concluded that women have diversified their sources of income by looking beyond agricultural activities and became financially independent on one side, and paved way to their social and political advancement.

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Introduction

Women comprise almost half of the Indian population. After independence, socio-economic role of women have changed a lot but still needs to achieve equality. With the changing scenario, the Government of India has changed its focus from welfare to development and now to empowerment of women. Similarly, the government had declared 2001 as year of Women Empowerment[1]. According to Oxford dictionary, empower means to give authority to someone or to give power to someone. The World Bank defines empowerment as "the process of increasing the capacity of individuals or groups, to make choices and to transform those choices into desired actions and outcomes. Central to this process are actions which both build individual and collective assets and improve the

efficiency and fairness of the organizational and institutional context which govern the use of these assets[2]".

Women empowerment policy was framed by GoI in 2001, which lays emphasis on participation of women in social, political and economic activities. National Policy on Women Empowerment states the empowerment of women as a process through which women can realise their full potential by becoming aware about their rights and using their rights to access equal opportunities in various domains of life. For political empowerment of women, participation in decision-making bodies and politics is required. Access to education, better health care facilities, nutritional food, safe drinking water, safe house, sanitation facilities, environment friendly cooking techniques and elimination of violence against women are measures defined by policy for social empowerment of women[3].

According to Amartya Sen, "...empowerment can accelerate development. From whichever direction the issue is looked into, it provides justification for giving economic empowerment to women" [4]. It has been noted that the economic empowerment policy comprises certain measures to remove poverty by providing access to micro credit, livelihood opportunities, imparting necessary training in agriculture and allied sectors and supporting working women by making suitable HR policies for them. Basically, economic empowerment consists of income and livelihood[5] on one side and freedom to spend income and control over resources on the other[6]. The capacity to decision-making and self-employment are roots of success and Self Help Group movement creates ways to empower the women in India[7]. But, women empowerment in a patriarchal society remains a critical challenge in reality, and time-to-time attracts academicians and policy makers to debate this burning issue.

Historically, Indian Constitution provides for gender equality. The Fifth Five-year plan (1974–78) shifted focus from women welfare to development, and the National Commission for women was set up in 1990. Importantly in 1993, through the 73rd and 74th amendments to the Constitution of India, it provided reservation to women in PRIs and local bodies in the country, Sawadhar 2002. Gender Responsive Budgeting was institutionalised in 2005–06, Ujjawala in 2007, Beti Bachao Beti Padhao in 2015, the government gave impetus to women in decision-making be it social, political, legal or economic etc. Time-to-time many initiatives were taken to uplift women equal to men[8]. Recently, the empowerment of women was identified also as part of Sustainable Development Agenda, 2030, of the United Nations General Assembly. Indian government has started many schemes to ensure economic participation of rural women such as Pradhan Mantri Mudra Yojana (PMMY) and DDU-GKY including Self Help Groups (SHG)[9]. NABARD has also recognized the significance of SHG in women empowerment and mentioned the role of SHG Bank Linkage Programme in socio-economic empowerment of the rural poor women[10]. In response to the pandemic Covid-19 and nationwide lockdown during March-April, 2020, Government of India announced a relief package with a one–time payment to women Jan Dhan account holders (Choudhary, A. 2020) and widows belonging to economically backward sections, pensioners, the differently-abled and a hike in collateral-free loans for SHGs etc[11]. It indicates the important recognition of women factor and the role of SHGs in rural society and to the economy of India. So let us understand the SHG concept, its inception and contributions.

Genesis of SHG in India

The idea of Self Help Groups was given by Professor Mohammed Yunus, winner of Noble Peace Prize who laid the foundation of Grameen Bank in Bangladesh—to promote the concept of SHG and micro credit. Self Help Group, as the name suggests, is based on the idea of helping oneself. People with same motive come together, work together and share the outcome of their efforts. The spirit is "Only the wearer knows where the shoe pinches" so nobody else can help the poor better than themselves. Conceptually, SHGs are informal organisations of ten to twenty individuals who voluntarily come together to form a Group[12]. There is special concession given to people living in hilly and tribal areas where population is scattered, viz, a group can be formed with minimum 5 members. SHGs are formed to achieve a common goal that is mutually decided by group members. Members in the group work collectively for the benefit of all the members. Coordination, cooperation and collective efforts of all members are requisite for smooth functioning and success of SHGs. It works on the principle of "Union is Strength".

SHGs are formed to inculcate the habit of thrift and saving among members. The members save small amounts of money (thrift) which is compulsory, and is used for providing loan to the members and for calculation of member's share in interest or dividend. The Financial Inclusion and Development Department of RBI defines the importance of regular thrift that it will increase the group's

corpus and consequently the members need not depend on moneylenders. The key principles of SHGs are regular periodic meeting, regular attendance of members, regular internal lending, timely payment by borrowers and proper record of group's financial and non-financial transactions. It is very important that SHG women get credit on easy terms with negligible formalities to start income generating activities so that they can raise their social and economic status, thus resulting in poverty eradication[13].

Self Help Groups are a dominant model for microfinance to reach poor community in India[14]. No doubt, credit access to poor women through formal channels helped them to earn their living and providing finance to needy poor population of the country is not a new concept. It was evolved in India when Shri Mahila Sewa Sahakari Bank was established in Ahmedabad, Gujarat, by Self Employment Women Association (SEWA). This is an Urban Cooperative Bank, which provides banking services to poor women working in the unorganised sector[15]. It is important to note that Self Help Group-Bank linkage model is one of the state-led microfinance models in India. The aim of this programme is to reach the poor people to meet their unmet credit needs and to inculcate a habit of saving. Basically, the Indian model is based on saving first and credit later. In 1992, the pilot phase of SHG-Bank linkage programme was launched by the National Bank for Agriculture and Rural Development (NABARD) to provide credit to the un-served poor population of the country. Earlier, this programme was introduced in the commercial banks, but in 1993, it was also extended to the RRB and Cooperative Banks. According to NABARD's Report[16] on Microfinance in India, 2019 "Self Help Group movement has emerged as the world's largest and most successful network of women-owned, community-based microfinance institution".

Review of Related Literature

Mehta (2011) [17] conducted a study on socio-economic status of SHG members in Jammu region. It was observed that SHG women were able to freely express their problems, increased monthly saving and availed loan for consumption needs and business purpose, and importantly improved the standard of living have inspired other women to join the SHGs. **Jain and Jain (2012)** [18] found positive impact of microfinance on empowerment of women as it increased their savings amount and decreased dependency on money lenders. It was reported that women are coming out of poverty conditions by generating income through SHG and taking decisions on their family's financial matters. **Gandhi and Kumari (2013)**[19] identified the products offered and marketing strategies adopted by the SHG women. It was found overall that the women members were engaged in production of a wide variety of food and non-food based items but not able to adopt mass production, mass selling, attractive packaging and product diversification strategies. **Sahoo (2013)**[20] investigated the relationship between women empowerment and SHG in Odisha state. The study reported that members have taken loan to start business activities, agricultural activities, for personal consumption, payment of medical bills and repair of house. The author concluded that the easily available credit was the main motivational factor for taking part in SHG movement. **Abraham (2015)**[21] studied the marketing activities of SHG women in Kerala and concluded that SHG members were facing difficulty in carrying goods to the stalls set up in different districts of the state and facing competition from other SHGs due to the similarity in products offered by them.

Kapoor and Kanwar (2015)[22] studied women empowerment through 446 SHG members in District Kangra, Himachal Pradesh. The authors highlighted many advantages for the women joining SHG, viz., getting exposure of outside world, confidence building, becoming financially secure, getting recognition at village level and availing various government schemes. It was concluded that after joining SHG, rural women were found to cooperative with each other, confident in handling money and economically secure. **Palanivel and Sudharsanan (2015)**[23] investigated the various problems faced by 534 SHG members in Kancheepuram district of Tamil Nadu. It was found that women were facing difficulty in starting new business activities due to lack of required skills and lack of financial resources due to high rate of interest on borrowing, not attractive product portfolio and lack of cooperation among women members. **Shettar (2015)**[24] revealed key obstacles in women empowerment in India such as low literacy rate of women, poverty and lack of access to health care facilities and nutritional food. The author mentioned that women form 29 per cent of the total workforce mostly in agriculture and animal care; while only 26 per cent have access to formal credit with a low proportion of women in ministerial level positions and judiciary. **Roy and Biswas (2016)**[25] examined the positive impact of SHGs on women empowerment and financial inclusion in West Bengal as women have opened bank accounts, availed loans, started using ATM and have diversified their sources of income by looking beyond their

corpus and consequently the members need not depend on moneylenders. The key principles of SHGs are regular periodic meeting, regular attendance of members, regular internal lending, timely payment by borrowers and proper record of group's financial and non-financial transactions. It is very important that SHG women get credit on easy terms with negligible formalities to start income generating activities so that they can raise their social and economic status, thus resulting in poverty eradication[13].

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traditional earning sources. **Koti and Devi (2019)**[26] pointed out that women join SHGs to financially support their families by running business activities jointly with other members, park their additional money in form of saving and even avail loan facilities. The study found remarkable increase in confidence of women after joining SHGs.

Objectives and Methodology

The key objective of the paper was to study women empowerment through SHGs by examining its growth pattern in HP. The data and information were collected from primary and secondary sources like books, magazines, journals, newspapers, websites and MIS / offices circulars etc. The collected data was analysed with suitable statistical tools like % weight age etc. and through the review of related literature, it was assumed that SHGs and women empowerment have a direct relationship.

Women Empowerment and SHGs: National Milieu and HP

Women empowerment is a buzzword around the globe including in India. Here, many initiatives are taken for this purpose and among those, the SHGs have emerged as one of the important options for poor rural women. The pattern and spread of SHGs at national level vis-à-vis the status in HP have been examined as Table 1.

Table 1 illustrates the number of savings- and credit-linked SHG in India. The number of savings-linked SHGs were 7,903,002 in FY 2015–16 that had grown to 10,014,243 at the end of FY 2018–2019. Karnataka accounted for 12 per cent of the country's total number of savings-linked SHG at the end FY 2015–2016 followed by Andhra Pradesh (11 per cent) whereas Himachal Pradesh constitutes only 0.56 per cent of total savings-linked SHG in India. At the end of FY 2018–2019, the number of savings-linked SHG were 10,014,243. Out of these, the maximum concentration was in Maharashtra (10.82 per cent) followed by Tamil Nadu (10.58 per cent) whereas Himachal Pradesh has only 0.54 per cent of total savings-linked SHG. In case of savings-linked SHG, in FY 2017, the highest growth was registered in Dadra Nagar Haveli followed by Chandigarh (474.22 per cent), while Odisha depicted maximum decline, i.e. 11 per cent, in FY 2018. Lakshadweep recorded the highest growth (4050 per cent), while Chandigarh has shown the highest negative growth rate (-72 per cent) and in FY 2019, savings-linked SHG increased by 141 per cent in Daman and Diu whereas the highest negative growth was in Jammu & Kashmir (-71 per cent). SHG having o/s loan with banks had grown by 3.76 per cent, 3.55 per cent and 1.13 per cent in FY 2017, FY 2018 and FY 2019 respectively. All states and union territories have credit-linked SHGs except Daman and Diu. The share of all women SHGs were 85.58 per cent, 85.36 per cent, 84.51 per cent and 85.19 per cent in total savings-linked SHG and 86.37 per cent, 88.36 per cent, 90.62 per cent and 87.87 per cent in total SHGs having loans outstanding at the end of FY 2016, FY 2017, FY 2018 and FY 2019 respectively. The savings and credit accounts clearly indicate the economic decision-making tendencies behaviour among women, which is showing upward trend amongst the poor women folk throughout the nation, with some exceptions.

SHG movement in Himachal Pradesh

On 15th April 1948, Himachal Pradesh state was formed by merger of 30 princely states. Popularly called Devbhoomi, Himachal Pradesh is situated in western Himalayas having an area of 55,673 square kilometres[27]. This is a hilly state comprising of 12 districts. It has 33.8 Lakh females in its total population of 68.65 Lakh (Census 2011)[28]. Almost 90 per cent people live in rural areas. The mainstay of people in the State is agriculture and horticulture activities. As per Economic Survey of Himachal Pradesh (2019–20), 25 agriculture and allied sectors contributed to 8.8 per cent of the State Domestic Product. As far as women were concerned, they were traditionally confined to their houses but are gradually exploring other options with the proliferation of education and communication. It is noted that at the time of statehood, the literacy rate was only 31.96 per cent, which has now increased to 75.93 per cent for females (Census 2011). It has contributed importantly in the overall inclusive development of areas and sections including women.

According to the Society for Economic Development and Environmental Management in Himachal Pradesh, the foundation for SHG was laid during the British Raj as Choe Reclamation (CR) groups in Una district to collectively solve the water scarcity problem of Kandi areas. After Independence, HP has witnessed many voluntary organisations including National Cooperative Union of India (NCUI) that worked for the formation of SHG in the State, but a revolutionary change was seen 1999 onward[29]. From 1st April 1999 to 31st March 2013, about 13,254 SHGs were formed in HP but it was noted that one-third of the total SHGs were formed in two districts of the State. It is pertinent to note that almost three-fourths of the total SHGs were able to start income generating activities. But more

Table 1: Growth Pattern of Savings-Linked and Credit-Linked SHGs in India

State/ UT	No. of Savings Linked SHG							No. of SHG having loan o/s at the end of FY						
	31.03.2016	31.03.2017	Growth from 2016 to 2017 (%)	31.03.2018	Growth from 2016 to 2017 (%)	31.03.2019	Growth from 2016 to 2017 (%)	31.03.2016	31.03.2017	Growth from 2016 to 2017 (%)	31.03.2018	Growth from 2016 to 2017 (%)	31.03.2019	Growth from 2016 to 2017 (%)
Chhattisgarh	160461	179496	11.86	190513	6.14	231876	21.71	81328	94018	15.60	106752	13.54	59263	-44.49
Madhya Pradesh	248618	238496	-4.07	256178	7.41	332512	29.80	118926	91730	-22.87	88698	-3.31	91861	3.57
Uttarakhand	42595	46930	10.18	48141	2.58	54053	12.28	17384	14489	-16.65	17193	18.66	13249	-22.94
Uttar Pradesh	363979	383592	5.39	407390	6.20	444318	9.06	217159	198174	-8.74	191735	-3.25	159769	-16.67
A & N Islands	4475	4874	8.92	5257	7.86	5856	11.39	623	1722	176.4	977	-43.26	1211	23.95
Bihar	278608	441309	58.40	594790	34.78	770195	29.49	267338	364169	36.22	474913	30.41	602089	26.78
Jharkhand	99326	130350	31.23	153192	17.52	238568	55.73	64999	87274	34.27	80482	-7.78	90611	12.59
Odisha	486686	431487	-11.34	530489	22.94	663381	25.05	213871	220662	3.18	232945	5.57	262326	12.61
West Bengal	831011	945056	13.72	847269	-10.35	976358	15.24	584071	669469	14.62	622836	-6.97	734278	17.89
Arunachal Pradesh	4617	5460	18.26	6000	9.89	5230	-12.83	408	239	-41.42	526	120.08	261	-50.38
Assam	333686	347505	4.14	375986	8.20	410481	9.17	107137	101457	-5.30	100455	-0.99	90218	-10.19
Manipur	13620	15470	13.58	16960	9.63	17702	4.38	2063	1762	-14.59	1495	-15.15	1996	33.51
Meghalaya	8196	8442	3.00	11427	35.36	20745	81.54	1573	1265	-19.58	1692	33.75	636	-62.41
Mizoram	8072	8737	8.24	8934	2.25	11897	33.17	2156	1378	-36.09	1824	32.37	2079	13.98
Nagaland	11432	13019	13.88	6533	-49.82	6033	-7.65	3348	2449	-26.85	1285	-47.53	681	-47.00
Sikkim	1542	4211	173.09	6077	44.31	5837	-3.95	632	696	10.13	3435	393.53	1424	-58.54
Tripura	48658	50043	2.85	53674	7.26	45544	-15.15	33543	33976	1.29	32936	-3.06	26259	-20.27
Chandigarh	225	1292	474.22	357	-72.37	529	48.18	211	107	-49.29	72	-32.71	64	-11.11
Haryana	42921	40615	-5.37	38216	-5.91	54663	43.04	18912	22497	18.96	15173	-32.56	15029	-0.95
Himachal Pradesh	44185	45735	3.51	49353	7.91	54079	9.58	18261	16486	-9.72	10420	-36.79	11943	14.62
J&K	8386	16862	101.07	17980	6.63	5213	-71.01	3641	6034	65.72	8971	48.67	3182	-64.53
New Delhi	3668	4480	22.14	4331	-3.33	5010	15.68	558	415	-25.63	320	-22.89	297	-7.19
Punjab	29971	31486	5.05	37734	19.84	44397	17.66	15034	11882	-20.97	10186	-14.27	7199	-29.32
Rajasthan	264119	316729	19.92	330912	4.48	384733	16.26	98107	86484	-11.85	99286	14.80	86416	-12.96
Daman & Diu	-	103	103	43	-58.25	104	141.86	0	0	0	0	0	0	0

Dadra Nagar Haveli	-	648	648	599	-7.56	685	14.36	0	223	223	219	-1.79	149	-31.96
Goa	7541	7408	-1.76	8218	10.93	9406	14.46	1791	1598	-10.78	1472	-7.88	1575	7.00
Gujarat	221350	247022	11.60	240297	-2.72	294609	22.60	48187	48364	0.37	65926	36.31	47482	-27.98
Maharashtra	789158	885420	12.20	848291	-4.19	1083811	27.76	208141	227912	9.50	208719	-8.42	227695	9.09
Andhra Pradesh	901517	848721	-5.86	927556	9.29	889559	-4.10	802227	751357	-6.34	774115	3.03	764426	-1.25
Karnataka	962446	1031733	7.20	835643	-19.01	907391	8.59	632437	649709	2.73	744479	14.59	612742	-17.70
Kerala	272859	279527	2.44	296289	6.00	389214	31.36	177880	142923	-19.65	173832	21.63	197154	13.42
Lakshadweep	2	4	100	166	4050	173	4.22	2	4	100	2	-50.00	2	0
Puducherry	14763	22340	51.32	24722	10.66	21428	-13.32	4833	5613	16.14	7284	29.77	7157	-1.74
Tamil Nadu	852034	909492	6.74	1047103	15.13	1059897	1.22	432893	384307	-11.22	376996	-1.90	385698	2.31
Telangana	542275	632781	16.69	517817	-18.17	568756	9.84	492947	607443	23.23	562707	-7.36	570911	1.46
Total	**7903002**	**8576875**	**8.53**	**8744437**	**1.95**	**10014243**	**14.52**	**4672621**	**4848287**	**3.76**	**5020358**	**3.55**	**5077332**	**1.13**

Source: NABARD: Status of Micro Finance in India, Compiled from *2015–16, 2016–17, 2017–18 and 2018–19*

than half of these SHGs were confined to three districts of the State. According to Annual Administrative Report (2012–13) of Himachal Pradesh Rural Development Department, Swaran Jayanti Gram Swarozgar Yojana helped the poor households to come out of poverty and provided credit plus subsidy benefits to SHGs, especially the vulnerable sections of the society such as SC/ST/disabled[30].

A scan of the data available found variations in sources about SHG's formation, objectives, activity, area location and banking access depending upon media or communication constraints etc. However, an attempt has been made to examine the recent trends of SHGs formation exclusive for women members in Himachal Pradesh, to study women empowerment, as under (see Table 2).

Table 2: Trend Analysis of SHG Formation and Women Members inn HP (2013 to 2020) under SGSY/NRLM

Financial year	No. of SHGs formed druing the year	Over the year growth rate	Total women became SHG member during the year	Over the year growth rate
Before 1-4-2013	433	—	3481	—
2013-14	2129	391.69	15324	340.22
2014-15	2461	15.59	18223	18.92
2015-16	1318	-46.44	10371	-43.09
2016-17	2008	52.35	15993	54.21
2017-18	2742	36.55	23545	47.22
2018-19	3789	38.18	31225	32.62
2019-20	3501	-7.60	27621	-11.54

Source: Compiled from MIS Office of HPSRLM, Department of Rural Development, HP

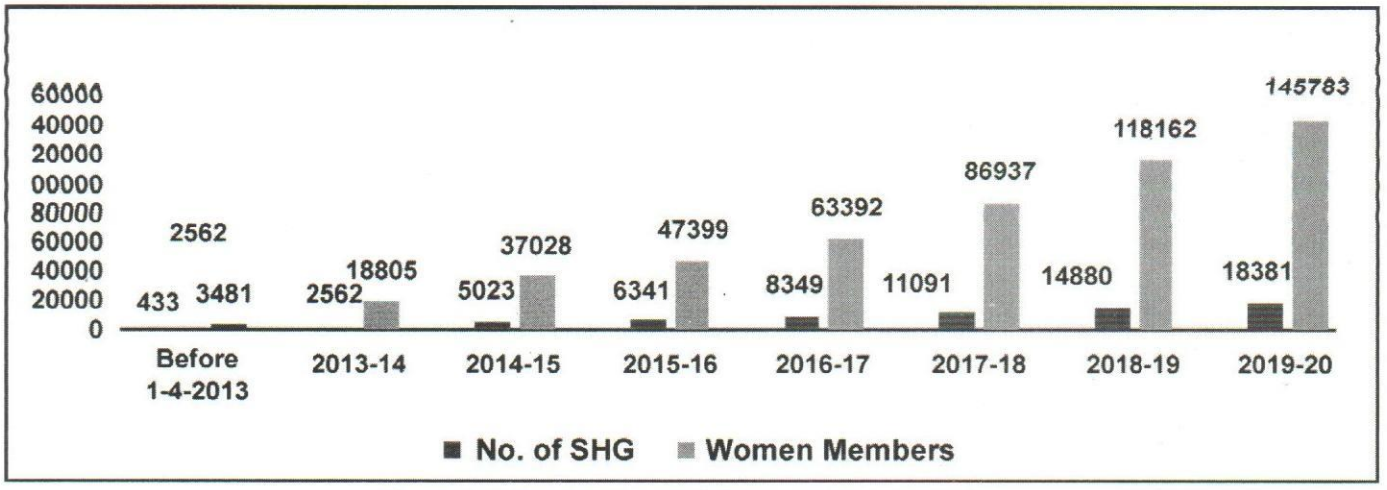

Figure 1. SHGs and Women Members under NRLM in HP

Above data shows the number of SHGs with women members functioning under the National Rural Livelihood Mission (NRLM). The Mission is running from 1st April 2013 in the State to encourage and facilitate progress of rural masses. In 2013, 433 SHG formed under NRLM and the number of SHGs and women members surged by 391 per cent and 340 per cent respectively in the first year of this scheme (2013–14). The data showed maximum numbers in 2018–19 and little decline in some other years owing to difficulty in accessing the exact data, and

Table 3: District-wise growth and share trend analysis of SHGs in HP (2015 to 2019) under NRLM

District Name	2014–15	2015–16	Growth Rate from FY 2015 to FY 2016 (%)	2016–17	Growth Rate from FY 2016 to FY 2017 (%)	2017-18	Growth Rate from FY 2017 to FY 2018 (%)	2018-19	Growth Rate from FY 2018 to FY 2019 (%)
Bilaspur	305 (6.1%)	395 (6.20)	29.51	498 (6%)	26.08	744 (6.7%)	49.40	915 (6.2%)	22.98
Chamba	288 (5.7%)	362 (5.7%)	25.69	473 (5.7%)	30.66	577 (5.2%)	21.99	961 (6.5%)	66.55
Hamirpur	340 (6.8%)	401 (6.3%)	17.94	540 (6.5%)	34.66 34.66	878 (7.9%)	62.59	1189 (8%)	35.42
Kangra	816 (16.2%)	1013 (16%)	24.14	1607 (19.3%)	58.64	2058 (18.6%)	28.06 28.06	2688 (18.1%)	30.61
Kinnaur	34 (0.7%)	44 (0.7%)	29.41	66 (0.8%)	50.00	140 (1.3%)	112.12	211 (1.4%)	50.71
Kullu	294 (5.9%)	332 (5.2%)	12.93	412 (4.9%)	24.10	642 (5.8%)	55.83	1008 (6.8%)	57.01 57.01
Lahaul and Spiti	4 (0.1%)	6 (0.1%)	50.00	9 (0.1%)	50.00	9 (0.1%)	0	13 (0.1%)	44.44
Mandi	1029 (20.5%)	1286 (20.3%)	24.98	1477 (17.7%)	14.85	1913 (17.3%)	29.52	2510 (16.87%)	31.21
Shimla	1216 (24.2%)	1541 (24.3%)	26.73	182 (21.8%)	18.17	2082 (18.8%)	14.33	2521 (16.95%)	21.09
Sirmaur	189 (3.8%)	246 (3.8%)	30.16	371 (4.4%)	50.81	628 (5.7%)	69.27	1010 (6.8%)	60.83
Solan	203 (4%)	326 (5.1%)	60.59	407 (4.9%)	24.85	541 (4.9%)	32.92	735 (4.9%)	35.86 35.86
Una	305 (6.1%)	388 (6.1%)	27.21	667 (8%)	71.91	875 (7.9%)	31.18	1115 (7.5%)	27.43 27.43
Total	5023	6340	26.22	8348	31.67	11087	32.81	14876	34.18

Source: NRLM: G10 Report- SHG Functioning Under NRLM, Compiled from *2014–15, 2015–16, 2016–17, 2017–18, and 2018–19* Retrieved from https://nrlm.gov.in/SHGFunctioningUnderNRLMAction.do?methodName=show SHGFunctioning NRLM, on 18th March, 2020

institutional and environmental factors. But the inclusion of poor women has shown remarkable improvement. Figure 1 shows an upward trend in the formation of SHGs and 145,783 women members were associated with SHGs. In a nutshell, SHGs were formed every year and women were showing interest in this movement for their desire to move in equally.

Table 3 illustrates the year-wise trend in number of SHGs in Himachal Pradesh under NRLM. In 2014–15, 5,023 SHG were functioning under NRLM which increased by 26.22 per cent to 6,340 in 2015–2016. Further, in 2016–2017, this number increased by 31.67 per cent to 11,087 SHGs and again surged by 32.81 per cent and 34.18 per cent in 2017–2018 and 2018–2019 respectively. Maximum growth was reported in Solan (60.59 per cent), Kangra (58 per cent), Kinnaur (112 per cent) and Chamba (66 per cent) in FY 2015, FY 2016, FY 2017, FY 2018 and FY 2019 respectively. Data shows an increasing trend in SHG formation in Himachal Pradesh because women members were given training on social mobilisation, bookkeeping and income generation activities such as Pattal making and Mushroom cultivation etc., and also to secure loan for starting livelihood activities @7 per cent p.a. with additional interest subvention of 3 per cent on prompt repayment in category 1 districts namely Kangra, Shimla, Mandi and Una, embracing almost 60 per cent of the total SHGs functioning in the state. It was also noted that HPSRLM provided revolving funds, community investment

Table 4: Trend analysis of savings-linked SHGs and amount in savings A/c in HP (2014 to 2019)

Year	No. of Savings-linked SHGs	Growth rate (%)	Amount in saving A/c in	Growth rate (%)
31.03.2014	37634	—-	2732.43	—
31.03.2015	37838	0.54	2648.99	-3.05
31.03.2016	44185	16.77	3411.12	28.77
31.03.2017	45735	3.51	5061.57	48.38
31.03.2018	49353	7.91	6678.07	31.94
31.03.2019	54079	9.58	6667.61	-0.16

Source: NABARD Reports: Status of Micro Finance in India, Compiled from 2013-14, 2014-15, 2015-16, 2016-17, 2017-18 and 2018-19

funds to the eligible SHG and helped the women to diversify livelihood activities through Zero Based Natural Farming, kitchen garden, food processing activities, handloom and handicrafts etc. Though the data showed presence of SHGs in every district, a few districts like Lahaul & Spiti, Kinnaur, Solan, Chamba and Bilaspur require strengthening of SHGs for empowering weaker sections and backward areas.

The economic empowerment really mirrors the growth and prosperity of any section or individual in terms of the savings habit. Table 4 depicts the growth in number of savings-linked SHGs and amount in their saving accounts in Himachal Pradesh. As on 31.03.2014, 37,634 SHGs have saving bank accounts whereas at the end of FY 2018–19, 54,079 SHGs were linked to the banks. As compared to the last year figures, number of savings-linked SHG grew by 0.54 per cent in FY 2015, 16.77 per cent in FY 2016, 3.51 per cent in FY 2017 and 7.91 per cent in FY 2018 and 9.58 per cent in FY 2019 respectively. It showed that women were able to save money and have more and more accounts in the banks—indicating high enthusiasm for economic activity. In terms of amount in saving accounts of SHG, the highest was 6678.07 Lakhs followed by 6667.61 Lakhs at the end of FY 2019. Overall, savings-linked SHG accounts have shown an increasing trend in the State.

Table 5 demonstrates growth in credit-linked SHGs in Himachal Pradesh. During FY 2014, 2,770 SHGs have availed loan facilities from various banks, while 17,618 SHGs have loan outstanding with banks and in FY 2015,

Table 5: Trend analysis of credit-linked SHGs and bank loans outstanding against SHGs in HP (2014 to 2019)

Year	Bank Loans disbursed during the year during the year		Bank Loans outstanding against SHGs %age to Loan OS		NPA as %age to Loan OS
	No. of SHGs	Loan Disbursed (in Lakh)	No. of SHGs	Loan outstanding (in Lakh)	
31.03.2014	2770	3706.66	17618	11404.05	16.22
31.03.2015	4062	5175.12	18527	11273.07	15.64
31.03.2016	3226	4527.28	18261	11165.8	13.63
31.03.2017	3715	5014.41	16486	11041.52	14.72
31.03.2018	3528	5016.97	10420	9980.2	13.96
31.03.2019	5098	7640.69	11943	12507.82	12.03

Source: NABARD Reports: Status of Micro Finance in India, Compiled from 2013–14, 2014–15, 2015–16, 2016–17, 2017–18 and 2018–19

Table 6: Activities-wise pattern analysis of establishments owned by SHGs

Broad activity	No. of establishments under ownership of SHGs
Livestock	4
Manufacturing	22
Retail trade	22
Water Supply, sewerage, waste management and remediation activities	1
Transportation and storage	12
Accommodation and food service activities	7
Information & communication	1
Financial and insurance activities	20
Real estate activities	2
Administrative and support services	5
Education	5
Human health & social work activities	266
Arts, entertainment, sports & amusement and recreation	1
Other service activities	262

Source: 6th Economic Census of Himachal Pradesh, 2015, Retrieved from http://himachalservices.nic.in/economics/pdf/ 6th Economics Census_2015. pdf P.15

4,062 SHGs have received loans whereas 18,527 SHGs have loan outstanding against banks which shows repayment of loan by the SHG. Loan disbursement grew by 84 per cent from FY 2014 to FY 2019, while number of SHGs having outstanding loan remained at 11,943 at the end of FY 2019. It is evident from the above table that members were paying back their loan amounts because despite the fact that loan disbursement was done every year, groups having outstanding loans at the end of the financial year were decreasing and Non-Performing Asset was also showing decreasing trend, it was 16.22 per cent of loan outstanding in FY 2014 and dwindled to 12.03 per cent at the end FY 2019. It signifies the interest and zeal of women members about SHGs in HP.

Table 6 shows the number of establishments under the ownership of SHGs. Self Help Groups run 4 livestock establishments under their ownership whereas more establishments are related to non-agriculture sector. 266 establishments are related to human health and social work activities. 262 SHG-owned establishments are providing miscellaneous services like repair of computer and mobile etc. SHGs own units in education and support services such as call centre, travel agency etc. Further, SHGs are owning food, accommodation related activities, as 7 units were working under its ownership up to 2015. Furthermore, transportation and storage facilities, entertainment, and sports and recreation facilities are provided by the SHGs under their ownership. Real estate units are also functioning under SHG framework. Overall, SHGs own enterprises in almost every sector, which shows that the members have started entrepreneurial activities to earn their living. However, it is pertinent to mention that these are the firms working in the formal structure and whereas others have access difficulties to exact data and information.

Observations and Conclusion

From the above analysis, it can be concluded that SHGs are spreading throughout the country including Himachal Pradesh, but their formation and growth prototype is

uneven. However, upward trend clearly hint that SHGs are helping significantly in the financial inclusion of women. In consequence to their association with SHGs movement, women have started saving small amounts of money for their future needs, linked themselves with formal banking system and availed micro credit on easy terms. Thus, it implies that SHGs are not only solving their routine problems but also improving their decision-making and risk-taking habits. However, its growth pattern was not same in all areas in the country. In the same vein, in Himachal Pradesh where 33 per cent SHGs were formed in two districts of the state could be a pointer to prevalent irritants and bottlenecks in other regions. Yet the trend analysis revealed that the progress in SHGs formation was high in Category 1 districts, which hold almost 60 per cent of total groups formed under this scheme where groups are eligible for additional interest subvention on regular repayment. Thus, it specifies a need for more financial incentives to boost SHGs movement. However, fact of the matter is that need-based training capsules, access to economic resources at affordable rates and better marketing facilities by SHGs were able to enthuse women to start new business firms collectively under the ownership of SHGs which shows improving confidence level, building their moral strengths, development of leadership qualities, managerial and entrepreneurial skills and decision-making power in women. It is reported that during the pandemic outbreak, SHGs manufactured low cost, quality sanitizers for government agencies in HP, which shows mutual trust and gains[31]. It can be concluded that women have diversified their sources of income by looking beyond agricultural activities, availed micro finance schemes and became financially independent on one side, and paved way to their social and political progression on the other. Yet in view of the uneven spread of SHGs, a need has been felt to educate women about government policies, training programs, banking system and interest rates for attaining real objectives of SHGs and consequently achieving the cherished goal of women empowerment in reality.

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"Women's empowerment helps raise economic productivity and reduce infant mortality. It contributes to improved health and nutrition. It increases the chance of education for the next generation".

– Nicholas D. Kristof

Constraining Factors Affecting Women Entrepreneurs in Enterprise Creation: A Study of Hadoti Region of Rajasthan

ANURODH GODHA AND MONIKA TALREJA

Women are now playing versatile roles. No doubt, they have created sensations in all the spheres but still there is a requisite to give them equal footings with the male-dominated society. They still face impediments in every walk of life. In order to explore this critical issue, the present study aimed to identify various problems faced by women entrepreneurs of Hadoti region. Moreover, an attempt was made to examine the difference in the opinions of women entrepreneurs on these problems, based on four districts of the region. The study was carried out on 275 women entrepreneurs applying stratified random sampling technique. Pearson's Chi-square test was used to test the stated hypothesis. The results revealed that women entrepreneurs belonging to this region face a lot of problems and challenges. However, the degree to which they face these problems varies with the district that they belong to. Lastly, the researcher has suggested an appropriate framework for the development of women entrepreneurship in this region.

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Introduction

The status of women has crossed through several changes from a cocooned stage behind the four walls in the yester years, to working at par with men in all walks of life—showing confidence, will and above all, self-reliant to be a women of today in a new defined meaning. The history of women in India has been hectic. Since ancient times, India has been a male dominated society and the invasions have made a blot on the status of women in the society that was detrimental in all aspects. Post-1991, due to liberalization, many prominent changes have been brought in our economy where the dependent of one time are generating employment for many, thereby entering into the various spectrums of economy such as art, literature, politics, business etc.

In modern India, women have occupied higher positions like President, Prime Minister, Speaker of the Houses, entrepreneurs etc. (Rao and Prasad, 2012). But, our society is drained by the social taboos where a woman is not having a choice to choose her responsibilities to anyone. Patriarchy is a common notion in our country where the females are carved by the various societal chains and they have to juggle between male domination and socio-cultural barriers in which they face several obstacles. Hence, the present study aims to deal with the various constraints being faced by women entrepreneurs both at a nascent stage and later.

Literature Review

Literature alleges a number of problems faced by the women as they venture to initiate and manage their businesses:

Schwartz (1979) in his paper "Entrepreneurship-A Female Frontier" conducted an exploratory study on 20

female entrepreneurs and analyzed that in the infant phase of business, bias in credit allotment was the major problem faced by women, followed by underestimating the operational and marketing cost.

Rathore (1991) through his paper "Promotion of Women Entrepreneurship-Training Strategies" highlighted that women in India face difficulty in managing the dual responsibilities of being housewives and businesswomen, and competing with her male counterpart. It was also analyzed that working women experienced more mental conflicts, that they are unable to devote the required energy and time to their family and pose difficulty in pursuing a career in entrepreneurship.

Justus (1996) in his paper "Financial Management of Small Scale Industries in Kerala" discussed about the financial assistance sought by the SSIs in Kerala. He concluded that even though several units approached the banks for term loans, they had to face many complications in raising loans. The study also suggests that the financial agencies should expedite the procedures for sanctioning loans and for disbursing sufficient funds to the SSIs.

Singh and Syal (1997) through their paper "Group Entrepreneurship for Women Entrepreneurship and Business" have depicted the hurdles being faced by the women entrepreneurs at different levels of their entrepreneurial career into three categories: a) at the phase of project formulation, b) at the phase of project implementation and c) at the phase of project operation. In the context of all the issues and problems related to female-managed enterprises, the author strongly favoured Group Women Entrepreneurship as a viable alternative. The Group Women Entrepreneurship can make women stronger by reinvigorating skills or traditional crafts with which they were familiar. The supporting agency should organize training sessions for the members of Group Working Entrepreneurship in their respective skills-development. The author also suggested that Group Working Entrepreneurship should form an integral part of Women welfare development programmes.

Malika Das (2001) in her paper "Women Entrepreneurs from India: Problems, Motivations and Success Factors" depicted that the shortage of working capital, lack of managerial skills, lack of time, business promotion and inadequate working capital were some of the obstacles faced by females in setting their entrepreneurial unit.

Barwa (2003) in his paper "Impact of Start Your Business (SYB) Training on Women Entrepreneurs" conducted a study on women entrepreneurs in Vietnam. The study revealed that females face additional issues due to socio-cultural factors and gender bias.

Watson (2003) in his paper "Failure Rates for Female Controlled Businesses: Are they any Different?' discussed about the success rate of female-owned business in Australia. The study outlined that the success rate of male-owned business is far better than the female-owned business.

Sarbpriya and Ishita (2011) through their paper "Some aspects of women entrepreneurship in India" debated about the status of women entrepreneurs in India and the various impediments faced by them in the initial and subsequent phases of their business. The study highlighted that there are significant differences between the male and female entrepreneurs on the basis of potential to work, capability to work and perseverance and finally suggested some measures to promote women entrepreneurship in India.

Adoram (2011) through his paper "Gender differences and their impact on Entrepreneurial Ventures" stated that lack of practical business knowledge affects women's revenue.

Waghmare (2012) in his book "Women Entrepreneurship" discussed about the problems and prospects of women entrepreneurs of Sangli district in Maharashtra. The author in the book tries to identify the type of problems being faced by them such as personal, social, marketing, occupational, mobility problems etc. The study reveals that women encountered more problems in accessing the financial resources for their business.

In GEM India Survey (2014), the researcher pointed out that lack of financial access, educational, vocational training and government policies are the three major constraints faced by women entrepreneurs in India.

Jyoti Rani and Sanjay Kumar Sinha (2016) in their research based on "Barriers Facing Women Entrepreneurs in Rural India: A Study in Haryana" mentioned that dual responsibilities, stereotype attitude of family and society, weak bargaining position, physical and mental harassment, cumbersome loan procedure, lack of awareness about sources of credit etc, were the major problems faced by rural women in Haryana.

Evelyn Omayemi et al., (2017) in their paper "An Exploratory study of Challenges faced by Women

Entrepreneurs in the construction industry in South Africa" examined that women in South Africa encounter deep-seated socio-cultural barriers, specifically in the context of patriarchal attitude of society.

Swati Panda (2018) in her paper "Constraints faced by Women Entrepreneurs in developing Countries" identified that work-family conflict, difficulty in accessing capital, unstable business-political environment, lack of infrastructural facilities, training and gender bias etc., were some of the major problems faced by the women entrepreneurs of developing nations.

V.K. Ajay (2019), in his paper based on "Problems of Women Entrepreneurship in India" identified that apart from social, cultural and economic impediments faced by female entrepreneurs, lack of entrepreneurial environment is another major constraint faced by them in India.

Research Objectives

- To identify the various constraints faced by women entrepreneurs of Hadoti region of Rajasthan.
- To suggest suitable measures to overcome these constraints, and to accelerate the growth of women entrepreneurs in the state and the nation.

Hypothesis

The following hypothesis has been formulated keeping in mind the above main objectives that will be tested during the study.

H_0: There is no significant difference in the opinion of women belonging to different districts regarding various constraints faced by them.

Methodology

To accomplish the research objectives of the study, the following methodology is proposed.

Research Design

The research design used is in accordance with the empirical study requirements. Descriptive research design has been used for the present study.

Selection of Sample

The respondent consists of women entrepreneurs. The list of women entrepreneurs was obtained from the database maintained by the DIC. Only those units in which the women entrepreneurs have active participation or involvement in the business were selected for the study. Therefore, to fulfil the above criteria, stratified random sampling technique has been used. Further, the women entrepreneurs who registered their units on or before 31st March 2012 were selected for the study, because every business needs at least 4–6 year operational period to overcome its initial constraints.

Sample Size

From all the 36 District Industrial Centres (GoI, 2018) four DICs of Hadoti region were selected randomly. After calculation of sample size, 320 (80 from each district) women entrepreneurs from the urban and rural areas of Kota division were selected to get response on the tool. Out of them, only 275 women entrepreneurs responded appropriately. The details of the respondent sample are shown in Table 1.

Data Analysis and Interpretation

Table 2 and Chart 1 represent the problems faced by women entrepreneurs. It was also found that some of the respondents were facing more than one problem.

Socio-Personal Problem

One important factor that clearly demarcates women entrepreneurs from male entrepreneurs is the additional responsibilities handled by women as wife, mother or daughter in law. The time consumed and the sentimental conflicts arising from the dual role creates hurdles in smooth operation of business for women. The predominant attitude of the society is that the female's priority is to take care of the family and children and to be available at home. Family constraints also abdicate their ways from entering into entrepreneurship. Some of them want to set up their own venture but again marriage acts as a stereotypical constraint in their lives.

The analysis in Table 3 and Chart 2 reveal that 35 per cent of the entrepreneurs were bound in the chains of dual obligation, as they had to maintain equilibrium between household and business chores. 24.2 per cent of the women cited the problem of limited liberty. Cumbersome exercises involved in starting a business, and negative attitude of the society towards the females often restrain them from becoming entrepreneurs. The women also expressed their concern towards the negative attitude of labour and the society, which are 5.4 and 18.3 per cent respectively. Nearly 5 per cent of the women entrepreneurs believed that the society is still male-dominated as their unusual interference also affects the

working of their business. The rest of the respondents (12.1 per cent) faced the problem of resistance from their husband and family members.

The data given in Table 4 shows the Pearson's Chi-square test value for the association between women's opinion regarding socio-personal problems faced by them and the districts to which they belong. The association is found to be statistically significant ($p<0.05$). Hence, women's opinion varies with the district they belong to. However, the majority of women opined that they faced dual problems as the main socio-personal problems.

In Baran district, about 25 per cent women entrepreneurs had a negative attitude of the society whereas nearly 26 per cent in Jhalawar and 27 per cent in Kota agreed that they faced the issues of limited liberty, respectively. Similarly in Jhalawar and Kota, nearly 11 per cent women faced negative attitude of labour, whereas in Baran and Bundi, none responded in favour.

On the other hand, in Baran and Bundi, nearly 9 per cent sample women agreed that they faced male dominance, whereas in Jhalawar and Kota, none responded in favour.

Marketing Problem

Women are generally poor in marketing their goods and finding customers. They entrust on mediators for the outsourcing or marketing of their products beyond their locale. This reduces their profit margin even though the quality of product is good. Women are rarely allowed to go out in public and sell their goods. As a result, skilled women workers are deprived from using their creative and entrepreneurial talents.

The data given in Table 5 and Chart 3 imply that stiff competition was the main problem faced by 26.0 per cent of the women entrepreneurs. Low mobility comes out to be the second, i.e., 17.9 per cent. More than 11 per cent of the respondents felt exploited by the middlemen and 16 per cent respondents felt the cost of advertising to be high. Nearly 6 per cent suffered problem of Lack of Market Orientation; fluctuation in demand and prices were chosen by 11.8 and 10.6 per cent of the respondents respectively.

The analysis given in Table 6 shows the Pearson's Chi-square test value for the association between women's opinion regarding marketing problems faced by them and the districts to which they belong to. The association is found to be statistically non-significant ($p>0.05$). Hence, women's opinions do not vary with the district they belong to.

Financial Problems

The women entrepreneurs in niche business enterprises start well but somewhere down the road in discharging their daily requirement, they get diverted from the success route. When analysis was made, the reason came out to be financial mismanagement. Financial assistance and its feasibility are the most important focal points of any business preposition.

The data in Table 7 and Chart 5 highlighted the basic financial problems faced by the women entrepreneurs. Many of them (26.4 per cent) opined that they encountered the problem of limited working capital, while 20.6 per cent of them did not have enough sales or turnover to obtain credit and 16.3 per cent of them faced the problem of collateral security. While 9.6 per cent of respondents answered they felt anxious in taking loans from any institutions, around 6.0 per cent mentioned that the procedure of procuring loans is very cumbersome and time consuming, and 6.8 per cent and 10.6 per cent of the respondents faced the problems of reluctance of financial institutions to extend credit to women and apprehensions of financial institutions for the recovery of the loans respectively. Nearly 4.0 per cent were unaware about the source of borrowings.

The data in Table 8 shows the Pearson's Chi-square test value for the association between women's opinion regarding financial problems faced by them and the districts.

The association is found to be statistically significant ($p<0.05$). Hence, women's opinion varies with the district they belong to. However, the majority of women mentioned limited working capital problems as their main financial problem.

In Baran and Bundi district, nearly 20 per cent women entrepreneurs faced the problem of lack of security, whereas in Kota and Jhalawar nearly 14 per cent respondents faced this problem. About 28 per cent respondents in Jhalawar and Kota faced the issue concerning sales on credit, whereas in Baran and Bundi the composition is nearly 13 per cent.

Nearly 32 per cent women entrepreneurs of Jhalawar and Kota faced more problems in terms of limited working capital, whereas in Baran and Bundi, only 20 per cent faced this problem.

Around 13 per cent of the respondents in Baran and Bundi have fear in their minds regarding the procedure of obtaining loan, however, in Kota and Jhalawar it constitutes about 6 per cent only. Similarly, in Bundi and Baran, nearly 13 per cent sample women faced the problem of Apprehension and Reluctance, whereas in Jhalawar and Kota, nearly 8 per cent responded in its favour.

On the other hand, in Jhalawar and Kota, nearly 8 per cent sample women agreed that they were unaware about the sources of borrowing in the state, whereas in Baran and Bundi, none responded in its favour.

Production Problems

The production activity implies consolidation of a number of factors. Some of them are in the control of the entrepreneurs, while upon some other factors, the entrepreneurs have little to no control. Lack of coordination or lag in the implementation of work can often lead to production problems in the business.

The data in Table 9 and Chart 5 demonstrate that the main problem faced by the women was to find a suitable place for their business unit. Around 32 per cent of the entrepreneurs suffered this problem. The government's perception, although very beneficial at the macro level, does not turn fruitful as far as allotment for sheds and plots are concerned. Another problem which most (32 per cent) of them were facing was the lack of knowledge or updated information about the available technology, which ultimately increased their cost of production of goods and affected the profit margin as well. Maximum women (35.8 per cent) encountered the problem of non-availability of raw material on time, which hampered their production process.

The data in Table 10 shows the Pearson's Chi-square test value for the association between women's opinion regarding Production problems faced by them and the districts to which they belong. The association is found to be statistically non-significant as $p>0.05$. Hence, women's opinion does not vary with the district they belong to.

Labour Problem

The women entrepreneurs in the state face many labour problems. They face more issues in the manufacturing sector than any other sector in the economy.

The analysis in Table 11 and Chart 6 imply that small-scale industries suffered various limitations. One of them was the non-availability of the required skilled labour. Around 40.7 per cent of the respondents face this problem. The availability of the skilled people and their recruitment itself is a major problem. Even if they find the skilled labour, training them is a laborious and time-consuming task. Even many employees leave their job after acquiring training. Nearly 19 per cent of the respondents faced the problem of absenteeism, while 10.7 per cent of women experienced Insufficiency of labour. Hike in salary demand/wages, high turnover and strained relations with workers were some other constraints, which corresponds to 8.6 per cent, 10.0 per cent and 10.7 per cent respectively.

The data in Table 12 shows the Pearson's Chi-square test value for the association between women's opinion regarding labour problems faced by them and the districts to which they belong. The association is found to be statistically significant ($p<0.05$). Hence, women's opinion varies with the district they belong to. However, the majority of women stated that non-availability of skilled labour was the main problem faced by them.

Nearly 21 per cent women entrepreneurs in Baran and 18 per cent in Bundi faced the problem of High Turnover of workers, whereas in Jhalawar and Kota, none responded in this context. Moreover, nearly 18 per cent women in Baran and 23 per cent in Bundi women entrepreneurs faced Insufficiency of Labour, whereas in Jhalawar and Kota, none responded in this regard.

On the other hand, in Jhalawar and Kota, nearly 22 per cent sample women faced the problem of Strained Labour Relations, whereas in Baran and Bundi, none responded in this regard. In the problem of High Salary Demand, nearly 18 per cent sample women in Jhalawar and Kota faced it, whereas in Baran and Bundi, none responded in this regard.

Technical Problems

The data in Table 13 and Chart 7 reveal that 34.2 per cent of the respondents face difficulties in repair and maintenance. 14.1 per cent of the women entrepreneurs face hardship in acquiring technical skills. For this, women must be educated to gain skills and knowledge in all fields. 32.9 per cent of the respondents faced difficulty in the availability of modern technology, whereas, 18.8 per cent women lack specialized skills for performing specific work.

The data in Table 14 shows the Pearson's Chi-square test value for the association between women's opinion regarding technical problems faced by them and the

districts to which they belong. The association is found to be statistically significant ($p<0.05$). Hence, women's opinion varies with the district they belong to. However, the majority of women expressed that they faced difficulties in repair and maintenance.

Nearly 42 per cent women entrepreneurs in Baran and 44 per cent in Bundi faced the problem of non-availability of modern technology, whereas in Jhalawar and Kota, none responded in this regard. Moreover, nearly 19 per cent women in Baran and Bundi faced difficulty in obtaining technical knowledge, whereas in Jhalawar and Kota, none responded in this regard.

On the other hand, nearly 64 per cent women in Jhalawar and 67 per cent in Kota faced the problem of repair and maintenance, whereas in Baran and Bundi, nearly 25 per cent responded in this regard.

Opinion Regarding Women Entrepreneurship

Right place for women is at home The data in Table 15 shows that majority (40.4 per cent) of the entrepreneurs disagree with the statement that the right place for women is at home. 69 per cent of the females had positive opinion towards the statement while 68 per cent respondents strongly disagreed with the statement. Only 9.8 per cent of women agreed with the statement.

Acquiring technical know how is a problem for women The data in Table 15 highlights that around 40.4 per cent of the respondents agree with the statement; 31.6 per cent of the women disagree with the statement, 18.5 per cent strongly disagree, while only 9.5 per cent agree that to acquire technical knowledge is a problem for women.

Training is a must for the women entrepreneurs The data in Table 15 implies that 38.2 per cent of the respondent strongly agree with this statement; 32.7 per cent agree with it, while 19.6 per cent disagree with the statement. Only few respondents (9.5 per cent) strongly disagree with the statement.

Women entrepreneurs cannot survive without family's support The data in Table 15 cites that around 37.8 per cent entrepreneurs disagreed with the statement; 31.6 per cent were in favour, 21.1 per cent strongly raised their discontentment against the statement and 9.5 per cent women strongly agree with the above-mentioned statement.

Women became entrepreneur due to family compulsion The data in Table 15 highlights that 37.8 per cent female entrepreneurs disagree with the statement; 31.6 per cent agree with the statement. Approximately 21.1 per cent respondents strongly oppose the statement while 9.5 per cent women strongly supported the statement.

Women should start their entrepreneurial career before marriage The data in Table 15 reveals that majority of the respondents strongly disagree with the opinion of entering into entrepreneurship before marriage. 19.6 per cent of the entrepreneurs strongly supported the argument. However, 29.1 per cent strongly gave negative comments to the above statement and 10.1 per cent spoke in its favour.

Availability of financial help from Support System is a problem The data in Table 15 depicts that most of the respondents, i.e., 44.7 per cent of them agree and 28.4 per cent of them responded positively towards this statement, while 15.3 per cent of the women disagree with the statement.

Women entrepreneurial career results in neglecting family The data in Table 15 shows that 43.6 per cent of the women rejected the statement and 14.2 per cent of the respondents strongly disagree. Those who agree with this statement were 32.4 per cent.

There should be separate support agencies for women entrepreneurs The data in Table 15 cites that 47.6 per cent of the sample women believe that there should be separate support agencies for women entrepreneurs. 17.8 per cent of them disagree with the sentence and 4.4 per cent of them strongly disagree with this opinion

Supervision and control of labour is easy for women entrepreneur The data in Table 15 reveals that the percentage of respondents who agree with the statement were 55.3 per cent, while the respondents who disagree with the statement were 12.0 per cent.

Results and Discussions

As per the analysis, it is evident that women entrepreneurs in Hadoti region of Rajasthan do face problems in running their businesses. Majority of the sample entrepreneurs agreed that the dual problem of socio-personal issues as the major one, high competition as a major marketing problem, lack of working capital as a major financial problem, problem of raw material as a major production problem, non-availability of skilled labour as a major labour

problem and difficulty in repair and maintenance as a major technical problem. In case of marketing and production problems, no significant difference was found in the opinions of women based on different districts. However, the nature of problem varies with the district they belong to in case of other problems, viz, socio-personal, financial, labour and technical.

Hence, it can be concluded that null hypothesis is rejected and alternative hypothesis is accepted–that there is a significant difference in the opinion of women belonging to different districts regarding various problems faced by them.

Recommendations

Based on the study, the following recommendations are made to develop an appropriate framework for women entrepreneurship development in the state of Rajasthan. It will help to overcome the problems faced by them and to improve the performance of women entrepreneurs-owned business units in the state. Some of the suggestions are:

- The Government agencies need to explore the vast untapped resources in terms of technically and highly qualified women entrepreneurs, by offering them attractive schemes to tilt their interests towards the field of entrepreneurship and assuring its proper implementation.
- In case of disbursement of loan by the financial institutions and the government agencies, the condition of demanding collateral security should be removed.
- Complex procedures or filling of forms should be simplified.
- District Women Entrepreneurial Cell should be set up in each district to facilitate and review the functioning of women-owned business units. This cell should run as a single-window system for the women, from where they can seek advice to solve their grievances and queries at one place.
- Agencies like DIC should maintain a close tie-up with the technical departments to obtain information about the updated technology that caters to the need of the small-scale enterprises. There should be specific arrangements for the storage of such information and its proper broadcast among the women entrepreneurs.
- Web portals like Mahila E-Hat should be created for women entrepreneurs where they can sell and market their products online, without going anywhere, and they can deal with both national and international clients without being exploited by the middlemen.
- Women Entrepreneurs should be provided with special discounts/ rebates in trade fairs as they find trade fairs as the most suitable platform for marketing their products.
- The attitude of the officers of the government agencies and their perception towards women entrepreneurs and their business enterprises negatively affects the performance of women entrepreneurs. Their attitude marked a negative change. Instead, their behaviour should be more understanding, positive and cooperative. Motivation on the part of the society is very essential to inspire women to enter the entrepreneurship field.
- Women should be trained how to overcome the different constraints like financial, institutional, perceptional, environmental problems etc. Specialized efforts should be made to train women by considering their emotional and physical issues, and teach them how to maintain a balance between the domestic and business responsibilities.

Conclusion

The women of 21st century are significantly contributing towards the growth of the economy. They have left an impact on all sections of the society. Today, more and more women stride forward to economic independence breaking the shackles of a male-dominated world. By becoming entrepreneurs, they are not only setting forth examples but also generating jobs and contributing their part to the upliftment of the society. However, being an entrepreneur is not an easy task for women as they have to face many challenges from their families and the society. The results of the study exposed that women face many type of problems. Hence, there is a need for some sincere efforts to promote women entrepreneurship in the country, which will help them to go a long way in setting the benchmark where young, confident females will create exemplary models for many to follow.

APPENDIX

Table 1: District-wise distributions of respondents

District	Selected sample	Respondent sample
Baran	80	70
Bundi	80	67
Jhalawar	80	73
Kota	80	65
Total	320	275

Source: Primary data collected from women entrepreneurs registered at DIC

Table 2: Problems faced by the women entrepreneurs

Problems	Number	Percentage
Financial problem	174	63.3
Marketing problem	152	55.3
Socio-personal problem	126	45.8
Production problem	54	19.6
Labour problem	69	25.1
Technical problem	41	14.9

Source: Primary data collected from women entrepreneurs registered at DIC

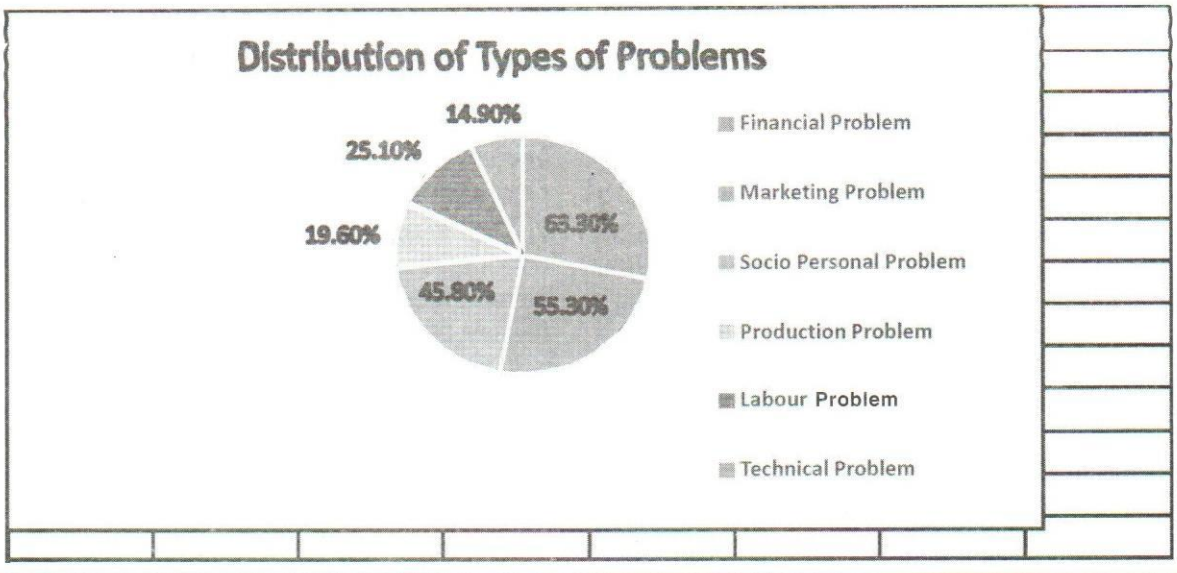

Chart 1: Distribution of types of problems faced by respondents

Table 3: Socio-personal problems faced by the women entrepreneurs

Socio-personal problems	Number	Percentage
Dual duties	84	35.0
Limited liberty to women	58	24.2
Resistance from husband/family	29	12.1
Negative attitude of labour	13	5.4
Negative attitude of society	44	18.3
Male dominance	12	5.0

Source : Primary data collected from women entrepreneurs registered at DIC Special

Note: Some respondents face more than one Socio-Personal problem

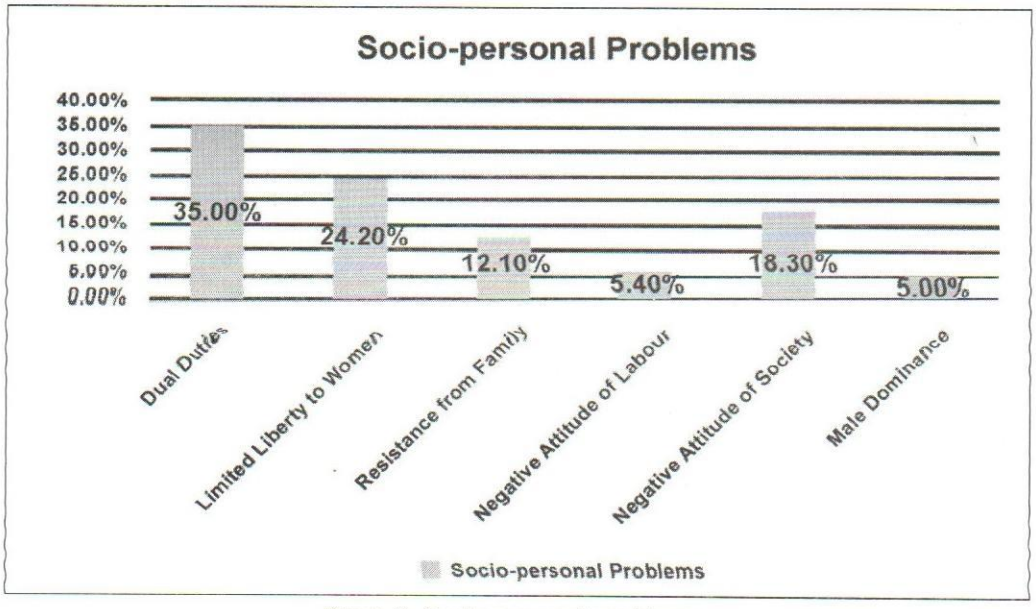

Chart 2: Socio-personal problems

Table 4: District-wise association of socio-personal problems

Socio-personal problems	District				Total
	Baran	Bundi	Jhalawar	Kota	
Dual problems	21	20	23	20	84
	32.81%	34.48%	37.10%	35.71%	35.0%
Limited liberty to women	13	14	16	15	58
	20.31%	24.14%	25.81%	26.79%	24.2%
Resistance from husband	8	6	8	7	29
	12.5%	10.34%	12.90%	12.5%	12.1%

Negative attitude of labour	0	0	7	6	13
	0.0%	0.0%	11.29%	10.71%	5.4%
Negative attitude of society	16	12	8	8	44
	25.0%	20.69%	12.90%	14.29%	18.3%
Male Dominance	6	6	0	0	12
	9.38%	10.34%	0.0%	0.0%	5.0 %

Source: Based on primary data collected from women entrepreneurs registered at DIC

Chi square test = 29.343, df = 15, P Value = 0.015 Significant

Table 5: Marketing problem faced by women entrepreneurs

Marketing problem	Number	Percentage
High competition	64	26.0
Exploitation by middlemen	39	11.8
Low mobility	44	17.9
High cost of advertising	39	15.9
Lack of marketing orientation	15	6.1
Fluctuation in demand	29	11.8
Fluctuation in prices	26	10.6

Source: Primary data collected from women entrepreneurs registered at DIC

Special Note: Some respondents face more than one Marketing Problem

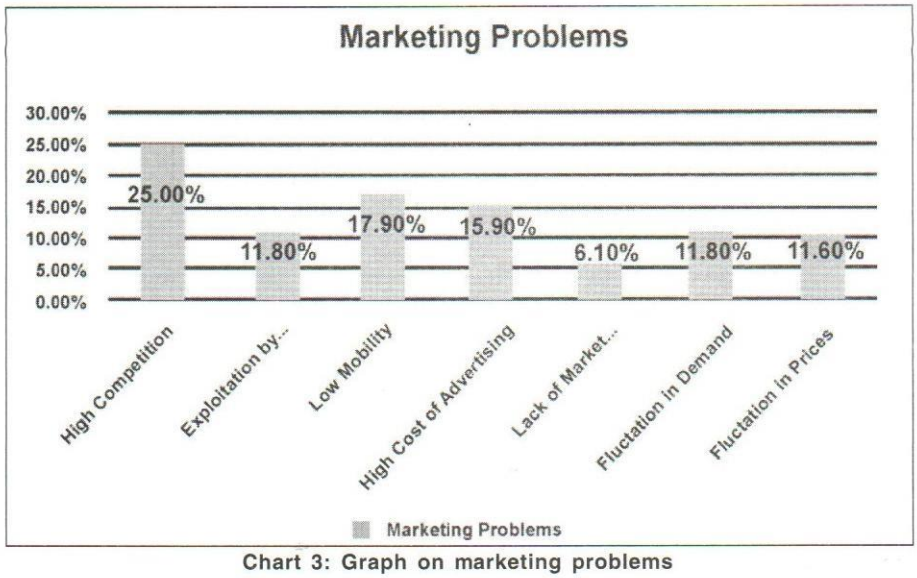

Chart 3: Graph on marketing problems

Table 6: District-wise association of marketing problems

Marketing problems	District				Total
	Baran	Bundi	Jhalawar	Kota	
High competition	12	12	22	18	64
	18.75%	19.35%	34.38%	32.14%	26.0%
Exploitation by middlemen	7	8	8	6	29
	10.94%	12.9%	12.5%	10.71%	11.8%
Low mobility	14	14	8	8	44
	21.88%	22.58%	12.5%	14.29%	17.9%
High advertising cost	8	6	13	12	39
	12.5%	9.68%	20.31%	21.43%	15.9%
Lack of marketing orientation	7	8	0	0	15
	10.94%	12.9%	0.0%	0.0%	6.1%
Fluctuation in demand	8	8	7	6	29
	12.5%	12.9%	10.94%	10.71%	11.8%
Fluctuation in prices	8	6	6	6	26
	12.5%	9.68%	9.38%	10.71%	10.6%

Source: Based on primary data collected from women entrepreneurs registered at DIC

Chi square test = 29.343, df = 15, P Value = 0.015 Significant

Table 7: Financial problems faced by the women entrepreneurs

Financial problem	Number	Percentage
Working capital requirement	105	26.4
Sales on credit	82	20.6
Lack of collateral security	65	16.3
Fear of taking loans	38	9.6
Lengthy procedure of loan	24	6.0
Reluctance of financial institutions to extend credit to women	27	6.8
Unawareness about the source of borrowing	15	3.7
Apprehensions of financial institutions for the recovery of the loans	42	10.6

Source: Primary data collected from women entrepreneurs registered at DIC Special

Note: Some respondents face more than one financial problem

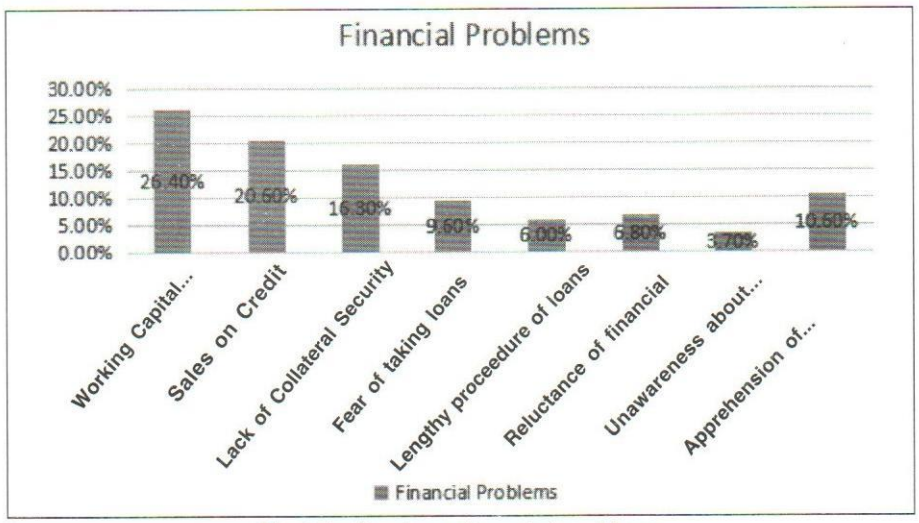

Chart 4: Graph on financial problems

Table 8: District-wise association of financial problems

Financial problems	District				Total
	Baran	Bundi	Jhalawar	Kota	
Limited working capital	21	20	34	30	105
	20.59%	20.83%	32.08%	31.91%	26.4%
Sales on credit	14	12	30	26	82
	13.73%	12.5%	28.30%	27.66%	20.6%
Lack of security	20	19	14	12	65
	19.61%	19.79%	13.21%	12.77%	16.3%
Fear of loan	14	12	6	6	38
	13.73%	12.5%	5.66%	6.38%	9.6%
Lengthy procedure	6	6	6	6	24
	5.88%	6.25%	5.66%	6.38%	6.0%
Reluctance	14	13	0	0	27
	13.73%	13.54%	0.0%	0.0%	6.8%
Apprehensions	13	14	8	7	42
	12.75%	14.58%	7.55%	7.45%	10.6%
Unawareness	0	0	8	7	15
	0.0%	0.0%	7.55%	7.45%	3.7%

Source: Based on primary data collected from women entrepreneurs registered at DIC

Chi square test = 54.189, df = 18, P Value = 0.000 Significant

Table 9: Production problem faced by the women entrepreneurs

Productionl problem	Number	Percentage
Inability to cope up with the technology	27	32.1
Inadequate availability of working area	27	32.1
Problem of raw material	30	35.8

Source: Primary data collected from women entrepreneurs registered at DIC

Special Note: Some respondents face more than one production problem

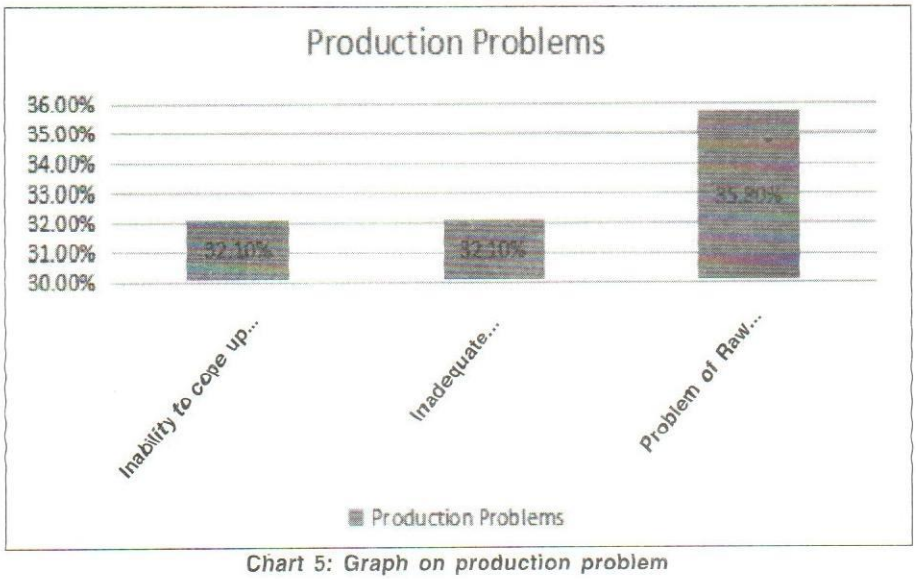

Chart 5: Graph on production problem

Table 10: District-wise distribution of production problem

Production problems	District				Total
	Baran	Bundi	Jhalawar	Kota	
Inability to cope up with the technology	6	6	8	7	27
	30.0%	27.27%	36.36%	35.0%	32.1%
Inadequate working capital	7	8	6	6	27
	35.0%	36.36%	27.27%	30.0%	32.1%
Problem of raw material	7	8	8	7	30
	35.0%	36.36%	36.36%	35.0%	35.8%

Source: Based on primary data collected from women entrepreneurs registered at DIC

Chi square test = 0.738, df = 6, P Value = 0.994 Non Significant

Table 11: Labour problems faced by the women entrepreneurs

Labour problem	Number	Percentage
Non Availability of skilled labour	57	40.7
Absenteeism	27	19.3
Insufficiency of labour	15	10.7
High Salary demand	12	8.6
High turnover of workers	14	10.0
Strained labour relations	15	10.7

Source: Primary data collected from women entrepreneurs registered at DIC

Special Note: Some respondents face more than one labour problem

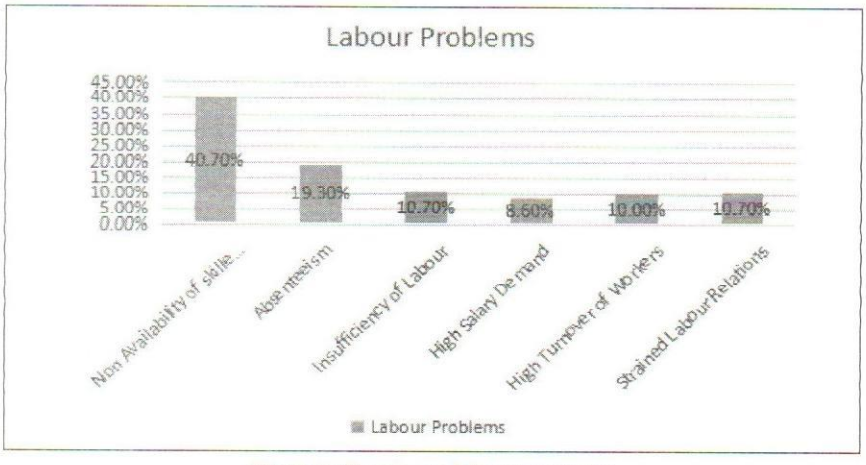

Chart 6: Graph on labour problem

Table 12: District-wise association of labour problem

Labour problems	District				Total
	Baran	Bundi	Jhalawar	Kota	
Non availability of skilled labour	15	14	15	13	57
	39.47%	41.18%	41.67%	40.63%	40.7%
Absenteeism	8	6	7	6	27
	21.05%	17.65%	19.44%	18.75%	19.3%
Insufficiency of labour	7	8	0	0	15
	18.42%	23.53%	0.0%	0.0%	10.7%
High salary demand	0	0	6	6	12
	0.0%	0.0%	16.67%	18.75%	8.6%
High turnover of workers	8	6	0	0	14
	21.05%	17.65%	0.0%	0.0%	10.0%
Strained labour relations	0	0	8	7	15
	0.0%	0.0%	22.22%	21.88%	10.7%

Source: Based on primary data collected from women entrepreneurs registered at DIC

Chi square test = 56.848, df = 15, P Value = 0.000 Significant

Table 13: Technical problems faced by the women entrepreneurs

Technical problem	Number	Percentage
Difficulty in repair and maintenance	29	34.2
Lack of technical knowledge involved	12	14.1
Non-availability of modern technology	28	32.9
Lack of specialized skills for specific work	16	18.8

Source: Primary data collected from women entrepreneurs registered at DIC

Special Note: Some respondents face more than one technical problem

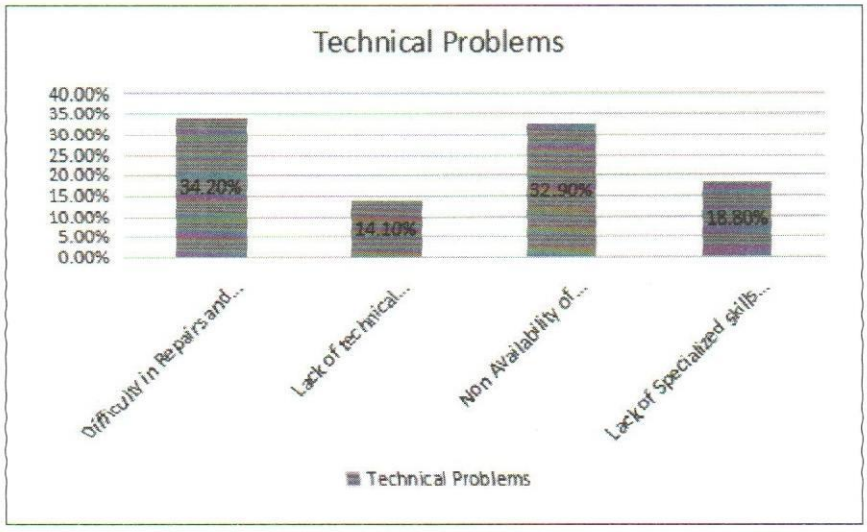

Chart 7: Graph on technical problem

Table 14: District-wise association of technical problem

Technical problems	District				Total
	Baran	Bundi	Jhalawar	Kota	
Difficulty in repair and maintenance	8	8	7	6	29
	24.24%	25.0%	63.64%	66.67%	34.2%
Lack of technical knowledge involved	6	6	0	0	12
	18.18%	18.75%	0.0%	0.0%	14.1%
Non availability of modern technology	14	14	0	0	28
	42.42%	43.75%	0.0%	0.0%	32.9%
Lack of specialized skills for specific work	5	4	4	3	16
	15.15%	12.5%	36.36%	33.33%	18.8%

Source: Based on primary data collected from women entrepreneurs registered at DIC

Chi square test = 23.368, df = 9, P Value = 0.005 Significant

Table 15: Opinion regarding women entrepreneurship

Opinion	SA	A	D
Right place for women is at home	69 (25.1)	27 (9.8)	111 (40.4)
Acquiring of technical knowhow is a problem for women	26 (9.5)	111 (40.4)	87 (31.6)
Management training is must for women entrepreneurs	105 (38.2)	90 (32.7)	54 (19.6)
Women entrepreneurs cannot survive without the help of husband/family members	26 (9.5)	87 (31.6)	104 (37.8)
Women become entrepreneurs due to economic compulsion	26 (9.5)	87 (31.6)	104 (37.8)
Ideal stage for women to take up entrepreneurial career is before marriage	54 (19.6)	29 (10.5)	112 (40.7)
Availing financial assistance from support system is a problem for women entrepreneurs	78 (28.4)	123 (44.7)	32 (11.6)
Women entrepreneurial career results in neglecting children, family and home	27 (9.8)	89 (32.4)	120 (43.6)
There should be separate support agencies for women entrepreneurs	83 (30.2)	131 (47.6)	49 (17.8)
Supervision and control of labour is easy for women entrepreneur	26 (9.5)	152 (55.3)	64 (23.3)

Source: Primary data collected from women entrepreneurs registered at DIC

Special Note: Some respondents face more than one problem

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"What I want young women and girls to know is: You are powerful and your voice matters"

– Kamala Harris

The Performance of Women Readymade Garments Cluster

E. BHASKARAN

WRMGC was formed by 30 women entrepreneurs as a special purpose vehicle (SPV) for setting up of a common facility centre under the Government of India scheme, viz., Micro and Small Enterprises Cluster Development Programme (MSE-CDP), engaged in ready made garment manufacture in and around Dhalavaipuram, Virudhunagar district of Tamil Nadu. The objective is to study the Physical and Financial Performance of Women Ready Made Garment Cluster before and after Cluster Development Approach (CDA) and also Difference in Differences of the control and the treated groups. The methodology adopted is collection of primary and secondary data from 375 cluster members and using SCOT Analysis, CAGR, Descriptive Analysis, Correlation Analysis, Regression Analysis, Time Series Analysis, T-Test ANOVA, Difference in Differences Analysis, Value Chain Analysis and development of Cluster Map. To conclude, there is significant increase in no. of units, employment and machinery, which are all an independent variables, and significant increase in Turnover which is a dependent variable. The Difference in Difference (DID) value is a positive one which implies the treated group has got much benefitted on CDA when compared to control group which have not adopted CDA, which also implies that the government's policy on CDA is a success. The WRMGC still needs to tap export market to compete in the global market.

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1. INTRODUCTION

M/s Dhalavaipuram Women's Garments Manufacturers Association is a society formed by 30 women entrepreneurs engaged in ready made garment manufacture in and around Dhalavaipuram, Virudhunagar district. The society acts as a special purpose vehicle (SPV) for setting up of a common facility centre at Dhalavaipuram under Government of India (GoI) scheme viz., Micro and small Enterprises – Cluster Development Programme (MSE-CDP) [Modified Guidelines of MSE-CDP]. The CFC would provide latest technology embroidery machine, 5 JUKI model sewing machines and training centre (with 20 JUKI Model sewing machines) for training tailors for the exclusive benefits of the women entrepreneurs. The society has been registered under section 10 of Tamil Nadu Act 27 of 1975 on 22nd of March 2011. It has about 10 members in its executive committee with the President, Vice President, Secretary and Joint Secretary of the society. The society has been actively involved in a number of welfare activities for women entrepreneurs of the cluster.

2. TECHNICAL SURVEY

2.1 Profile of the cluster

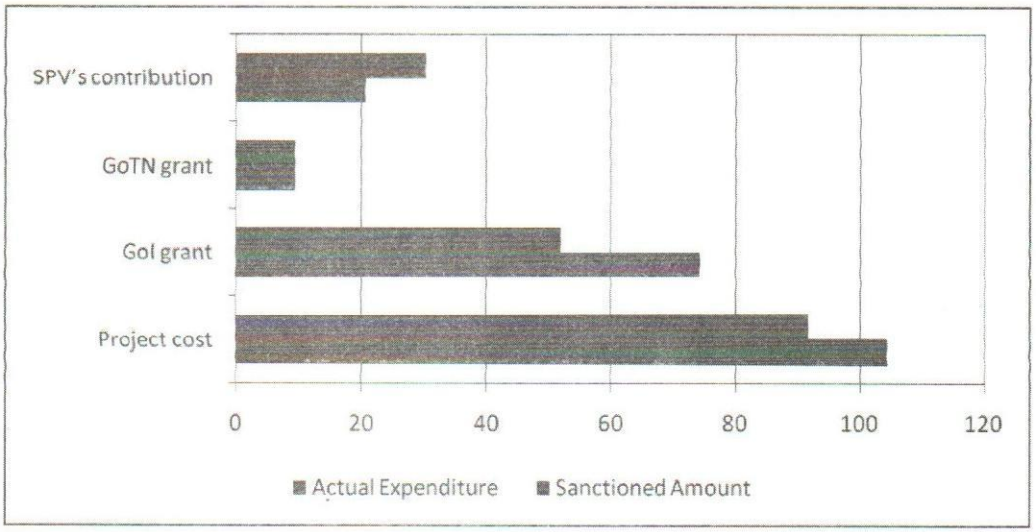
The WRMGC (WRMGC) is situated at Dhalavaipuram, near Rajapalayam in Virudhunagar district in Tamil Nadu. The cluster is spread over a 30 km radius around Dhalavaipuram. The cluster covers Rajapalayam, Dhalavaipuram, Chettiarpatti, Meenakhiyapuram, Puthur, Mugavur, Komanthapuram, Sethur, Devadhanam, Mettupatti, Krishnapuram, Sundaranachiarpuram, Kollamkondan, which are located in Rajapalayam Taluk. There are about 350 micro and small ready made garments manufacturing units in the cluster area owned by women entrepreneurs, out of which around 150 units are engaged in job work.

The cluster provides employment to around 8,500 people directly (out of which 85% are women workers) and around 10,000 people indirectly. The cluster has made a turnover of INR. 820 crores in FY 2011.

2.2 Need for CFC

Presently, the cluster members manufacture a limited range of products including in-skirts, ladies nightie, chudidhar and ladies nightgown. Most of the unit is doing job work, do not have the facility for embroidery, and for that purpose, they approach other SSI units. The rates charged for such outsourcing of embroidery work are high, and affects their profit margin. Moreover, they do not also get to select designs of their choice for embroidery job. The rates change for embroidery work. The larger units take up orders only at excess capacity. Setting up a Common Facility Centre (CFC) with facilities for embroidery work and stitching would be beneficial to the cluster members as they will not need to outsource embroidery work and would be able to get their embroidery work done. [1]

To Create CFC, the funds got by WRMGC, Dhalavaipuram, under MSE-CDP, Ministry of Micro, Small and Medium Enterprises, Government of India (GoI), MSME Department, GoTN and SPV contributions are given in Figure 1.



Source: WRMGC

Figure 1: Project Cost of Women Ready Made Garments Cluster

Twenty-four clusters have been implemented in Tamil Nadu as shown in Figure 2, which includes WRMGC in Dhalavaipuram, Virudhunagar [2]. Many studies have been made to identify performance for Clusters under CDA like Automobile [3] and Starch and Sago [4].

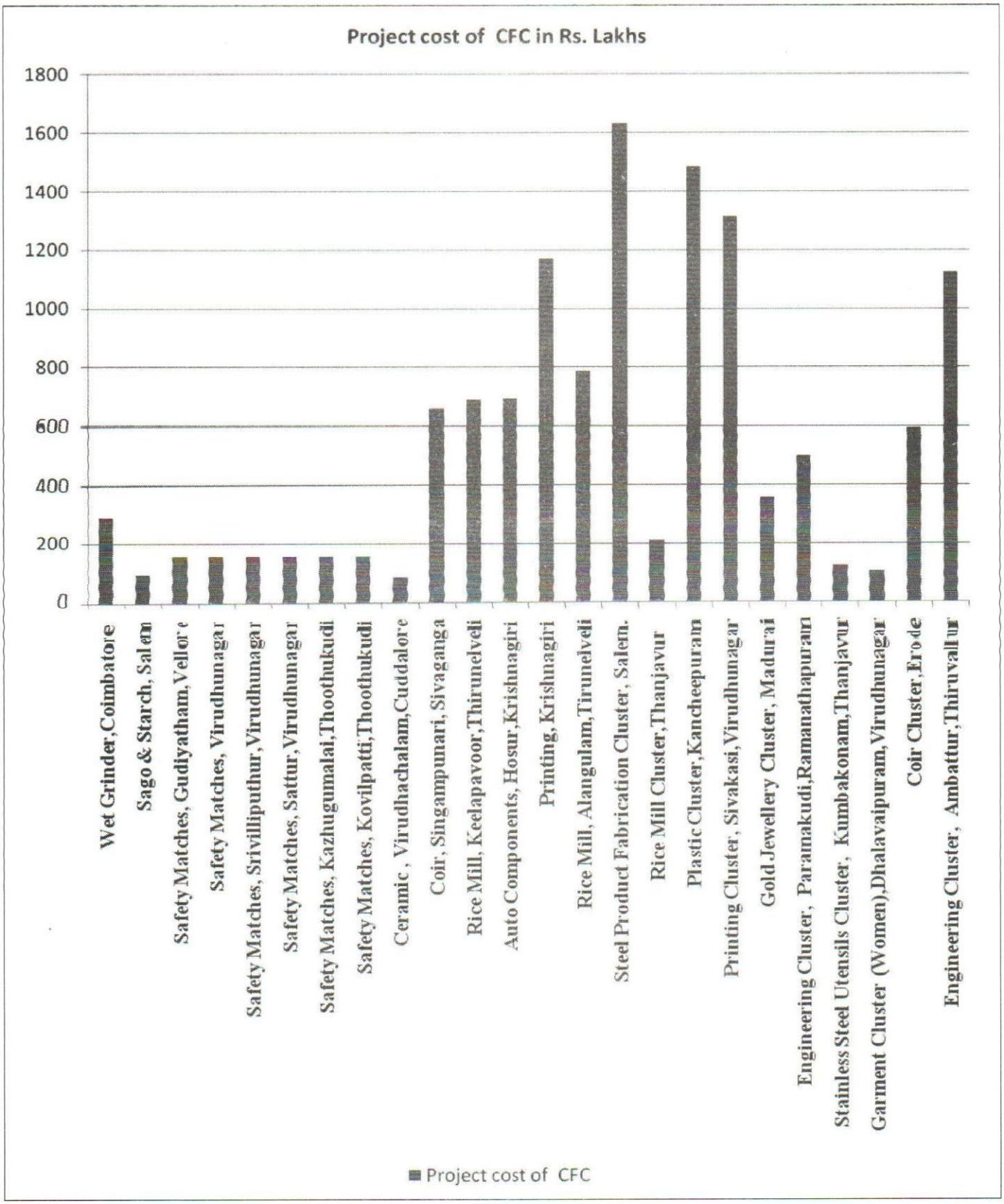
3. OBJECTIVES OF THE STUDY

The objectives are:

1. To study the Compound Annual Growth Rate and Physical and Financial Performance of WRMGC in Dhalavaipuram before and after CDA.
2. To study the Descriptive Analysis, Correlation Analysis, Regression Analysis, Trend Analysis, T-Test and ANOVA of WRMGC in Dhalavaipuram before and after CDA.
3. To study on the Difference in Difference (DID) on WRMGC in Dhalavaipuram, of Control Group and Treated Group.
4. To study on the Value Chain Analysis on WRMGC in Dhalavaipuram.
5. To develop a Cluster Map on WRMGC in Dhalavaipuram, after intervention.

4. METHODOLOGY

The methodology adopted is collection of primary data from 375 Women Ready Made Garments manufacturers in Dhalavaipuram, before (2016–17, 2017–18) CDA (CDA_B) and after (2018–19, 2019–20) CDA (CDA_A). Secondary data is collected from Ministry of MSME, GoI, and MSME, GoTN, Department of Industries and Commerce, GoTN



Source: Policy Note, MSME Department, Government of Tamil Nadu

Figure 2: Project Cost of CFC projects implemented in Tamil Nadu.

and Tamil Nadu Small Industries Development Corporation Limited (TANSIDCO).

The data were analyzed with Descriptive Analysis, Correlation Analysis, Regression Analysis, Trend Analysis, Compound Annual Growth Rate (CAGR), and Analysis of Variance (ANOVA) by taking No. of Units [U], Employment in numbers [E], Plant and Machinery [M] in Lakhs, Year/ time [Y] as independent variables and Turnover[T] in Lakhs as Dependent Variables. The data were also analysed using SCOT Analysis Value Chain Analysis and Cluster Map analysis.

5. TECHNICAL ANALYSIS

5.1 SCOT Analysis

The Strength (S), Challenges (C), Opportunities (O) and Threats (T) Analysis [5] are given in Table 1.

Table 1: SCOT Analysis

Strength	**Challenges**
• Ever-increasing demand for the products from the cluster. • Carved a niche in the ladies ready made garment market. • Availability of machineries for setting up a new unit.	• Low level of technology • Small scale operation. • Less profit margin as price is fixed by dominant big buyers. • Inadequate infrastructure facility. • Lack of knowledge on latest trends.
Opportunity	**Threats**
• More market for embroidery garments. • Opportunities for product diversification. • Opportunities for exports.	• Competition from bigger units within clusters and other clusters in Tamil Nadu. • Ever-changing fashion and designs. • Exploitation by big buyers and unhealthy competition within the clusters (undercutting)

5.2 Physical Performance

The physical performance of WRMGC is shown in Figure 3

Physical performance, as shown in Figure 3, is a constant trend in number of units with constant CAGR and for Plant and Machinery with CAGR of 11.41.

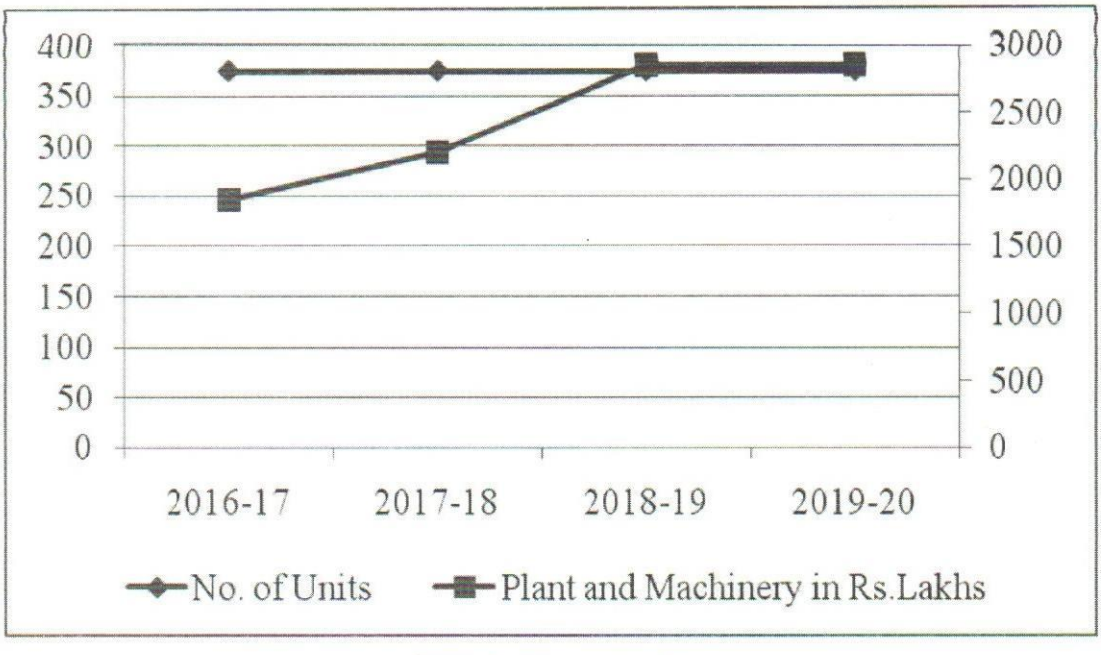


Figure 3: Physical Pearformance

5.3 Financial Performance

The financial performance of WRMGC is shown in Figure 4.

Financial Performance as shown in Figure 4 is an increasing trend for Turnover with CAGR of 4.56 and for employment with CAGR of 8.22.

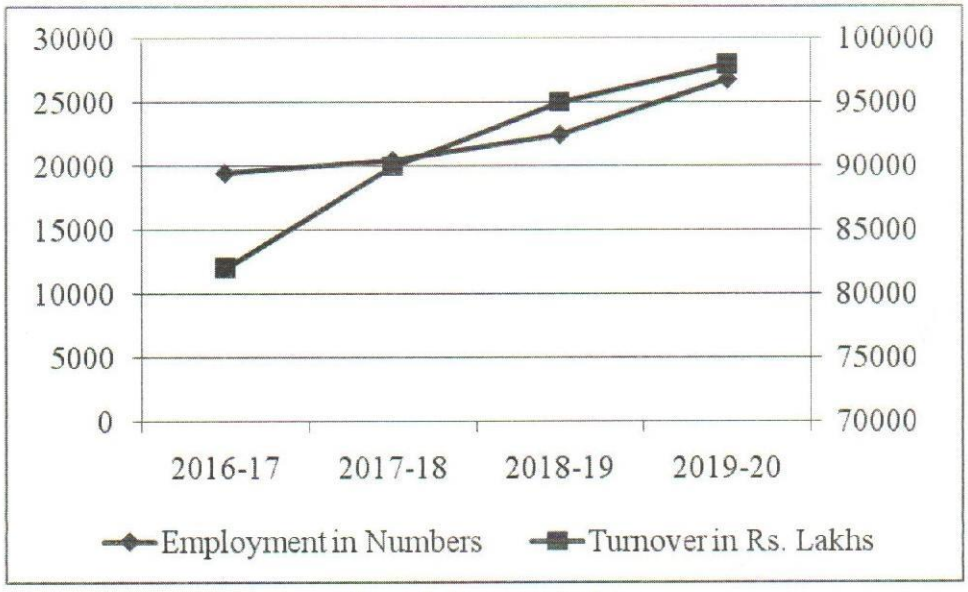
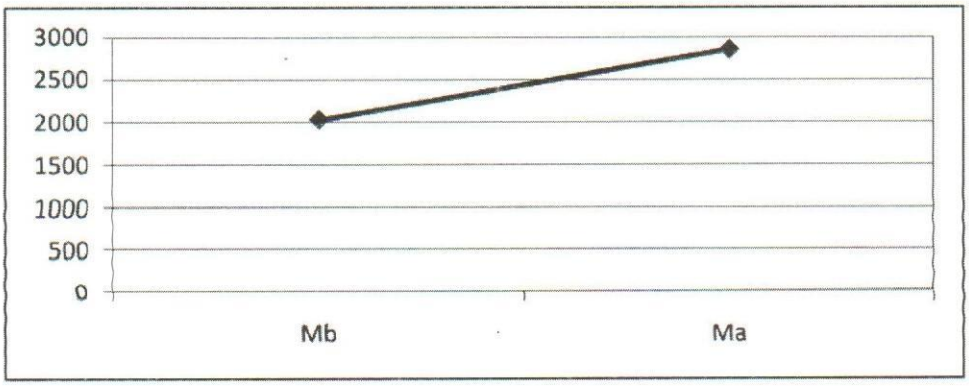
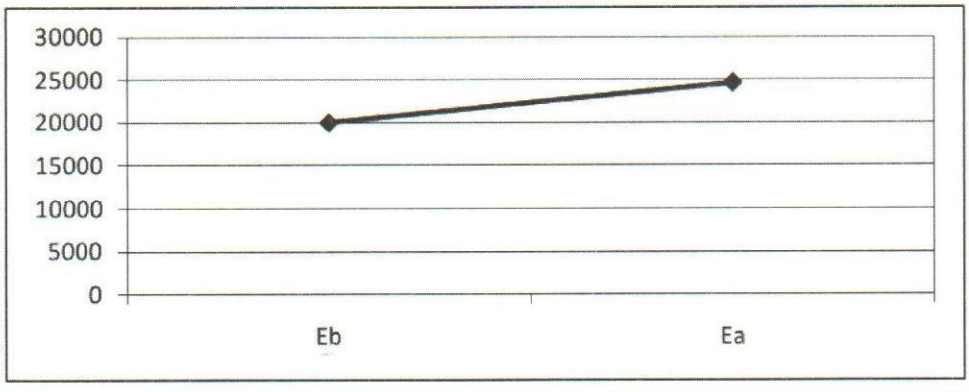


Figure 4: Financial Performance

5.4 Overall Performance before and after CDA

The overall performance of WRMGC before and after CDA is given in Figure 5.





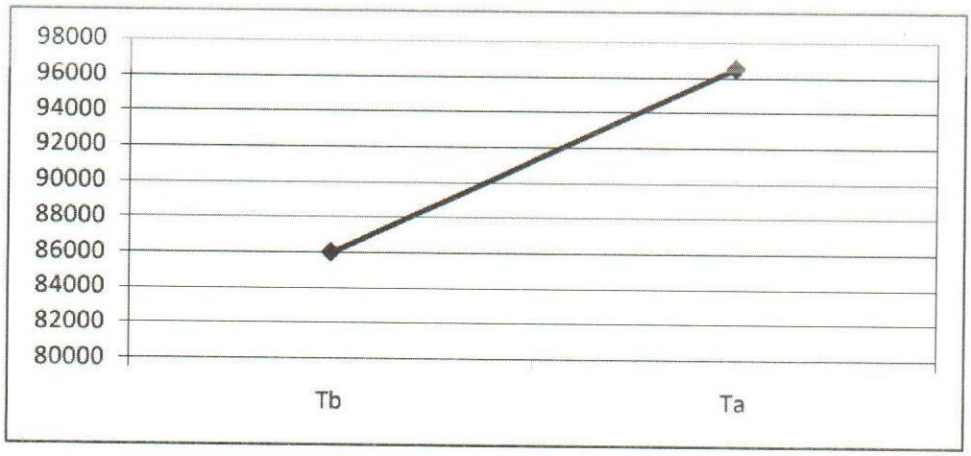


Figure 5: Overall Performance before and after CDA

As per Figure 5 the overall Performance of WRMGC before[b] and after[a] CDA for Employment, Plant and Machinery and Turnover is in increasing trend as per CAGR of 11.41 for Plant and Machinery, as per CAGR of 4.56 for Turnover and as per CAGR of 8.22 for employment.

5.5 Descriptive Analysis of WGC before and after CDA

The Descriptive Analysis of WRMGC before and after CDA is given in Table 2.

As per Table 2, there is increase in mean value of before and after CDA on Employment, Plant and Machinery and Turnover. The units, employment, production, turnover and exports indicate that there is growth in all variables after CDA.

Table 2: Descriptive Analysis of WRMGC

	Mb	Ma	Eb	Ea	Tb	Ta
Mean	2027.5	2850	20000	24625	86000	96500
Standard Error	177.5	0	500	2125	4000	1500
Median	2027.5	2850	20000	24625	86000	96500
Standard Deviation	251.023	0	707.107	3005.2	5656.85	2121.32
Sample Variance	63012.5	0	500000	9031250	3.2E+07	4500000
Range	355	0	1000	4250	8000	3000
Minimum	1850	2850	19500	22500	82000	95000
Maximum	2205	2850	20500	26750	90000	98000
Sum	4055	5700	40000	49250	172000	193000
Count	2	2	2	2	2	2
Largest (1)	2205	2850	20500	26750	90000	98000
Smallest (1)	1850	2850	19500	22500	82000	95000
Confidence Level (95.0%)	2255.35	0	6353.1	27000.7	50824.8	19059.3

Source: Computed Data.

5.6 Correlation Analysis

The Correlation Analysis is given in Table 3.

Table 3: Correlations

	Plant and Machinery in Lakhs	Employment in Numbers	Turnover in Lakhs
Plant and Machinery in Lakhs	1		
Employment in Numbers	0.83	1	
Turnover in Lakhs	0.97	0.87	1

Source: computed data

Null Hypothesis 1: There is no relationship between Machinery, Employment and Turnover.

Alternate Hypothesis: There is relationship between Machinery, Employment and Turnover.

As per Table 3, there exists a significantly high degree of positive relationship between machinery, employment and turnover, employment and turnover. Higher dependent variable like turnover is associated with higher independent variables like employment and plant and machinery.

5.7 Regression Analysis

The Regression Analysis is given in Table 4.

Table 4: Regression Equations

Equation No.	Regression Equations	R^2	p value	Result
1	T = 53445.34 + 10.87 P + 0.51 E	R^2=0.95	p = 0.23	Not Significant
2	T = 58086.97 + 13.60 M	R^2=0.93	p = 0.09	Significant
3	T = 48722.08 + 1.91 E	R2 =0.77	p = 0.13	Not Significant

Regression equation 1, in Table 4, reveals that employment and plant and machinery significantly predicts turnover. Higher dependent variable like turnover significantly predicts independent variables like employment and plant and machinery after CDA. For one unit increase in plant and machinery, turnover increases by 10.87 units, and employment by 0.51 units.

5.8 Trend Analysis

The Trend Analysis is given in Table 5.

Table 5: Trend Equations

Equation No.	Regression Equations	R^2	p value	Result
4	M = 1527.5 + 364.5 T	R^2 = 0.90	p=0.05	Significant
5	E = 16375 + 2375 T	R^2 = 0.91	p=0.04	Significant
6	T = 78000 + 5300 T	R^2 = 0.96	p=0.02	Significant

Source: Computed Data.

As per trend equation 4 in Table 5, an annual average increase in Plant and Machinery is INR. 364.5. As per trend equation 5 in Table 5, an annual average increase in employment is 2,375 nos. As per trend equation 6 in Table 5, an annual average increase in turnover is INR. 5,300.

There is an annual average increase in dependent variables like turnover, and there is an annual average increase in independent variables such as employment, plant and machinery, after CDA.

5.9 Analysis of Variance (One-Way Anova)

The descriptive data are given in Table 6.

Table 6: Descriptive Data

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
M	1.00	2	2027.50	251.023	177.500	-227.85	4282.85	1850	2205
	2.00	2	2850.00	.000	.000	2850.00	2850.00	2850	2850
	Total	4	2438.75	496.494	248.247	1648.72	3228.78	1850	2850
E	1.00	2	20000.00	707.107	500.000	13646.90	26353.10	19500	20500
	2.00	2	24625.00	3005.204	2125.000	-2375.69	51625.69	22500	26750
	Total	4	22312.50	3210.497	1605.249	17203.88	27421.12	19500	26750
T	1.00	2	86000.00	5656.854	4000.000	35175.18	136824.82	82000	90000
	2.00	2	96500.00	2121.320	1500.000	77440.69	115559.31	95000	98000
	Total	4	91250.00	6994.045	3497.023	80120.91	102379.09	82000	98000

Source: Computed Data

Table 7: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
M	Between Groups	676506.250	1	676506.250	21.472	.044
	Within Groups	63012.500	2	31506.250		
	Total	739518.750	3			
E	Between Groups	2.139E7	1	2.139E7	4.489	.168
	Within Groups	9531250.000	2	4765625.000		
	Total	3.092E7	3			
T	Between Groups	1.103E8	1	1.103E8	6.041	.133
	Within Groups	3.650E7	2	1.825E7		
	Total	1.468E8	3			

Source: Computed Data

Null Hypothesis 2: There is no significant difference in employment on before and after CDA.

Alternate Hypothesis 2: There is significant difference in employment on before and after CDA.

As per Table 7, $p = 0.168 > 0.05$, hence null hypothesis is accepted and alternate hypothesis is rejected i.e., there is no significant difference in employment on before and after CDA. However, as per Table 5, M (Mean)

value on CDA_A = 24625.00 > CDA_B = 20000.00 where there is significant increase in employment after CDA.

Null Hypothesis 3: There is no significant difference in machinery on before and after CDA.

Alternate Hypothesis 3: There is significant difference in machinery on before and after CDA.

As per Table 7, p = 0.044 <0.05, hence null hypothesis is rejected and alternate hypothesis is accepted i.e., there is significant difference in machinery on before and after CDA. The mean value as per Table 5, M (Mean) value on CDA_A = Rs.2,850.00 lakhs > CDA_B = INR. 2,027.50 lakhs where there is significant increase in value of machinery after CDA.

Null Hypothesis 4: There is no significant difference in turnover on before and after CDA.

Alternate Hypothesis 4: There is significant difference in turnover on before and after CDA.

As per Table 7, p = 0.133 >0.05, hence null hypothesis is accepted and alternate hypothesis is rejected i.e., there is no significant difference in turnover on before and after CDA. However as per Table 5, M (Mean) value on CDA_A = INR. 96,500.00 lakhs > CDA_B = INR. 86,000.00 lakhs where there is significant increase in turnover after CDA.

5.10 Paired Sample T-Test

The Paired Sample T-Test is given in Tables 8, 9 and 10.

As per Tables 8, 9 and 10, even though there is no significant difference in variables, there is increase in mean value of employment, machinery and turnover before and after CDA.

Table 8: Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Ma	2850.0000	2	.00000	.00000
	Mb	2027.5000	2	251.02291	177.50000
Pair 2	Ea	24625.0000	2	3005.20382	2125.00000
	Eb	20000.0000	2	707.10678	500.00000
Pair 3	Ta	96500.0000	2	2121.32034	1500.00000
	Tb	86000.0000	2	5656.85425	4000.00000

Source: Computed Data

Table 9: Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Ma & Mb	2	.	.
Pair 2	Ea & Eb	2	1.000	.000
Pair 3	Ta & Tb	2	1.000	.000

Source: Computed Data

Table 10: Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Ma - Mb	822.50	251.021	177.50	-1432.85	3077.85	4.634	1	.135
Pair 2	Ea - Eb	4625.00	2298.09	1625.00	-16022.58	25272.58	2.846	1	.215
Pair 3	Ta - Tb	10500.00	3535.53	2500.00	-21265.51	42265.51	4.200	1	.149

Source: Computed Data.

5.11 Difference in Differences (DID)

The Government of India and Government of Tamil Nadu policies on CDA are important ones for MSMEs. A test was conducted between control group (who have not adopted CDA) and Treatment Group (who have adopted CDA). The Treatment T for time t for employment, machinery and turnover and Difference in Differences (DID) equation formed are given in equation as 7, 8 and 9 in Figures 6, 7 and 8 and in Table 11.

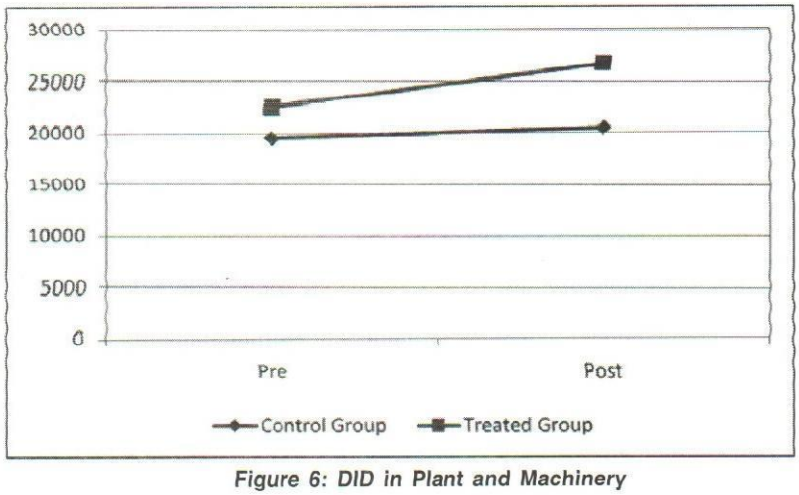


Figure 6: DID in Plant and Machinery

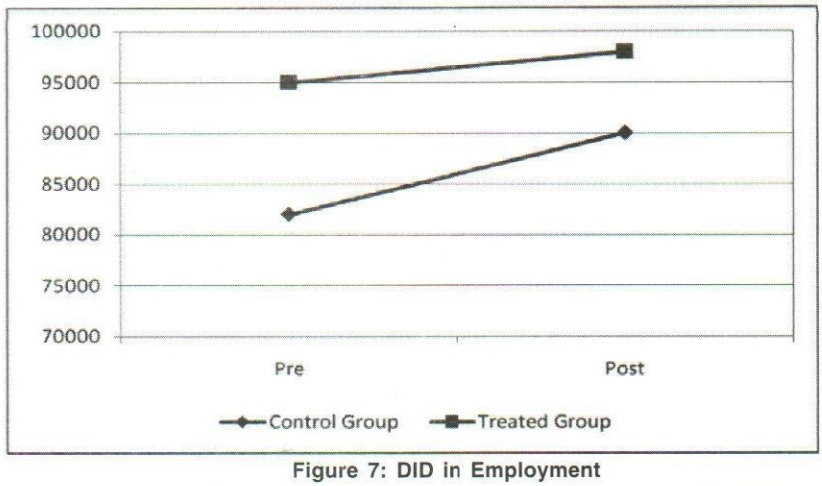


Figure 7: DID in Employment

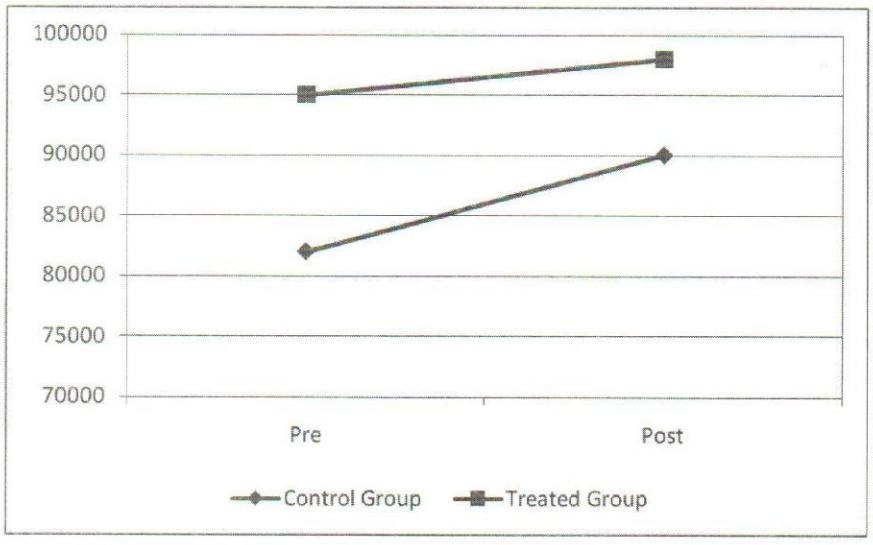


Figure 8: DID in Plant and Machinery

Table 11: Difference in Differences Equations

Equation No.	Trend Equations	R^2	p value	Result
7	M = 2205 - 355 T + 645 t + 355 DID	$R^2 = 1$	p=0.05	Significant
8	E = 20500 - 1000 T + 2000 t + 5250 DID	$R^2 = 1$	p=0.05	Significant
9	T = 90000 - 8000 T + 5000 t + 11000 DID	$R^2 = 1$	p=0.05	Significant

According to equation 7, the DID for machinery is INR. 355 lakhs. There is an increase in machinery value in the treated group / CDA intervened group when compared to control group.

According to equation 8, the DID for employment is INR. 5,250 lakhs. There is an increase in employment in the treated group / CDA intervened group when compared to control group.

According to equation 9, the DID for Turnover is INR. 11,100 lakhs. There is an increase in turnover value in the treated group / CDA intervened group when compared to control group.

5.12 Value Chain Analysis

The value-chain concept has been used to distinguish between cooperative strategies according to the type of resources pooled by the partners. This study is based on the value chain concept and integrated approach developed by researcher on cluster development, as shown in Figure 9.

It has been discussed that Cluster Approach is a major motivating factor and enterprises are keen to accept the challenge to maximize their profits. Majority of enterprises are highly satisfied with the infrastructure interrelationships, technology interrelationships, procurement interrelationships, production interrelationships and marketing interrelationships after the CDA.

5.13 WRMGC Model

The Cluster Model as shown in Figure 10 indicates the cluster level linkages of all actors, namely, TIIC-Tamil Nadu Industrial Investment Corporation, SIDBI-Small Industries Development Bank of India, EXIM Bank-Export Import Bank, SIDCO-Small Industries Development Corporation, TANSTIA- Tamil Nadu Small and Tiny Industries Association, NSIC-National Small Industries Corporation, MSMEDI- Micro, Small and Medium Enterprises Development Institute, DIC-District Industries Centre, ITPO-Industrial Trade Promotion Organization, MOI-Ministry of Industry involved effectively in the formation and the supporting activities of the Engineering Cluster. From the outcome of the present study, it is obvious that the cluster has significant interrelationships among the enterprises. One location of the clusters plays a crucial

Figure 9: Value Chain Analysis for Women Ready Made Garment Cluster

SUPPORT ACTIVITIES	**Infrastructure**	With Government of Tamil Nadu, through TANSIDCO, and Government of India's assistances, created the Common Facility Centre. Facilities at CFC are computerized 12 head 9 color embroidery machine, 20 head 5 color embroidery machine and 25 power sewing machine with training centre (Trailer)	Infrastructure Interrelationships	PROFIT
	Human Resource Management	The 350 women units at Dhalavaipuram are responsible for a direct employment of 8,500 people (85% are women) and gives indirect employment to another 10,000 people. Training centre, which has computerized embroidery and stitching to train and impart technical skills to employees, will generate 160 tailors every day.		
	Technology Development	The machineries used by ready made garment manufacturing units in the manufacturing process are cutting machine, sewing machine, hemming machine and piping machine. Few units have embroidery machines having very little capacity, which depends on bigger unit. Hence, latest machines like computerized embroidery and stitching have been bought in the cluster.	Technology Interrelationships	
	Procurement	For manufacturers of in-skirt (petticoat), the raw material is poplin cloth. The procurements are from Erode, Bombay and Tirupur. For manufacturers of other garments, the material will be cotton and cotton mix, and the procurements are from Erode, Bombay and Jaipur. The common raw material bank (consortia) may be created under Public Private Partnership (PPP) concept which leads to best quality inputs with low input costs, and Just in Time (JIT) model with less raw material cost (10% to 20%) compared to open market.	Procurement Interrelationships	
	Primary Activities	*The manufacturing process of ready* made garments involves five stages of production process: Stage I: Cutting of fabric, Stage II: Embroidery work, Stage III: Stitching, hemming and piping, Stage IV: Ironing. Stage V: Individual packing and bulk packing. At present, women cluster manufactures in-skirts, ladies night suit, churidhars and nighties through computerized embroidery and stitching.	*The individual manufacturers have their own regular buyers in Kerala and Tamil* Nadu. Direct sales are made to bigger / smaller shops throughout Tamil Nadu, Andhra Pradesh, Karnataka and Kerala. The units also market through agents. CFC will go for new products like pillow covers, sofa covers, curtains with embroidery work and also embroidered saris.	
		Inbound Logistics / **Operations** / **Outbound Logistics**	**Marketing/ Sales** / **Service**	
		Production Interrelationships	**Marketing Interrelationships**	

Source: Developed by Researcher

role in the integrated study. Constant involvement of industrial units in the cluster will improve their performance. The costs of the industrial units have considerably reduced due to the intervention and the profit has increased sizably. The policy planners can identify the parameters of industrial growth in different locations of the region using CDA. The outcome of CDA will attract the financial investors to concentrate more on specified industrial centers for investment. This will improve the economic status of the region for overall development. The WRMGC Model (see Figure 10) indicates the cluster level linkages of all actors involved effectively in the formation and the supporting activities of Cluster.

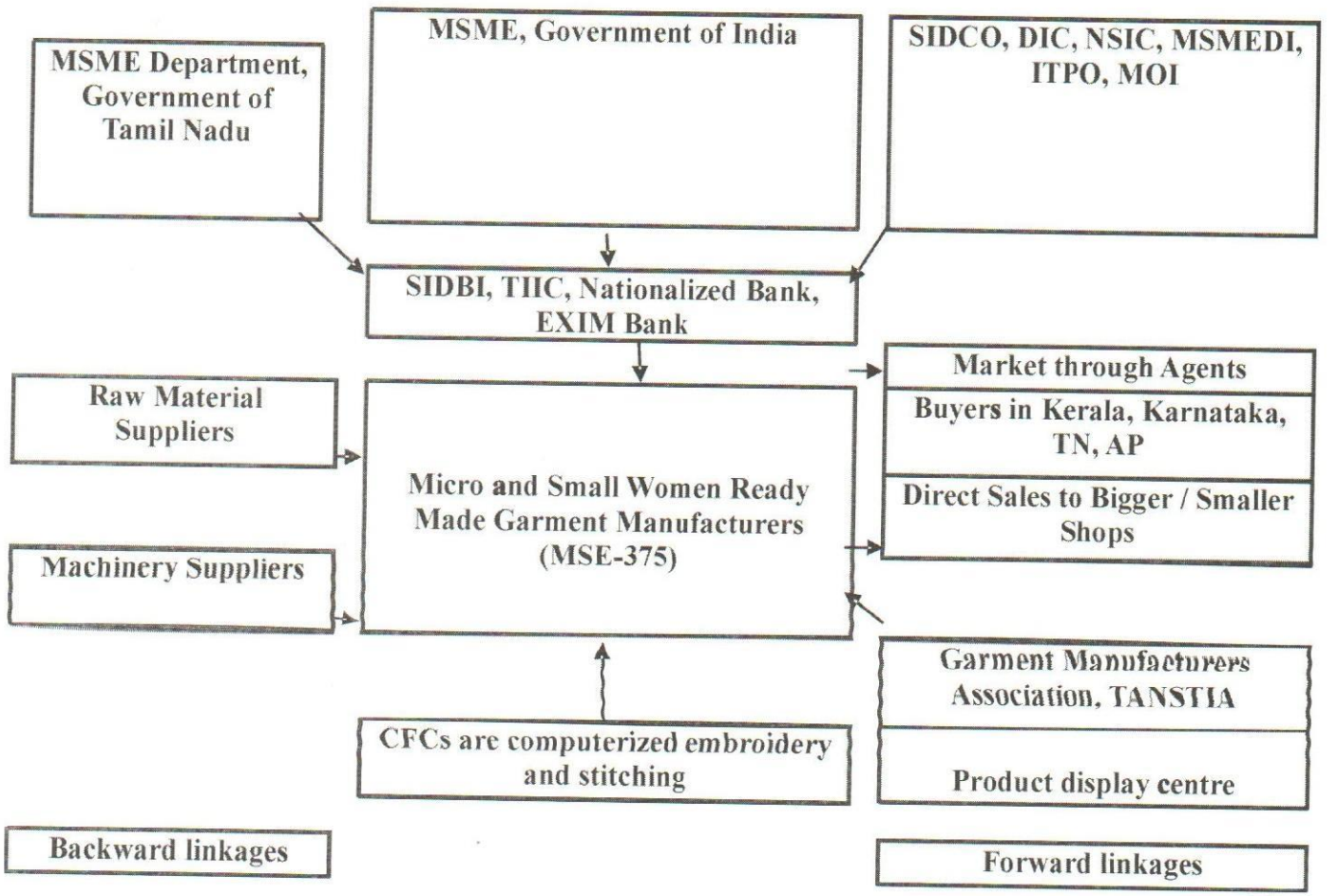


Figure 10: Cluster Map

The CFC created is shown in Figure 11 and Figure 12 where embroidery work is carried out.

6. Findings, Suggestions and Conclusion

An attempt has been made to study the performance of WRGC before and after CDA, and to study the differences in the treated and the control groups, which shows interesting results. There exists a significant high degree of positive relationship between machinery, employment and turnover. For one unit increase in machinery and employment, turnover increases. There is an annual average increase in machinery, employment and turnover. There is significant increase in employment, machinery and turnover before and after CDA.

The Difference in Differences for machinery, employment and turnover is a positive and high one for the treated group i.e., those adopted CDA when compared to control group versus those who have not adopted CDA. It implies that the government's policy on CDA is a success. It has been discussed that Cluster Approach is a major motivating factor and enterprises are keen to accept the challenge to maximize their profits. Majority of enterprises are highly satisfied with the infrastructure interrelationships, technology interrelationships, procurement interrelationships, production interrelationships and marketing interrelationships after the CDA. The WRMGC needs to tap the export markets to compete in the global market.

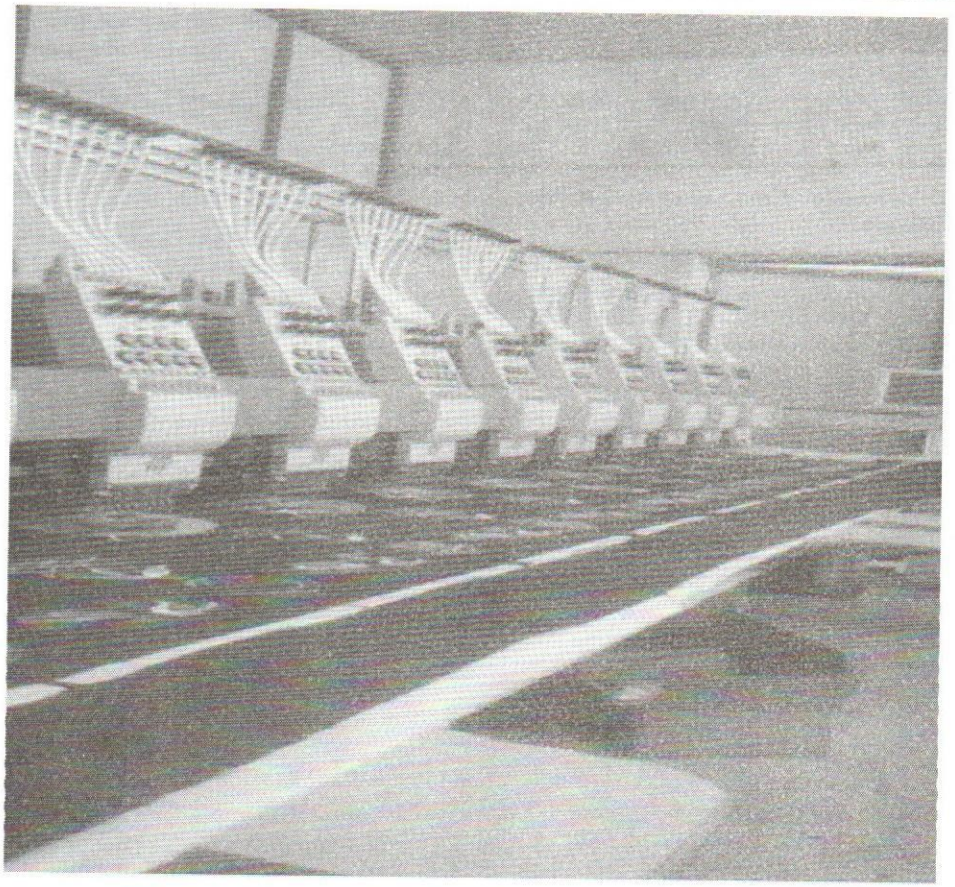


Figure 11: CFC – Computerized Color Embroidery Machine-Process

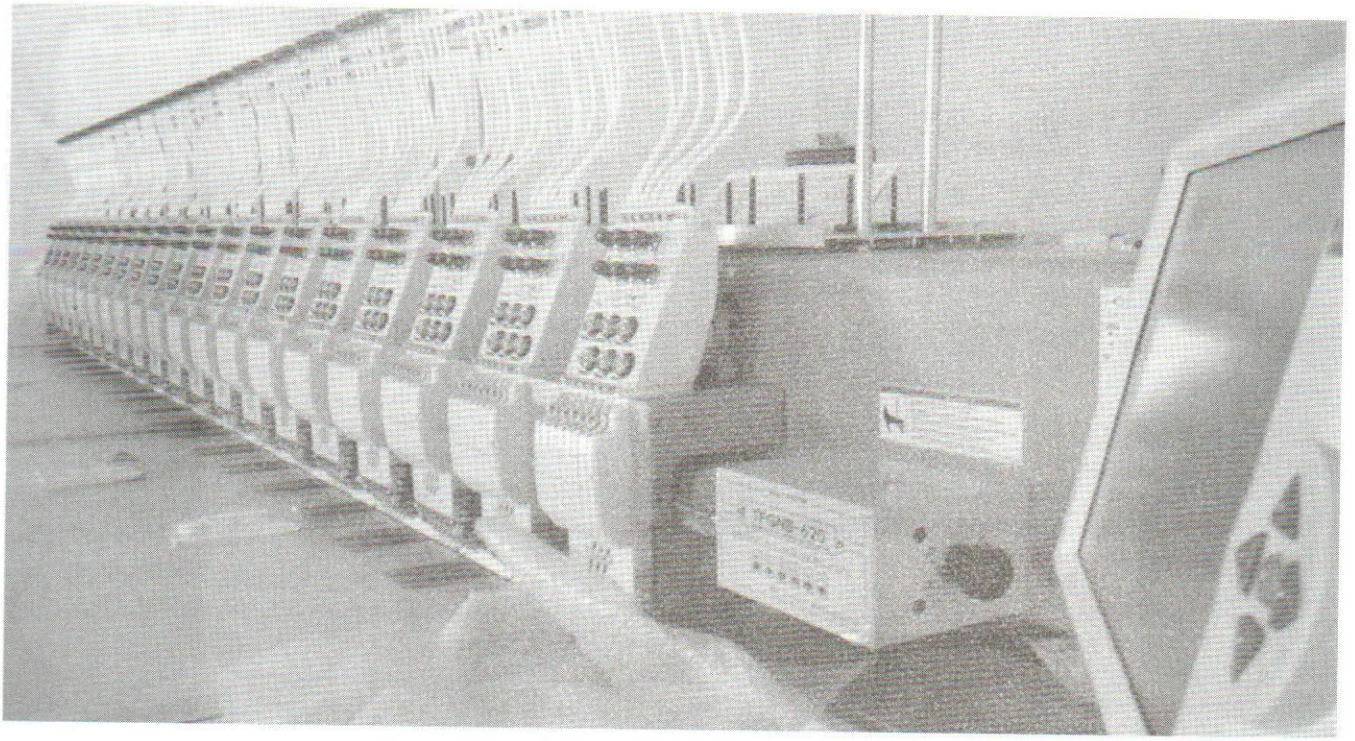


Figure 12: 20 Head Computerized Color Embroidery Machine

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"There is no tool for development more effective than the empowerment of women and girls."

– Kofi Annan

A Study on Productivity & Empowerment of Women Intensive Sericulture Sector of West Bengal*

CHANDAN ROY AND SANCHARI ROY MUKHERJEE

Sericulture is a women-intensive sector where 60 per cent of the workers are either family workers or hired female workers. Productive skill makes the presence of women indispensible both in pre- and post-cocoon sectors. This larger participation is expected to raise their level of empowerment too. Higher level of empowerment is expected to induce the woman to usher improved productive technology. However, field survey in Malda districts of West Bengal reveals a complete bleak picture. Neither productivity nor the empowerment levels have reached the desired level, which calls for an immediate intervention and revision of policies.

** This is an original paper and has not been submitted anywhere for review/publication. Part of the paper is outcome of the unpublished Ph.D. thesis of the first author, under supervision of second author at North Bengal University.*

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1. Introduction

Sericulture is a women labour intensive household industry throughout the world. Almost sixty percent workers both in pre- and post-cocoon sectors are either family women or hired women workers. In India, 91.76 lakh persons are engaged in sericulture during 2018–19, cultivating mulberry in 23.5 lakh hectares of lands (CSB, online). So, it can be assumed that around 55 lakh persons engaged in sericulture during 2018–19 are women workers. A study has shown that India is home to 12.7 crores of working women, out of which 90 per cent are engaged in unorganized sectors (Goswami and Bhattacharya, 2013). Participation of these women workers is mostly found in marginal and casual employment due to inadequacy of skill, illiteracy, restricted mobility and lack of individual status (Chari, 1983). Another study revealed that women labourers in India are mostly engaged in agro-based household sectors as unpaid labour and the prominent sectors are handloom, sericulture, dairying, fisheries, small animal husbandry and handicrafts (Mehta and Sethi, 1977). Out of the 6.39 lakh villages in India, sericulture is practiced in 52,360 villages (8.2 per cent) and generates livelihood to around 9.48 lakh families (Savithri et al., 2013).

Among the five traditional raw silk producing states, West Bengal is the third largest mulberry raw silk producer in India, which yields 11.5 per cent of the country's total production (CSB, Annual Report 2017–18). West Bengal occupies the highest rank in terms of 'families involved per village ratio', i.e., 48.9 per cent (Roy, 2015a). The reason is spatial concentration of silk production in only three of its districts, namely, Malda, Murshidabad and Birbhum. In 2017–18, West Bengal produced 2,540 MT of mulberry raw silk utilizing 16,480 ha under mulberry cultivation and involving 1.21 lakh sericulturists, 24,000 reelers and 31,088 weavers (CSB, 2019). As women have a high level of

participation in all these sericultural activities, this income generation seems to improve the decision-making ability in the production process which can be expected to improve the sericultural productivity (Venkatesh et al., 2010). This paper will shed some lights on various dimensions of the productivity and empowerment of women in sericulture in West Bengal. It also intends to construct women empowerment index, especially for the women workers attached to sericulture, and thereby want to measure their level of empowerment.

2. Methodology

Malda is the largest mulberry raw silk producing district in West Bengal, manufacturing 67.93 per cent of the state's production during 2016–17. Kaliyachak Block-I & II were chosen as the primary survey areas, since 90 per cent of mulberry-cultivated area and sericulture farms are clustered in this region. Eight villages namely Marupur, Alipur, Shershahi, Sujapur, Gayesbari, Mothabari, Feranchak and Jodhkabil were selected through stratified random sampling method. Around 25 household farms were chosen per village using random sampling, and women representative members were asked various structured questions connected with decision-making abilities. Based on their response, the data were tabulated. Our objective was to investigate the reasons behind productivity-inhibiting factors existing in sericulture and measure the level of empowerment of women in sericulture in West Bengal using our own constructed index.

3. Women Labour Demand in Sericulture Farm : Issues of Productivity

Women's precision and patience make their presence indispensible in silkworm handling. Since traditions and customs of society in Indian rural context do not encourage the majority of rural women to work outdoors, sericulture proves to be a boon. It gives a wide opportunity to women who can carry on with all their contributory work even after attending to their regular household chores. Thus, sericulture, besides agriculture, is ideally suited for women who are able to contribute as family labour in the rural areas.

Jayaram et al., (1998) found that under irrigated conditions, every acre of sericulture generated employment of 247 men and 193 women round the year. They also inferred that the small-scale mulberry farms provided ample scope for employment of family labour and thereby having the potential to solve the problem of seasonal unemployment. Lakshmanan et al., (1999) found that female labour is proportionately higher in all sericultural activities, which is surely due to their specialised skill and productivity. Saraswathi and Sumangala (2001) observed that within the indoor activity of silkworm rearing, women's participation was as high as 94.67 per cent and that except for the peak period, the entire sericulture activity is conducted using productivity of family labour.

Farm women have certain productivity attributes, which are of special relevance to sericulture development.

(i) A farm woman is always concerned about the well-being of the family. So, when larger participation is seen in sericulture activities, it is surely due to their efficiency. Silkworm rearing calls for intensive attention as well as motherly care, especially in the larva stage. Identifying and then collecting mature silkworms and putting those on spinning trays require a great deal of specialized skill and patience. Women members can ideally fit into the round-the-clock schedule of sericulture (Banerjee, 1990).

(ii) According to the Central Sericultural Research & Training Institute, Mysore (Guide to Sericulture Extension, CSB), women have proven themselves to be better learners. They have better capacity to concentrate, listen, integrate and recall. They are also easily adaptable and thereby can be expected to reap the benefit of better technologies.

(iii) Silkworm reeling & spinning requires nimble fingers, which provides special edge to women workers to keep attached with the post-cocoon sector of the artisanal silk industry.

(iv) Women are also seen to be better managers of credit. Therefore, with larger participation of women and greater access to income from sericulture, the rate of savings generated from it can lead to high degree of asset formation, which may lead to sustainable development in sericulture (Venkatesh et al., 2010).

Usha Rani (2007), in one of her studies in Andhra Pradesh, has observed that the establishment of one acre of mulberry garden for rearing 300 disease free layings (DFLs) of silk worms in two months generates 96.36 man days of employment, of which 72.70 percent are by women. She has also noticed that cocoon cutting, and sexing and egg-incubation are exclusively done by women.

Sarkar, Majumdar and Ghosh (2017) conducted a study in few villages of Murshidabad District, West Bengal, to assess the role of women workers in sericulture, which included observations on the share of workload borne by the women. For example, mulberry garden management needs higher share of women workers than in the establishment of mulberry garden. Silkworm rearing, reeling and twisting require proportionately higher percentage of women workers (see Table 1). In fact, women workers perform comparatively more delicate but less hazardous jobs in mulberry cultivation, such as the preparation of cuttings, planting them into nursery or in the field, application of manure, fertilizers, etc. Few activities including weeding, harvesting of leaves and their transportation to markets are exclusively performed by women workers. However, it has been observed that landless women workers are hired in peak periods of sericulture in the villages of West Bengal, thus providing work opportunities to the marginalized women.

In small and poor sericulture farms, family women take care of silkworm rearing, as it often requires round-the-clock care. Family women undertake this cumbersome work with the hope that they will also become an anchor to their family. They perform leaf-plucking, removal of weeds, bed-cleaning, worm-feeding, picking the right worms and placing it into bamboo tray (*chandrika*) and so on. Researchers opined that an operation like leaf-plucking is skilled and delicate. The workers must know which leaf is to be plucked. This specialized productivity skill makes their role more indispensible in sericulture. However, the role of women in cocoon market is rarely visible in West Bengal. When it comes to dealing with cash, the male members of the family take proactive role.

In the post-cocoon process, the reeling of silk is largely done by family women following the traditional crude method of 'Charka' (wheel). Household women and non-farm family women are mostly involved in producing silk yarn. Improved cottage basins are mainly used by large farms and their silk yarn are relatively better than the charka-made silk. These cottage basins also employ large number of women workers and child workers, mainly due to their low wage demand. Women are also employed in silkworm egg production, manufacturing of sericulture appliances such as bamboo trays, leaf baskets etc.

The gender-segregation of workers in sericulture is historically evolved. But, whether it is due to their specialized productivity skill or as cheap labour is a matter of research and debate. Roy et al., (2012) have shown that low productivity of land is no way responsible for lower production of raw silk in West Bengal compared to Karnataka, but still sericulture failed to develop evenly across the state. Malda, Murshidabad and Birbhum are the only three districts which produce 90 per cent of mulberry raw silk. Nature of soils, climatic conditions and generation-borne experiences of sericulture artisans, play the key role. When male workers migrate outside the state in search of work, they leave the entire burden of the household to domestic women. If the rural households are to be made economically viable and self-sustaining, the employment and income generation by rural women needs to be revamped (Chattyopadhyay et al., 2008). Sericulture, with its characteristics of being low capital intensive with low risk attached, and minimum gestation period with comparatively high returns, is ideal for the women of the household. Trivedi and Sarkar (2015) calculated that sericulture is capable of generating more income than other cash crops such as paddy and wheat, in West Bengal. They have surveyed the villages of Murshidabad, West Bengal, and calculated that sericulture can generate an annual income of INR. 52,900/- from one acre of irrigated land (assuming it can be cultivated 4–5 times a year) while multiple cropping (viz., paddy in summer, paddy in monsoon, mustard in other season) from the same plot of land can generate INR. 42,550/-. Thus, for the villages of Malda and Murshidabad, where the majority of male workers are migrant workers, sericulture seems to be an ideal and sustainable livelihood for the household women. Statistics reveal that growth in silk production is highest in Murshidabad, i.e., almost doubled between 2011 and 2017, while the rise is not significant in Birbhum. Malda ever remains the largest raw silk producing district in our state (see Table 2).

3.1 Productivity Improvement Related Issues

Agricultural extension (i.e., successful application of the fruits of scientific research and new technology) can play a crucial role in boosting agricultural productivity as it acts as an engine of pro-poor economic growth (Raghunathan et al., 2019). In India, per hectare productivity of mulberry silk was found to be very low during 1960s and 1970s, i.e., around 14-20 Kg of mulberry raw silk per hectare (Rai and Dwivedi, 2015). In 1980s and 1990s, significant hectare productivity improvement was observed which was undoubtedly the fruit of successful agricultural extension work (Mote et al., 2014). The average hectare productivity

of raw silk in India has shown a fluctuating trend over the period 2009–10 to 2018–19. From 88.92 Kg/ha in 2009–10, the land productivity of raw-silk rose to 100.9 Kg/ha in 2011–12, declining thereafter to 95.93 in 2013–14 but again rose to 107.84 Kg/ha in 2018–19. However, per hectare productivity of raw silk is much higher in West Bengal compared to national average, although it shows a declining trend recently, i.e., from 2014–15 to 2018–19. The per hectare productivity of raw silk diminished to 153.57 Kg/ha in 2018–19 from 161.68 Kg/ha in 2014–15, However, the area under mulberry plantation had risen and it will be more practical to analyze this trend along with the changing trends in labour productivity (see Table 3).

In fact, the labour productivity trend shows marginal fluctuations from 2009–10 to 2018–19. From an average of 2.39 Kg raw silk production per person in 2009–10, it declined to 2.25 Kg of raw silk/person in 2010–11 and then continually showed a rising trend and ultimately increased to 2.76 Kg of raw silk production per person in 2018–19. But if we look back further over the planning period, it revealed a substantial fluctuating trend. Starting from an average of 3.35 Kg/person per annum in the First Plan, it reached to an average of 4.63 Kg/person per annum in the Third Plan and then it dipped to 2.594 Kg/person per annum in the Ninth Plan (Roy, 2015b). The year 2001–02 showed a rise in labour productivity to 6.06 Kg/person. But the year 2010–11 exhibited a steep rise in productivity, i.e., 15.78 Kg/person, which marginally declined to 14.59 Kg/person in 2017–18. This labour productivity in West Bengal remained much higher than the National average, which was mainly possible due to the induction of technologies (see Table 4). Unless the women workers are more favourable to these technological updates, this rise in productivity would never have been possible.

Sericulture in West Bengal (especially in Malda and Murshidabad districts) is largely controlled by the women members of the household farms as these two districts have high numbers of male out-migrant workers. According to market experts, the technology which is conducive to raise productivity is input cost intensive, which is not affordable by most of the poor women artisans. Often, there was a lack of concern for appropriate technologies which matched with low resource base, lower risk taking ability and the overall production strategies of the poorer sections. This technology bias itself works against the productivity of the poor women workers of sericulture (Venkatesh et al., 2010). Sandhya Rani (2006) has observed that with the introduction of more farm machinery, women's labour is getting further and further pushed into unskilled category and thereby the whole process ensures continued marginalization of women workers in sericulture. However, analyzing the resource base efficacy, research studies (Das et al., 1999; Manjunatha et al., 2018) exposed that marginal farmers have greater productivity potential and therefore they should be given sufficient help to boost the overall productivity. Another study established inverse relation between farm-size and productivity (Das et al., 2000) and found that the net return would be optimal at mulberry land holdings of 0.2 hectare in most of the districts of West Bengal.

However, productivity of women workers in small farms is hampered by the drudgery associated with their farming practices. While surveying eight villages in Malda districts, we found several kinds of productivity-inhibiting drudgeries faced by seri-women, such as (a) financial exploitation faced by the family workers as they are never paid in cash for their endeavours; (b) they work for long hours starting from 4.00 AM to 6.00 PM, which degrades their health condition; (c) while cooking and reeling cocoons in boiled water, their fingers often suffer burn injuries; (d) hot and humid air and smoke in reeling units affect their lungs; (e) most of the seri-women suffer from health issues such as headache, giddiness, burning of eyes and throat, excess heat in the body etc; (f) women workers experience fatigue while handling rearing trays, plucking leaves and cleaning rearing rooms, (g) for charka reelers, the sitting posture is strenuous and prolonged work in that posture worsens their health status; (h) women workers additionally face problems of wage inequality with the male workers; (i) owners of the farm prefer to pay the hired women workers more in kind than in cash and (j) health insurance scheme for the women workers is yet to reach in much of these remote villages.

Our major findings from the primary survey revealed that out of an average of 14 family workers in one household, women workers are 6 and among them almost 5 are from family and 1(one) is hired woman worker. The average daily working hour is more than nine hours and most of the women are illiterate or functionally literate. This low level of education itself works as a hindrance in technology transfer, which in turn affects their productivity. Health issues are observed among 62 per cent of the households and wage gap between male and female hired worker is more than Rs. 60/- per day. All this affects the productivity of women workers and thereby affects the progress of sericulture in the villages of West Bengal.

However, Raghunathan et al., (2019, p.567) opined that extension directed at women workers bears the potential to increase the technical efficiency and improve adoption of technologies which benefit women. Again, interventions aiming at women being updated to the recent technical breakthroughs may be achieved through empowering women and enhancing their decision-making role. Increased decision-making roles can even reduce wage gap (Hertz et al., 2009) and increase the adoption of drudgery reducing technology (Khan, Kishore and Joshi, 2016). Thus, improving productivity seems to be impossible without empowerment in the household industry like sericulture.

4. Women Empowerment in Sericulture: Multidimensional Issues

Despite showing specialized productivity, tenacity and persistence at work, efforts put forward by women workers remain unnoticed and they continue to work as unpaid family workers. But this perception has changed for the better in recent years owing to the significance of the critical operations that they perform as well as their share in the production value chain; although, their participation in decision-making regarding family expenditures can hardly be noticed. Venkatesh Kumar et al., (2010, p.179) have observed that seri-women are also compelled to work outside on others' fields to supplement their family income, yet they have very little say regarding the earning or any decision regarding where she is to work and how much she is to be paid.

Care Pathways' *Theory of Change* (2013) states that rise in productivity of small and poor women farmers in turn helps to increase her earning capacity while also empowering them. Contribution and influence over household income helps the domestic women to participate in decision-making process, which raises her self-confidence and self-esteem too. Sinha (1989) pointed out that when women from sericulture families forgo alternative paid employment in order to assist sericulture, their empowerment rises. However, Charsely (1976) suggests that for middle class sericulture families, silkworm rearing represents a suitable domestic activity for the women folk, who would not be expected to work outside home. In this situation, the intra-family power remains unaffected. When women's labour becomes an essential in the production function and male enjoyment of conspicuous consumption becomes dependent on it, that raises the female power. When sericulture is taken up by the lower class families, women power within home could decline.

Roy Chowdhury et al., (2011) found that in sericulture enterprises, decision taken by women themselves are restricted to activities such as quality of mulberry leaves selection, maintenance of hygiene in rearing houses etc. In several studies, it has been highlighted that although women workers participated in large numbers in the total work force, but their status in production decision is minimal (Venkatesh et al., 2010; Roy, 2015b). In the chain of production, they just act as the obedient workers, be it in relation to spacing silkworms in bamboo tray or about sorting out diseased worms. Regarding scale of production, timing of production, technology of choice, they have virtually no power in decision-making. In fact in a sericulture farm, since the land belongs to the male member of the family, his decision dominates over others and he becomes the main sericulturist. This non-recognition of women workers virtually lowers her self-esteem and deprives her right to various institutional services. Women are supposed to be better managers of credit, but bankers are hesitant to advance credit to them, as they can't provide land as security and/or any other collateral. Thus, the possibility fails to mature and women empowerment in sericulture of West Bengal remains a pipe dream.

Larger participation of women workers in sericulture would cause an improvement in their decision-making ability in the production process, which in turn is expected to improve sericultural productivity. While working in the two Gram Panchayats of Malda district of West Bengal, Roy (2015b) experienced significant quantitative presence of women workers in the total workforce, which was supposed to boost their group confidence. Empowerment always makes a match between economic opportunities and their capabilities. Most of the time due to lack of concern, economic opportunities are lagging behind their capabilities. Increased participation in labour force would raise their self-esteem and would inspire them to involve in decision-making activities both in farm and households, which in turn would enhance women's work agency.

4.1 Construction of Women Empowerment Index for Women Workers in Sericulture

Women's Empowerment in Agriculture Index or WEAI (IFPRI, 2012), has been introduced by the Global Hunger and Food Security Initiative to overcome the obstacles and economic constraints faced by the agricultural women

in LDCs. As empowerment is inherently context specific and shaped by the socio-economic, cultural and political condition, we intend to construct two indicators of women empowerment relevant to sericulture, following the computation method of WEAI. Roy et al., (2018) also constructed Women Empowerment Index to measure rural empowerment level. Their study indicated that women empowerment being dependent on complex sociological and economic issues, needs to be measured in specific parameters.

For the sericulture sector, we choose two broad domains for computing the empowerment indices, specially where women are expected to exhibit their power after being financially supportive through this household industry, i.e., (i) Within Family Sphere, (ii) Within Social Sphere.

4.1.1 Family Empowerment Index (C_f)

Within the family sphere, the empowerment of the women depends upon her participation in decision-making role in the following three household activities:

(a) Various decisions with respect to silk production

(b) Control on the use of income earned from sericulture

(c) Decisions about health & education of her children (including her own reproductive health)

These three sub-indicators are given equal 1/3 weights to construct 'Family Empowerment Index' in Sericulture (C_f)

$$C_f = w_1 I_1 + w_2 I_2 + w_3 I_3$$

where, I_1 = 1, if the household women participate in decision-making of running daily family expenditure;

= 0, otherwise;

I_2 = 1, if the household women participate in decision-making about the health and education of her children in the family (including her own reproductive health);

= 0, otherwise;

I_3 = 1, if the household women participate in decision-making about her household business, i.e., sericulture.

= 0, otherwise.

$\Sigma w_i = 1$, i= 1, 2, 3 (w_i being the weight)

All three decisions in a sericultural family are expected to have equal importance. Thus the assumption of equal weights to all three decisions is made, i.e., $w_1 = w_2 = w_3 = 1/3$

Hence, Family Empowerment Index ranges between 0 and 1.

$0 \leq C_f \leq 1$

C_f = 1 would imply family empowerment at the highest attainable level, which also signifies gender parity at perfect level within her family

C_f = 0 would imply absolute disempowerment of women within her family

Empowerment has not been defined in binary consequence as either empowered or disempowered. Field experience observed women with various degrees of empowerment. According to the index construction, the level of family empowerment among sericulture women in Malda district has been found at the level of 0.25, which is much below the '*adequate level of empowerment*', i.e., 0.80. The socio-economic background in the minority concentrated regions is the major reason for this low-level of empowerment in sericulture farms where domestic labour force is largely used. An attempt has been made to compute the association between Family Empowerment Index of Sericulture Women and several other socio-economic factors using primary survey data collected from sericulture-rich villages of Malda District of West Bengal, and some notable results have been found (see Table 5).

4.1.2 Social Empowerment Index (C_s)

In order to include the leadership domain of the sericulture women, it is necessary to build a Social Empowerment Index. Being more socially empowered, the sericulture women are expected to take a leading role even in marketing of cocoon and raw silk, including other outdoor activities associated with this livelihood. We propose three indicators that capture the essence of social empowerment by transforming the family woman to a more socially dynamic and mobile one, who are free to operate in the public domain and not confined to the private domain.

(a) Being member of NGO (social interaction)

(b) Being member of Self Help Group (social grouping for economic interest)

(c) Being representative of political parties (power of articulating in public)

The three sub parameters are given equal weights 1/3 to construct 'Social Empowerment Index'(C_s) in the artisanal silk sector:

$$C_s = w_4 I_4 + w_5 I_5 + w_6 I_6$$

Where, $I_4 = 1$, if the household women actively participate in NGO (Non-Government Organisation) by becoming its member;

= 0, otherwise;

$I_5 = 1$, if the household women participate in any Self Help Group as a member of that group;

= 0, otherwise;

$I_6 = 1$, if the household women represent any political party either in local, zonal or higher constitutional body.

=0, otherwise;

$\Sigma w_i = 1$, i= 4, 5, 6 (w_i being the weightage)

We feel all three social fields are equally important for any household women involved with sericulture, for expressing and controlling her social views. So, we place equal weights to all three social participation, i.e.,

$w_4 = w_5 = w_6 = 1/3$

SEI also ranges between 0 and 1. $0 \leq C_s \leq 1$

$C_s = 1$ would imply social empowerment at highest attainable level, which also signifies gender parity at perfect level in society.

$C_s = 0$ would imply perfect disempowerment of women in the society.

Empowerment has not been defined in binary outcome, e.g., either the woman is empowered or disempowered. Field experiences helped to find sericulture women with different level of empowerment. According to the index construction of social empowerment, it is found that the value of SEI for sericulture women in Malda district is 0.04, which is again much below the 'adequate level of empowerment', i.e., 0.80. The socio-economic background, especially in the minority-dominated regions, is the major reason for this low level of empowerment. An attempt is made to compute the association between Social Empowerment Index of Sericulture Women and several other socio-economic factors as mentioned earlier (see Table 6).

4.1.3 Summary of Findings

A significant association has been found between the proportion of women working in the family and the family-empowerment—which is an expected outcome. Increased involvement in income-generating activities makes the women more empowered, while the social empowerment has an inverse relation with the proportion of women working in the family (though not in significant proportions). One can defend this inverse association by explaining, higher the community involvement by woman, the lower their chance of involvement in family enterprises. Moreover, sericulture activities of women require time and care which is raised to 10 hours per day during the rearing season. Therefore, it is quite understandable why a socially empowered woman is less associated with sericulture workforce since she is expected to devote more time in social activities in the public domain.

An empowered woman would always prioritize health and education of her children. So, if she is empowered enough, she would not let her children work inside the house. She would rather send them to school instead of supplementing family income against their toil. Social empowerment has, however, no significant relation with children workforce in the family. However, more involvement in social activities by a woman most often burden the girl children at home to undertake household chores and take care of the younger siblings at the expense of her education.

Though women empowerment is often called a tool for raising productivity and thereby poverty alleviation, no significant relation could be observed between income earned by a sericulture farm and empowerment of the women of the household within and outside her house.

The final result is most interesting and it opens few new issues in the arena of Women's Studies. It has been found that the 'education years of the family head' is negatively correlated with 'the family empowered women'. This is a typical patriarchal reflection where the educated head of the family (usually a male) seldom shares his decision-making activity with the family woman. But, the relation is not statistically significant. However, significant positive correlation is observed between social empowerment of women workers and education years of head of the household.

5. Way Ahead

Though our primary survey results fail to find any significant association between level of empowerment and income earning of a sericulture farm, which is expected to be an outcome of higher productivity, linkages between productivity and empowerment cannot be ignored. Both are mutually dependent on each other for their level of growth. In other words, there exists two-way causation

between empowerment and the level of productivity, and they are positively correlated. Sericulture-rich villages of West Bengal have some typical problems like religion based orthodox attitude that hinders both productivity and empowerment. Changes in the mindset can be achieved through mass campaign and promotion of extension work. More and more SHGs can be encouraged to take up sericulture as their venture. Special concessional loans can provide the incentive to undertake such ventures. Scientific research to raise productivity should be more cost-saving, more region-specific and cheap-resource based. It is only then that we can expect a sustainable development in rural sericulture in West Bengal through higher productivity and higher levels of empowerment of the women engaged in such activities.

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Total Commitment is the common denominator among all successful men and women.

– Abdul Kalam

Appendices

Table 1: Gender segregation by occupation in mulberry cultivation & silkworm rearing

Sericulture Activities	% Share of Women Workers in Labour Force (1st year of establishment)	% Share of Women Workers in Labour Force (2nd year of establishment)
Establishment of mulberry garden	43	30
Management of mulberry garden	73	82
Silkworm rearing	60	60
Silk reeling	50	50
Silk twisting	60	60
Silk weaving	63	63
Silk printing	50	60
Average	57.3	65.7

Source: Sarkar et al., (2017)

Table 2: District-wise production of mulberry raw silk during 2011–17

Districts	Mulberry raw silk (Metric tonnes)	
	2010–11	2016–17
Malda	1389.36	1714.62
Murshidabad	252.54	546.96
Birbhum	242.90	262.46

Source: CSB (2019), DoS_Govt of WB (2011)

Table 3: Productivity of mulberry raw silk in India and West Bengal

Year	Labour productivity of Mulberry raw silk in India (kg/person)	Land productivity of Mulberry raw silk in India (Kg/ha)	Land productivity of Mulberry raw silk in West Bengal (Kg/ha)
2009–10	2.39	88.02	N.A.
2010–11	2.25	96.06	143.46
2011–12	2.41	100.90	N.A.
2012–13	2.45	100.61	N.A.
2013–14	2.48	95.93	N.A.
2014–15	2.66	97.30	161.68
2015–16	2.48	98.01	151.68
2016–17	2.50	98.12	157.85
2017–18	2.56	98.54	155.95
2018–19	2.76	107.84	153.57

Source: Central Silk Board (online)

Table 4: Labour productivity trend in sericulture sector of West Bengal

Items	2001–02	2010–11	2017–18
Plantation area (ha)	19,013	13,138	16,480
No. of silk farmers (Rearers & reelers)	110,000	92,000	145,000
No. of weavers	122,000	27,260	31,088
Total employment	232,000	119,460	176,088
Silk production (MT)	1,407	1,885	2,570
Labour productivity	6.06	15.78	14.59

Source: Govt of West Bengal-Ministry of Textiles (Sericulture), Compendium of Seri-states-2019

Table 5: Findings from primary survey in sericulture rich villages of Malda district

Serial No.	Parameters related with women labour	Average (Arithmetic Mean)
1	Number of women workers per household	5.55
2	Number of total workers per household	13.9
3	Numbers of family women workers per household	4.61
4	Numbers of hired workers per household	1.05
5	Numbers of female child workers per household	0.63
6	Working hours of family women workers	9.6 hours
7	Years of education of family women workers	3 years
8	Households with major women health issues (%)	62%
9	Daily wage of hired female workers	Rs. 122/-
10	Daily wage of hired male workers	Rs. 168/-

Source: Compiled from Primary data surveyed in Malda District

Table 6: Correlation between sericulture empowerment index & socio-economic factors

Associated factors	Family Empowerment Index (C_f)	Social Empowerment Index (C_s)
Ratio of working women in family	Spearman R = -0.184** Kendall's R = 0.149**	Spearman R = -0.031 Kendall's R =-0.026
Number of child workers in the family	Spearman R = -0.162* Kendall's R = - 0.140*	Spearman R = 0.013 Kendall's R = 0.011
Income of sericulture farm	Spearman R = 0.126 Kendall's R =0.095	Spearman R = 0.021 Kendall's R = 0.018
Average years of education of Head of Family	Spearman R = -0.116 Kendall's R = -0.098	Spearman R = 0.176* Kendall's R = 0.153*

*significant at 0.05 level; **significant at 0.01 level

Socio-economic Development of Women in Rural Bhutan

PAWAN KUMAR SHARMA

This study is concerned with women's contribution towards socio-economic development in rural Bhutan. The need to evaluate the effects in terms of empowerment and contribution towards socio-economic development arises due to the perception that intercessions have little effect on women's contribution in the development processes in rural Bhutan owing to cultural factors. To test the proposition, Chapcha Gewog under Chukha Dzongkhag has been studied and analyzed. The paper evaluates participation, contribution, and sustainability of the women in family earnings in Bhutan. It is expected to help researchers with useful insights into the issues of women's empowerment and contribution towards socio-economic development. The findings indicate improvements in education, involvement in economic and social activities, and participation in decision-making processes, etc. However, the results also confirm the paradoxical situation facing women's participation in developmental activities and involvement in decision-making processes. Finally, it concludes that women contribute to socio-economic development, but not more than the men do.

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Introduction

Throughout history, women have been marginalized by the society, making it impossible for women to achieve their goals and desires in life. Women have always been treated as second best by society over the centuries. They have been kept at home and excluded from public space. Such marginalizing rendered the importance of women in society, both economically and socially. Therefore, it is important to know the role of women in all activities of the economy and the society. Over a considerable period, there has been a debate on the role of women in societies and their participation in economic activities.

Socio-economic development of a country fully depends upon the development at grass root level i.e. villages. In rural areas, women constitute half of the population and majority of them are unrecognized contributors to agricultural and economic productivity. In most of the rural areas, women make greater and enthusiastic participation in harvest, poultry and livestock activities. Yet, women's contribution to agricultural and household production as an economic activity receives less recognition. They are involved in every corner of household work and in every decision or planning of the family. The understanding of role of women in homestead and family life needs to be assessed by every individual of the nation. The present study was initiated to throw light on the importance of women's role in socio-economic development.

Review of Literature

Socio-economic development and women's empowerment are closely related. Development is in itself a driver of gender equality and a tool for women's empowerment (UNCTAD, 2012). In recent debates on women's

empowerment through adult learning, different perspectives on women's advancement have been expressed. There is also growing empirical evidence indicating that women as political decision-makers make different choices than men do (Institute of Economic Affairs, Kenya, 2008). The different choices made by women in leadership also explain why higher rates of female participation in Government is associated with lower levels of corruption (Dollar, Fisman and Gatti 1999, cited in the report Institute of Economic Affairs, Kenya, 2008). Women undoubtedly have an immense role to play in socio-economic development. In the mid-1980s, 95 percent of Bhutanese women from the age of 15 to 64 years were involved in agricultural work, compared with only 78 percent of men in the same age range (Lewis, 1991). Three distinct theoretical traditions were identified that help understand sex and gender. In the first tradition, men mature to become competitive and work-oriented, while women mature to become nurturing, person-oriented and child-centered (Risman, 1998).

Likewise, most of the empirical studies indicate that increased schooling of the mother is associated with larger effects on child health, schooling and adult productivity, than increased schooling of the father (Schultz, 2002). Bhutan's pride lies on its lack of a class system and an absence of sexual discrimination (Armington, 2002). Bhutanese women have the same privileges as men, including rights to education, voting and holding positions in government. Education is an important component of opportunities and empowerment. A number of empirical studies have found that promoting women's education boost their wages and that returns of educating women are frequently larger than the education for men. Those women who were work in the farm–belonging to farmers and small farms–are contributing to the income of their family, and therefore, it can be deduced that it will eventually increase their living standard (Khan & Bibi, 2011).

There is positive relationship between women's economic activities and family's well-being. This finding is in line with the empirical study that economic empowerment leads to family welfare (Pillai, 1995, cited in the work of Khan & Bibi, 2011). Traditionally, women have been socialized either to abstain from alcohol use or to drink less than men (Fillmore & et al., 1997, stated in the work of Collins & McNair, 2002). Women who do not participate in the labour force may have less access to alcohol than men and women employed outside the home (Wilsnack, 1992, stated in the work of Collins & McNair, 2002). The demands of women's roles in parenting and family life also may discourage alcohol intake (Leonard & et al., 1999, stated in the work of Collins & McNair, 2002).

Research Problem

Although socio-economic development requires a united effort of both men and women, the role of women in socio-economic development in rural Bhutan has probably not been thoroughly studied in earlier studies conducted in the country. The present study is confined to rural Bhutan. As Bhutan's 65.5 per cent of the population dwells in rural areas of the country, the study is expected to reveal the true aspect of the Bhutanese society.

Objectives

a. To find out how women contribute to agriculture, livestock, family income, household activity and society, and the level of their participation in decision-making in all these areas.

b. To study the socio-economic status of women in rural Bhutanese society.

Scope of the Study

a. The study covers how women contribute to socio-economic aspect of rural development. It provides a broader and conclusive view of women's role.

b. The study intends to explore whether societal problems are related to women's role in the society.

c. The study will act as an evidence to prove the existence/non-existence of gender parity/inequality in terms of social and economic status.

Research Methodology

The study was conducted at Chapcha Gewog in Chukha Dzongkhag. Chapcha was selected for the study since the place has a major proportion of rural population that is thriving on agriculture, which in a way replicates closely the pattern in the country's economy as a whole. For the purpose of the study, a convenient sample of 76 households was selected. The samples were selected because of their convenient accessibility and proximity to the group. The households that derive their living exclusively from sources other than agriculture and livestock were excluded for the survey. The data collection

instrument that was chosen for the study was a Schedule. The interview and scheduling method was used for data collection because a majority of the respondents were illiterate. The study is a descriptive study, which describes the facts and other characteristics concerning the research sample or situations. The study does not attempt to find any casual relationships.

Demographic Profile of Respondent

There is a majority of married women comprising 71.26 per cent, followed by 11.98 per cent of divorced women, then 8.98 per cent and 7.78 per cent of widowed and unmarried women amongst the respondents. It was found that majority of the women residing in Chapcha Gewog are illiterate, with 68.26 per cent having no educational background at all. 11.98 per cent of women had studied up to middle secondary school and followed by 10.78 per cent who have studied NFE and Dzongkha only. The study revealed that majority of the respondents, 31.74 per cent, has only one child and those households having two children are 19.76 per cent. The percentage of families having no child is 9.58 per cent. According to our survey, only 6.59 per cent of the respondents have 6 to 10 acres of land. Most of the respondents (77.84 per cent) owned 1 to 5 acres of land while the rest 15.57 per cent have less than 1 acre of land. Details of demographic profile of respondent are depicted in Table 1.

Table 1: Demographic profile of respondent

S. No.	Particulars	Frequency	Percentage
1	**No. of female in household**		
	One female	22	28.95
	Two females	32	42.11
	Three females	12	15.79
	Four females	6	7.89
	Five females	3	3.95
	Six females	1	1.32
2	**Marital status of female**		
	Married	119	71.26
	Unmarried	13	7.78
	Widowed	15	8.98
	Divorced	20	11.98
3	**Education level of female**		
	Primary	13	7.78
	Middle	20	11.98
	High Sec	2	1.20
	NFE and Dzo	18	10.78
	No educational background	114	68.26

4	**No. of children**		
	No children	16	9.58
	One	53	31.74
	Two	33	19.76
	Three	26	15.57
	Four	17	10.18
	Five	9	5.39
	Six	9	5.39
	Seven	4	2.40
5	**Land holding**		
	Less than 1 acre	26	15.57
	1 acre to 5 acres	130	77.84
	6 acres to 10 acres	11	6.59
6	**Women and sources of living – household**		
	Agriculture	42	55.26
	Agriculture & livestock	1	1.32
	Agriculture, livestock & other means	33	43.42
7	**How much income do you approximately earn in a year (household/family income)**		
	Less than Nu. 10,000	2	2.63
	Nu. 10,000–Nu. 50,000	23	30.26
	Nu. 50,000–Nu. 10,0000	32	42.11
	Nu. 100,000–Nu. 150,000	16	21.05
	Above Nu. 150,000	3	3.95
8	**Who is the head of your family?**		
	Men	33	43.42
	Women	41	53.95
	Both	2	2.63

Data Analysis

a. To test whether there exists any significant difference with regards to the role of women in social welfare activities among varying number of women in a household.

Majority of the women, figuring to 39.5 per cent, participate in about 50 per cent of the activities concerning social welfare taking place in their locality. 17.1 per cent of the women participate in about 75 per cent of the activities, there after it increases to 21.1 per cent for those who participate in 100 per cent of the social welfare activities taking place in their locality. There is a decrease in figure from 15.8 per cent to 6.6 per cent from those who participate in 25 per cent of the social welfare activities, to those who do not participate at all. All in all, it is obvious that women are taking a greater role in social welfare activities compared to their male counterparts. Majority of the respondents said that men and women participate almost indiscriminately in the social welfare activities that are taking place in their locality. While it is found that women putting effort up to an extent of 75 per cent is highest in case of households with one woman (27.3 per cent against 23.1 per cent for households with two women), women taking up the whole responsibility themselves is highest in case of households with two female (22.7 per cent against 21.9 per cent against households with one woman). Therefore, in order to test whether there exists any significant difference as regards the role of women in social welfare activities among varying number of women in a household, the Chi-square test is used as follows:

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.783	20	0.667

Since the value of Pearson Chi-Square test (i.e., 0.66) is more than the alpha value of 0.05, the result is *not significant*. Hence, it can be concluded that women's participation in social welfare activities is not significantly different among households having different number of female members. Further, the study reveals that, where women participate in more than 50 per cent of the total effort required in social welfare activity, an increasing percentage of 29.8 per cent, 36.4 and 40.4 per cent belong to households having one, two and three male members respectively. This indicates that as the number of male member increases in the family, more is the women's participation in the social welfare activities. Moreover, the study reveals that where women are participating more than 50 per cent in social welfare efforts, a proportion of 41.7 per cent, 38.9 per cent and 20 per cent were observed from households which own lands within the range of: less than 1 acre, 1 to 5 acres and 6 to 10 acres respectively. This indicates that as the area of land holding increases, the women's contribution to social welfare activities decreases.

b. To test the relationship between woman education and woman empowerment.

Bhutan is known for having gender equality. Gender equality is gaining a lot of attention today all over the world, and it is becoming a much-discussed issue in many of the international conferences too. 53.95 per cent of women are the head of the family, while 43.42 per cent are male and 2.63 per cent is indifferent. This indicates that women empowerment is high in Chapcha Gewog.

In case of married women, a man as a head of the family is in slight majority representing a figure of 54.5 per cent. But in case of unmarried, divorced and widowed women, their heads of the family are mostly women figuring 66.7 per cent for unmarried, 87.5 per cent for divorced and 85.7 per cent for widowed women. Though there is a slight majority of men domination in family head position, the overall picture depicts that women empowerment is quite high in the area. Indeed, the result can be also attributed to the divorce and widowed statuses. Therefore, it can be said that women empowerment is high and is prevalent irrespective of their marital status.

There is an interesting relationship between gender empowerment and land holding. Women heads in case of households that have less than 1 acre of land represent a much larger proportion compared to men (75 per cent against 16.7 per cent). The proportion of women heading the family has decreased as the land holding increased to 1–5 acres of land, i.e., to 50.8 per cent against 49.2 per cent. The difference is very insignificant. But, as the land holding increased to more than 6 acres, men have dominated the family by a percentage of 60 against 40. Therefore, we can conclude that women empowerment is greater as the land holding decreases and vice versa.

The number of women heading the family is more than men, by a proportion 13.6 per cent in case of households having only one female member whereas the gender empowerment in case of households having two women is equal. It is evident from here that where there is only one female in a family, majority of them are heading the family (54.5 per cent). In case of households having only one man, women are heading the family in a proportion of 55.2 per cent. Ironically, in case of households having two and three men, men are heading the family in a proportion of 54.5 per cent and 69.2 per cent respectively. Therefore, it can be concluded that women empowerment is more pertinent in cases where the number of men in a family is lesser.

Men, as head of family, are predominant in households where women have a higher secondary education level with a proportion of 100 per cent. On the other hand, women as the head of a family are prevailing in households where woman are either illiterate or literate up to middle secondary level with their respective proportion of 51.9 per cent, 62.5 per cent, and 66.7 per cent. This portrays a very complicated situation. Yet, when subjected to the Chi-square test of correlation, it was found that there exists no significant relationship between woman education and woman empowerment, probably because the proportion of literate woman is so insignificant. The following is the Chi-square test result:

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.535(a)	8	0.96

c. To test if the education level of the mother has any impact on the performance of the child/children.

How women affect the child/children's education and how women's education affects their role and participation in the society, is the key of taking education as an important parameter in the study. Children, in this response, refer to only those who are below the age of 18 and who are studying during the time of the data collection. Therefore, it does not include the entire sample. So, direct frequency count has been used instead of percentage in this case. Women/mother education comes under any of the 5 categories, while child performance has been divided into three: poor, average and above average. The cross tabulation is an attempt to study whether the mother's education has any impact on the performance of the child/children.

Table 2: Performance of Child 1 * education level (female)

		Education level (female)					Total
		No	Primary	Middle sec	Higher sec	NFE & Dzo	
Performance of Child 2	Poor	0	0	1	0	0	1
	Average	20	3	5	0	2	30
	Above Average	13	2	1	1	1	18
Total		33	5	7	1	3	49

Source: Primary Data

Table 3: Performance of Child 2 * education level (female)

		Education level (female)					Total
		No	Primary	Middle sec	Higher sec	NFE & Dzo	
Performance of Child 2	Average	9	3	4	0	1	17
	Above Average	8	1	2	1	0	12
Total		17	4	6	1	1	29

Source: Primary Data

Table 4: Performance of Child 3 * education level (female)

		Education level (female)					Total
		No	Primary	Middle sec	Higher sec	NFE & Dzo	
Performance of Child 3	Average	8	1	2	1	0	12
	Above Average	2	2	1	0	1	6
Total		10	3	3	1	1	18

Source: Primary Data

Despite evidence of a negative relation between the mother's education and the child's performance, Chi-square test has been deployed to test whether there is any significant relationship between the mother's education level and the child's performance.

Pearson Chi-square tests in all the three cases gives

Chi-Square Tests for Child 1

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.886[a]	8	0.352

Chi-Square Tests for Child 2

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.951[a]	4	0.566

Chi-Square Tests for Child 3

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.8[a]	4	0.308

value more than 0.05 (i.e., 0.325, 0.566 and 0.308 respectively). Since all the values are larger than the alpha value of .05, we can conclude that the result is not significant. This means that the education level of the mother does not have much impact on the performance of the child/children. In other words, performance of the child of educated mothers is not significantly different from the performance of the child of uneducated mothers. Therefore, it can be concluded that mother's education does not play a significant role in child's educational performance.

d. *Women and Alcoholism*

Alcoholism is one aspect of a socially harmful habit that is bringing in much problem and disharmony in many societies around the world. A report found out that a major chunk of governmental health expenses has been incurred for the treatment of alcohol related diseases in the country. This topic aims to study how alcohol has affected the lives of the Chapcha people. It is also to test whether women are able to play the role of a social builder in the country. Though the proportion of women drinkers in the area is very low, further analysis is being made as follows:

Amongst the total respondents, the most that consume alcohol are divorced women figuring to 37.5 per cent, while it is 16.7 per cent for unmarried, 14.5 per cent for married and 14.3 per cent for widowed. This can in fact be attributed to the problem and stress that women experience after divorce. Yet, there is a good indication that majority of those who consume alcohol drink only occasionally. From the divorced class, 62.5 per cent said they never get drunk though they drink, while 37.5 per cent pointed out that they become drunk only occasionally. With 7.3 per cent, married women top the highest frequency of respondents who get drunk quite frequently. To see whether there exists some kind of a relation between these conflicting observations, a Chi-square test has been done:

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.640993[a]	3	0.450

Pearson Chi-square value of 0.45 is more than the alpha value of .05, so it is not significant. It is clear through these observations that, alcohol consumption is not dependent on the marital status of a woman.

Alcohol consumption by women is highest in case of households that are having two females in a family. 25 per cent of the women from those households drink, while only 9.1 and 8.3 per cent of the women drink from households having one and three women respectively. Therefore, the reasons behind this may be that since women from those households have indicated a greater contribution in socio-economic activities, alcohol may have been consumed, as it is popularly believed that alcohol relieves the drudgery of hard work. The hardest workers who put the maximum effort in their fields (i.e. two women in a family) form the highest proportion of drinkers.

Amongst respondents who drink alcohol, majority with 53.8 per cent are from those households that have one man. This constitutes 24.1 per cent of the total households which are having one man. The second highest is in case of households that do not have any male member (18.2 per cent). This particular group also forms the major proportion of households where women drink occasionally and quite frequently (i.e. 40 per cent and 60 per cent) as compared to the other 7 groups that are characterized by the number of male member in their family. Though alcoholism is not a common problem in the area, it can be said that alcoholism is most prevalent in houses that have only one male member.

From a very low figure of women alcohol drinker (17.1 per cent), it has been observed that women who are illiterate are the highest proportion with 21.2 per cent as compared to 16.7 per cent and 11.1 per cent amongst women who have studied up to primary and middle secondary education level. This gives a vague impression that illiterates are more vulnerable to socially harmful activities. Interestingly, while observing a trend, it was found that from those who drink, illiterates are the highest proportion who get drunk frequently (9.6 per cent).

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.687[a]	4	0.611

Testing it with Chi-square, it however resulted that though illiterates are the highest proportion of alcohol consumers, there is no statistically significant difference between illiterate women consuming more and literates consuming less alcohol.

In cases where women responded that they consume alcohol, a descending percentage of 38.5, 30.8 per cent and 15.4 per cent of women belong to those families who have one, two and three children respectively. Consequently, the study also reveals that those women who consume alcohol frequently (60 per cent) are from those families which have one child, while those families who have two children drink frequently (only about 20 per cent) and those who have three children don't drink so frequently (5 per cent). So, this indicates that the proportion and frequency of women drinking and getting drunk is more as the number of children decreases. There is positive indication that most of the women of Chapcha Gewog do not allow their children to drink, representing 97.4 per cent. This depicts that children are brought up with care and discipline.

Findings of the Study

a. All households under the study are engaged in agriculture and more than half of them depend solely on agriculture as their primary source of living. There is a major proportion of divorced women depending solely on agriculture and married women depending on both sources of agriculture and livestock. Findings also show that there isn't any kind of relation between the primary sources of living and the extent of their land holding.

b. Findings reveal that family income distribution is not equal in the area. It was found that the number of men in a family have a direct relation with the family income. Lesser the woman in a household, higher is their income yet the difference is not statistically significant. Therefore, it can be concluded that men are more economically productive as compared to women. Larger the area of land holding, higher the income has been observed from these households.

c. Women's participation in agriculture in terms of the physical labour contribution is very high as compared to men. Data revealed that, the more women participate in agriculture as the number of women in a family increases and vice versa but, the relationship is inverse with the number of men in a family, i.e. more women participate as the number of men decreases. Illiterate women are found to be contributing more labour in agriculture. The extent to which women participate in the agriculture fields is found to be unaffected by the amount of arable land a farmer owns.

d. Women's participation in decision-making relating to agriculture is also very high as compared to men.

e. Women's participation in livestock is slightly higher than men in terms of the physical effort they put in. It was observed that women from households having larger area of land are putting in more effort. As number of women increases, it was noted that women's role in livestock activity is also increasing. But, the number of men and children in a family has an inverse relationship with the extent of effort women put in the livestock activity, i.e. higher the number of men and children, lower do women participate and vice versa.

f. Regarding the women's participation in decision-making relating to livestock, it has revealed that women put a slightly lower effort as compared to men. It was observed that women's participation is dependent on the number of female members and the land holding of a family. The more the number of female in a family and the more arable land a family owns, more is the women's participation in livestock decision-making.

g. Women's participation in trading of the farm products is high but not as high as men. It was found that women coming from households that have lesser member (both men and women) are more involved in trading. Moreover, it was observed that women's participation in trading is highest in case of households holding the least area of land, yet, no positive relation was observed between the women's involvement in trading and the area of land holding.

h. Household activities are almost fully reserved for women both at the physical work and decision-making level. The study found that, lesser the number of women, and also men, in a household, the more do they engage in household activities. Similarly, the lesser the arable land, findings revealed that, more do women from such households participate in household activities. There is no significant relationship between the levels of literacy with participation of women in household activities.

i. As far as women's participation in child rearing is concerned, it is notable that women take a greater responsibility compared to men. It was observed that, more the number of women and the area of cultivable land a household has, the greater do women engage in looking after the children. There is an inverse relationship between the number of male and women's participation in rearing their children i.e. as number of men in a family increases, women's participation decreases.

j. It was remarkable that women take almost the whole responsibility of the household decision-making. Amongst them, it was found that women's involvement in household decision-making rises as the number of male and female in a family declines. It was also evident that women's engagement in household decision-making is the highest among those households that are having only one child, yet no significant relation has been observed with regard to the number of children.

k. Participation of women from a household in social works is equivalent to men. Data revealed that women's participation in manual social works increase as the number of both men as well as women in a family declines and vice versa.

l. It is found through the study that the proportion of women empowering a family is higher than the proportion of men. Among those households who are headed by a woman, patterns indicate that, as the number of female and male member decreases in a household, the degree of women empowerment is greater. The same pattern is also observed between the land holding and women heading the family. No significant impact of marital status and women education has been found on the extent to which women are heading the family.

m. Women health is found to be considerably in good condition. More the number of women in a family, the lesser are the health problem among the women. It was also observed that married women are the highest proportion of health problem victims. In studying the relation between health and land holding, it was found that health problems are not related to the intensity/frequency of having to bear/not to bear greater/lesser agricultural drudgery and responsibility.

n. The proportion of women drinking alcohol is significantly low in the area. Women drinkers are most prevalent in households having two women, and one man. Data also indicates that as the number of children increases, there is lesser proportion of women consuming alcohol and vice versa. Despite indications of more women drinkers prevailing amongst the divorced and illiterates, the differences are not found to be statistically significant. It was also found that prevalence of child alcoholism is significantly low in the area.

Suggestion and Recommendation

a. Women play a greater role in agriculture and livestock, yet men were found to be financially more productive than women. Therefore, in order to strengthen and accelerate economic growth, the Ministry of Agriculture and other concerned organizations should focus more on women during their training and developmental programs that are aimed at increasing financial productivity of rural farmers.

b. The fact that there is lower women participation in social meetings (in *zomdues*) reveals a paradox that the majority's voice is not effectively represented in social and economic decisions. Therefore, we suggest the local government and concerned authorities to encourage more women participation in the community meetings.

c. Women are playing a major role in agricultural livestock activity as compared to men. We suggest government and relevant bodies to give more attention towards women while helping farmers in these areas.

Conclusion

Women play a major role in the socio-economic development of rural Bhutan. Agriculture being the main occupation of rural households, it is but natural that agriculture forms the key source of livelihood. Livestock, after agriculture, is the important source of livelihood for rural Bhutan. Women's contribution in agriculture as well as livestock is very remarkable, both at the physical work- and decision-making level. As it is popularly conjectured, women form the backbone of household activities. They also play a very significant role in social development and welfare activities.

Women have come a long way in moulding the socio-economic growth of the country and it was found that women put even more efforts than men in rural development, in the various fields of socio and economic sectors. In keeping with the country's goal, women empowerment is high in the rural societies. Despite enormous role of women in rural Bhutan, it was found that women's role is mostly limited to the small and lesser-numbered male families. Moreover, despite a high number and greater role, women's participation in decision-making at the societal level is pretty low. It was also found that women are financially less productive compared to men. There isn't any notable impact of education on women's role in socio-economic development of Bhutan.

However, major findings conclude that women are healthy and more participative in socio-economic activities. Findings also showed that women take more responsibility in raising and looking after their children. Overall, the findings of the study clearly revealed that women are certainly the building blocks of rural socio-economic development in Bhutan.

Limitations of the Study

The study is only confined to Chapcha Gewog. So, the findings may not apply to the whole country or other parts of the country in entirety. Our sample constitutes of only those households in rural area that engage in agricultural and livestock activities. Therefore, economic contribution by women through other activities is not studied.

Future Scope of the Study

Suggestions on the following areas for further research since we could not arrive at concrete conclusions:

a. The impact of modern education on socio-economic development and particularly on women's socio-economic role.

b. Socio-economic role of women in different sized families: There are several evidences of women's role differing with the size of families, i.e. population of male and female in the family. The present study couldn't make clear distinctions.

c. Relation between women's socio-economic role and land holding.

d. The impact of agriculture drudgery and work-burden on women's health.

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"There is no limit to what we, as women, can accomplish."

– Michelle Obama

Feature

Packtech Industry in India : A Promising Future

ASIYA CHAUDHARY AND GULFISHAN AKHTAR

Innovative products and technologies, nowadays multi-functional fibres and high-performance materials are emerging and are commonly known as Technical Textile, is an advanced technology upcoming sector that is gaining ground in India. Based on usage, there are 12 Technical textile segments, i.e. Agrotech, Meditech, Clothtech, Hometech, Packtech, Protech, Geotech, Indutech, Buildtech, Sporttech, Oekotech and Mobiletech. This sector has become significant due to the rising per capita income of consumer, increasing flexibility and recognition of products, expansion of industry sectors, government's FDI promotion initiatives, investment promotion scheme by the government etc. The objective of the present study is to evaluate and analyse the production of various segments of Technical Textile industry. Furthermore, an attempt has been made to find out which segment helps in the growth of the industry and strengthens the country's inherent competitive advantages in manufacturing field. One-way ANOVA and Multiple Comparison Technique have been applied to find out if there is statistically any significant difference across various segments of Technical textile, covering the period of 12 years i.e 2004–05 to 2015–16. The result reveals that there is only one pair of group whose mean significantly differ at the 0.05 significance level from each other, i.e., Packtech industry, whereas, Clothtech, Geotech, Indutech, Sporttech, Buildtech, Mobiletech, Hometech, Meditech, Protech, Agrotech and Oekotech segments in each group differ insignificantly from each other.

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1. Introduction

Due to specific demands of the humans, textile has undergone new technological development for a particular requirement like protection from risky situation, fire, water etc., and evolved a segment called Technical textile. They are also called by the names functional, engineering or industrial textile. Technical textile is any product intended for functional requirement rather than aesthetic and decorative characteristics. It provides not only a chance for boosting the growth and development of the industry but also a path for its expansion. Technical textile comprises of a wide gamut of activities right from agriculture & construction to automobile industry. Globally, Technical textile growth rate is about 4 per cent per year greater than the growth rate of home and apparel textiles, which are increasing at a rate of 1 per cent per year. Technical textile material is mostly used in furniture, filter clothing, hygiene medicals and construction. It is a potential area for investment in India. The production of different items of the industry has been steadily increasing in the country. But still there is less published data available about its actual status. The responsiveness among future entrepreneurs and consumers is very less. Henceforth, entrepreneurs and investors need information regarding market size, domestic and global scenario of Technical textiles, details of government schemes, list of existing Technical textile manufacturers, importers and exporters, details of Technical textile machinery manufacturers, etc.

With the growing dominance of Technical textiles, Techtextil, Messe Frankfurt GmbH has classified Technical textiles into twelve groups from the application point of view. They are as follows: (Rakshit et al., 2007)

i) Agrotech (agriculture, horticulture and forestry)

ii) Buildtech (building and construction)

iii) Clothtech (technical components of shoes and clothing)

iv) Geotech (geotextiles, civil engineering)

v) Hometech (components of furniture, household textiles and floor coverings)

vi) Indutech (filtration, cleaning and other industrial)

vii) Meditech (hygiene and medical)

viii) Mobiletech (automobiles, shipping, railways and aerospace)

ix) Oekotech (environmental protection)

x) Packtech (packaging)

xi) Protech (personal and property protection)

xii) Sporttech (sport and leisure).

2. Review of Literature

Following empirical and theoretical studies have explored the Technical textile segment-wise in terms of growth and policy measures, which includes substantive findings as well as theoretical and methodological contribution to this particular study. Shishoo. R.L (1997) in his paper entitled "Technological Textile- Technological and market developments and trends" discussed the various high functional and high performance textile and fibres both from the point of view of market developments, trends, applications and technology in the area of Technical Textile. Rakshit.A, Hira.M & Gangopadryaly.U.K (2007) in their paper "Technical Textile-What India needs to do now" addressed the diverse issues regarding processes, material, technology, machines and marketing of technical textile industry and also highlighted the various strategies for the promotion of Technical Textile industry in India.Chaudhary and Shahid, (2011): "Growing importance of Hometech textile in India" concluded that Technical textile is important not only for increasing export economic growth and employment generation but also in terms of public safety, hygiene, quality infrastructure, security and overall better world and for better life.

Memon.N and Zamon.N have reviewed in their paper "Pakistan lag behind in technical textile" the application of technical textile in medical, civil engineering, automotive and sportswear field etc. The result shows that the future development of the technical textile market and products will largely be depend upon new materials, new processes and new applications working on a global basis for the growth of economies of scale in product development and production. Hasan.A and Shivsharan U.S, Raut E.S and Sheikh Z.M (2014) in their paper "Packaging of Cosmetics: A Review" throw light on the cosmetics packaging. The major findings of the study include that Packaging play an essential role in the appearance and branding of products and also in marketing the cosmetics products. Finally it does not matter whether we use glass, plastic and metal packaging material, but it should be good in appearance, compatible and must be according to the requirement of the cosmetics.

After reviewing several more literature, it was discovered that not much work is done regarding Packtech industry in India.

3. Objective

The objective of the study is to:

1. Examine the production (market size) of various segments of Technical textile in India; and
2. Conduct inter-segment comparative analysis.

4. Hypothesis of the study

The study aims to test the following hypothesis:

H_{01}: There is no significant difference in the production (market size) of various segments of Technical textile in India.

5. Data collection and Research Methodology

The study is based on secondary sources of data retrieved from the reports published by Ministry of Textiles. Besides this, some data has been collected from published papers and different websites. The study covers the period of twelve years, i.e. from 2004–05 to 2015–16. The one-way ANOVA is used for testing the hypothesis. For the test of significance, t-test has been used. The Scheffe test is used for segment-wise multiple comparisons of the production of Technical textile in India, while Levene's test is applied to evaluate the tenability of homogeneity of variances.

6. Analysis and Findings

6.1 Descriptive Statistics: Interpretation

It can be observed from Table 1 that the highest mean of production of Technical textile was registered in Packtech segment, which is Rs 20626.291667 with a standard

deviation of Rs 15461.6410717, followed by Clothtech, which are Rs 9225.983333 and Rs 4349.4014148 respectively. Whereas the lowest mean of production of Technical textile is Rs 118.933333 for Oekotech segment along with standard deviation of Rs 79.9816039. The result reveals that the mean of total production of Technical textile from all the segments is Rs 4721.743264 crores, which is

Table 1: Descriptive statistics

Segment	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Clothtech	12	9225.983333	4349.4014148	1255.5640388	6462.505516	11989.461150	4835.0000	19601.0000
Pachtech	12	20626.291667	15461.6410717	4463.3913174	10802.433613	30450.149720	4588.3000	52527.0000
Sportech	12	3720.700000	2017.2259435	582.3229708	2439.015783	5002.384217	1649.3000	8052.0000
Mobiletech	12	4283.683333	2622.8550547	757.1530359	2617.200737	5950.165929	1454.9000	8787.0000
Buildtech	12	2590.575000	1337.8506454	386.2042151	1740.545254	3440.604746	1254.8000	5585.0000
Hoketech	12	6098.608333	4665.0023657	1346.6701858	3134.607239	9062.609428	1199.7000	16238.0000
Indutech	12	4298.875000	2944.8035292	850.0915552	2427.836102	6169.913898	1050.6000	9484.0000
Meditech	12	2368.825000	1237.3508256	357.1924161	1582.649793	3155.000207	1036.7000	4766.0000
Protech	12	1673.177500	1186.9409104	342.6403271	919.031225	2427.323775	652.6000	4327.0000
Geotech	12	923.291667	432.6832737	124.9049023	648.377830	1198.205503	272.9000	1688.9999
Agrotech	12	731.975999	373.9057833	107.9373023	494.406599	969.543401	337.6000	1558.0000
Oekotech	12	118.933333	79.9816039	23.0887003	68.115447	169.751220	24.7000	299.0000
Total	144	4721.743264	7250.5929890	604.2160824	3527.394048	5916.092480	24.7000	52527.0000

approximately half of the mean of the production of Technical textile received in Packtech alone.

6.2. Test of Homogeneity of Variances: Results and Discussion

The assumption of normality was checked by using histogram (Table 1) and found tenable for all the groups. It can be observed from Table 2 that the assumption of homogeneity of the variances was tested and found tenable using Levenelt reveals that the mean of total production of . Further, it is pertinent to note that the Levene's test for Homogeneity of variance with significance value of 0.00 indicates that the variances in production of Technical textile in various segments are significantly different from each other. It is worth mentioning that the above segments show a narrow variance in Packtech segment of 15461.6410717, and much wider variance of 4665.0023657 for Hometech segment.

7. Testing of the Hypothesis: Results and Discussion

Table 2: Test of homogeneity of variances

Production			
Levene Statistic	df1	df2	Sig.
17.944	11	132	.000

Source: SPSS output

H_{01}:"There is no significant difference in the production (market size) of various segments of Technical Textile in India.f

The one-way ANOVA is employed to test the null

Table 3: Results of ANOVA between and within Groups

Production	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	4167294341.636	11	378844940.149	14.840	.000
Within Groups	3344195550.114	131	25528210.306		
Total	7511489891.749	142			

Source: SPSS output

hypothesis. The independent variable included all the twelve segments of Technical textile in terms of production of the Technical textile as a dependent variable.

It can be observed from Table 3 that the F-value is 14.840, and P-value (=0.000 < 0.05) indicate that there is significant evidence to reject the null hypothesis and conclude that there is a statistically significant difference in production of Technical textile among the various segments in India. Hence, the null hypothesis has been rejected. However, the actual difference in mean of production of Technical textile from various segments of India is quite small. Moreover, we conclude that the mean of production of Technical textile is significantly different for at least one of the segment (F (11, 131) = 14.840, p= 0.000). Note that the ANOVA alone does not tell us specifically, which means they were different from another. To determine that, we need to follow up with multiple comparisons (or post hoc) tests.

7.1. Post hoc Scheffe test for Multiple Comparisons: Results and discussion

In Table 4 multiple comparisons are concluded to evaluate the pair wise differences among group, with the use of post hoc Scheffe test since equal variances were tenable. Scheffe test reveals the significant pair wise differences between means of production of Technical textile among various segments in India. The result reveals that there is only one pair of group whose mean significantly differs at the P<0.05 level from each other, which is certainly to be the pair of Packtech, whereas the remaining segments in

Table 4: Multiple comparison of segment-wise production of Technical textile in India

Dependent Variable: Production							
	(I) Segment	(J) Segment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
	Clothtech	Packtech	-11400.3083333*	2056.2420175	.003	-20705.921213	-2094.695454
		Sporttech	5505.2833333	2056.2420175	.781	-3800.329546	14810.896213
		Mobiletech	4942.3000000	2056.2420175	.884	-4363.312880	14247.912880
		Buildtech	6635.4083333	2056.2420175	.498	-2670.204546	15941.021213
		Hometech	3127.3750000	2056.2420175	.997	-6178.237880	12432.987880
		Indutech	4927.1083333	2056.2420175	.886	-4378.504546	14232.721213
		Meditech	6857.1583333	2056.2420175	.440	-2448.454546	16162.771213
		Protech	7552.8058333	2056.2420175	.276	-1752.807046	16858.418713
		Geotech	8302.6916667	2056.2420175	.145	-1002.921213	17608.304546
		Agrotech	8494.0083333	2056.2420175	.121	-811.604546	17799.621213

		Oekotech	9107.0500000	2056.2420175	.063	-198.562880	18412.662880
		Clothtech	11400.3083333*	2056.2420175	.003	2094.695454	20705.921213
		Sporttech	16905.5916667*	2056.2420175	.000	7599.978787	26211.204546
Scheffe		Mobiletech	16342.6083333*	2056.2420175	.000	7036.995454	25648.221213
		Buildtech	18035.7166667*	2056.2420175	.000	8730.103787	27341.329546
		Hometech	14527.6833333*	2056.2420175	.000	5222.070454	23833.296213
	Packtech	Indutech	16327.4166667*	2056.2420175	.000	7021.803787	25633.029546
		Meditech	18257.4666667*	2056.2420175	.000	8951.853787	27563.079546
		Protech	18953.1141667*	2056.2420175	.000	9647.501287	28258.727046
		Geotech	19703.0000000*	2056.2420175	.000	10397.387120	29008.612880
		Agrotech	19894.3166667*	2056.2420175	.000	10588.703787	29199.929546
		Oekotech	20507.3583333*	2056.2420175	.000	11201.745454	29812.971213
		Clothtech	-5505.2833333	2056.2420175	.781	-14810.896213	3800.329546
	Sporttech	Packtech	-16905.5916667*	2056.2420175	.000	-26211.204546	-7599.978787
		Mobiletech	-562.9833333	2056.2420175	1.000	-9868.596213	8742.629546
		Buildtech	1130.1250000	2056.2420175	1.000	-8175.487880	10435.737880
		Hometech	-2377.9083333	2056.2420175	1.000	-11683.521213	6927.704546
		Indutech	-578.1750000	2056.2420175	1.000	-9883.787880	8727.437880
		Meditech	1351.8750000	2056.2420175	1.000	-7953.737880	10657.487880
		Protech	2047.5225000	2056.2420175	1.000	-7258.090380	11353.135380
		Geotech	2797.4083333	2056.2420175	.999	-6508.204546	12103.021213
		Agrotech	2988.7250000	2056.2420175	.998	-6316.887880	12294.337880
		Oekotech	3601.7666667	2056.2420175	.989	-5703.846213	12907.379546
		Clothtech	-4942.3000000	2056.2420175	.884	-14247.912880	4363.312880
		Packtech	-16342.6083333*	2056.2420175	.000	-25648.221213	-7036.995454
		Sporttech	562.9833333	2056.2420175	1.000	-8742.629546	9868.596213
		Buildtech	1693.1083333	2056.2420175	1.000	-7612.504546	10998.721213
		Hometech	-1814.9250000	2056.2420175	1.000	-11120.537880	7490.687880
	Mobiletech	Indutech	-15.1916667	2056.2420175	1.000	-9320.804546	9290.421213
		Meditech	1914.8583333	2056.2420175	1.000	-7390.754546	11220.471213
		Protech	2610.5058333	2056.2420175	.999	-6695.107046	11916.118713

		Geotech	3360.3916667	2056.2420175	.994	-5945.221213	12666.004546
		Agrotech	3551.7083333	2056.2420175	.990	-5753.904546	12857.321213
		Oekotech	4164.7500000	2056.2420175	.964	-5140.862880	13470.362880
		Clothtech	-6635.4083333	2056.2420175	.498	-15941.021213	2670.204546
		Packtech	-18035.7166667*	2056.2420175	.000	-27341.329546	-8730.103787
		Sporttech	-1130.1250000	2056.2420175	1.000	-10435.737880	8175.487880
		Mobiletech	-1693.1083333	2056.2420175	1.000	-10998.721213	7612.504546
		Hometech	-3508.0333333	2056.2420175	.991	-12813.646213	5797.579546
	Buildtech	Indutech	-1708.3000000	2056.2420175	1.000	-11013.912880	7597.312880
		Meditech	221.7500000	2056.2420175	1.000	-9083.862880	9527.362880
		Protech	917.3975000	2056.2420175	1.000	-8388.215380	10223.010380
		Geotech	1667.2833333	2056.2420175	1.000	-7638.329546	10972.896213
		Agrotech	1858.6000000	2056.2420175	1.000	-7447.012880	11164.212880
		Oekotech	2471.6416667	2056.2420175	1.000	-6833.971213	11777.254546
		Clothtech	-3127.3750000	2056.2420175	.997	-12432.987880	6178.237880
	Hometech	Packtech	-14527.6833333*	2056.2420175	.000	-23833.296213	-5222.070454
		Sporttech	2377.9083333	2056.2420175	1.000	-6927.704546	11683.521213
		Mobiletech	1814.9250000	2056.2420175	1.000	-7490.687880	11120.537880
		Buildtech	3508.0333333	2056.2420175	.991	-5797.579546	12813.646213
		Indutech	1799.7333333	2056.2420175	1.000	-7505.879546	11105.346213
		Meditech	3729.7833333	2056.2420175	.985	-5575.829546	13035.396213
		Protech	4425.4308333	2056.2420175	.945	-4880.182046	13731.043713
		Geotech	5175.3166667	2056.2420175	.846	-4130.296213	14480.929546
		Agrotech	5366.6333333	2056.2420175	.810	-3938.979546	14672.246213
		Oekotech	5979.6750000	2056.2420175	.670	-3325.937880	15285.287880
		Clothtech	-4927.1083333	2056.2420175	.886	-14232.721213	4378.504546
		Packtech	-16327.4166667*	2056.2420175	.000	-25633.029546	-7021.803787
		Sporttech	578.1750000	2056.2420175	1.000	-8727.437880	9883.787880
		Mobiletech	15.1916667	2056.2420175	1.000	-9290.421213	9320.804546
		Buildtech	1708.3000000	2056.2420175	1.000	-7597.312880	11013.912880
	Indutech	Hometech	-1799.7333333	2056.2420175	1.000	-11105.346213	7505.879546
		Meditech	1930.0500000	2056.2420175	1.000	-7375.562880	11235.662880

		Protech	2625.6975000	2056.2420175	.999	-6679.915380	11931.310380
		Geotech	3375.5833333	2056.2420175	.994	-5930.029546	12681.196213
		Agrotech	3566.9000000	2056.2420175	.990	-5738.712880	12872.512880
		Oekotech	4179.9416667	2056.2420175	.963	-5125.671213	13485.554546
		Clothtech	-6857.1583333	2056.2420175	.440	-16162.771213	2448.454546
		Packtech	-18257.4666667	2056.2420175	.000	-27563.079546	-8951.853787
		Sporttech	-1351.8750000	2056.2420175	1.000	-10657.487880	7953.737880
		Mobiletech	-1914.8583333	2056.2420175	1.000	-11220.471213	7390.754546
		Buildtech	-221.7500000	2056.2420175	1.000	-9527.362880	9083.862880
	Meditech	Hometech	-3729.7833333	2056.2420175	.985	-13035.396213	5575.829546
		Indutech	-1930.0500000	2056.2420175	1.000	-11235.662880	7375.562880
		Protech	695.6475000	2056.2420175	1.000	-8609.965380	10001.260380
		Geotech	1445.5333333	2056.2420175	1.000	-7860.079546	10751.146213
		Agrotech	1636.8500000	2056.2420175	1.000	-7668.762880	10942.462880
		Oekotech	2249.8916667	2056.2420175	1.000	-7055.721213	11555.504546
		Clothtech	-7552.8058333	2056.2420175	.276	-16858.418713	1752.807046
		Packtech	-18953.1141667	2056.2420175	.000	-28258.727046	-9647.501287
	Protech	Sporttech	-2047.5225000	2056.2420175	1.000	-11353.135380	7258.090380
		Mobiletech	-2610.5058333	2056.2420175	.999	-11916.118713	6695.107046
		Buildtech	-917.3975000	2056.2420175	1.000	-10223.010380	8388.215380
		Hometech	-4425.4308333	2056.2420175	.945	-13731.043713	4880.182046
		Indutech	-2625.6975000	2056.2420175	.999	-11931.310380	6679.915380
		Meditech	-695.6475000	2056.2420175	1.000	-10001.260380	8609.965380
		Geotech	749.8858333	2056.2420175	1.000	-8555.727046	10055.498713
		Agrotech	941.2025000	2056.2420175	1.000	-8364.410380	10246.815380
		Oekotech	1554.2441667	2056.2420175	1.000	-7751.368713	10859.857046
		Clothtech	-8302.6916667	2056.2420175	.145	-17608.304546	1002.921213
		Packtech	-19703.0000000	2056.2420175	.000	-29008.612880	-10397.387120
		Sporttech	-2797.4083333	2056.2420175	.999	-12103.021213	6508.204546
		Mobiletech	-3360.3916667	2056.2420175	.994	-12666.004546	5945.221213
		Buildtech	-1667.2833333	2056.2420175	1.000	-10972.896213	7638.329546
	Geotech	Hometech	-5175.3166667	2056.2420175	.846	-14480.929546	4130.296213

		Indutech	-3375.5833333	2056.2420175	.994	-12681.196213	5930.029546
		Meditech	-1445.5333333	2056.2420175	1.000	-10751.146213	7860.079546
		Protech	-749.8858333	2056.2420175	1.000	-10055.498713	8555.727046
		Agrotech	191.3166667	2056.2420175	1.000	-9114.296213	9496.929546
		Oekotech	804.3583333	2056.2420175	1.000	-8501.254546	10109.971213
		Clothtech	-8494.0083333	2056.2420175	.121	-17799.621213	811.604546
		Packtech	-19894.3166667*	2056.2420175	.000	-29199.929546	-10588.703787
		Sporttech	-2988.7250000	2056.2420175	.998	-12294.337880	6316.887880
		Mobiletech	-3551.7083333	2056.2420175	.990	-12857.321213	5753.904546
		Buildtech	-1858.6000000	2056.2420175	1.000	-11164.212880	7447.012880
	Agrotech	Hometech	-5366.6333333	2056.2420175	.810	-14672.246213	3938.979546
		Indutech	-3566.9000000	2056.2420175	.990	-12872.512880	5738.712880
		Meditech	-1636.8500000	2056.2420175	1.000	-10942.462880	7668.762880
		Protech	-941.2025000	2056.2420175	1.000	-10246.815380	8364.410380
		Geotech	-191.3166667	2056.2420175	1.000	-9496.929546	9114.296213
		Oekotech	613.0416667	2056.2420175	1.000	-8692.571213	9918.654546
		Clothtech	-9107.0500000	2056.2420175	.063	-18412.662880	198.562880
		Packtech	-20507.3583333*	2056.2420175	.000	-29812.971213	-11201.745454
	Oekotech	Sporttech	-3601.7666667	2056.2420175	.989	-12907.379546	5703.846213
		Mobiletech	-4164.7500000	2056.2420175	.964	-13470.362880	5140.862880
		Buildtech	-2471.6416667	2056.2420175	1.000	-11777.254546	6833.971213
		Hometech	-5979.6750000	2056.2420175	.670	-15285.287880	3325.937880
		Indutech	-4179.9416667	2056.2420175	.963	-13485.554546	5125.671213
		Meditech	-2249.8916667	2056.2420175	1.000	-11555.504546	7055.721213
		Protech	-1554.2441667	2056.2420175	1.000	-10859.857046	7751.368713
		Geotech	-804.3583333	2056.2420175	1.000	-10109.971213	8501.254546
		Agrotech	-613.0416667	2056.2420175	1.000	-9918.654546	8692.571213
LSD		Packtech	-11400.3083333*	2056.2420175	.000	-15467.758287	-7332.858380
		Sporttech	5505.2833333*	2056.2420175	.008	1437.833380	9572.733287
		Mobiletech	4942.3000000*	2056.2420175	.018	874.850046	9009.749954
		Buildtech	6635.4083333*	2056.2420175	.002	2567.958380	10702.858287
		Hometech	3127.3750000	2056.2420175	.131	-940.074954	7194.824954

	Clothtech	Indutech	4927.1083333*	2056.2420175	.018	859.658380	8994.558287
		Meditech	6857.1583333*	2056.2420175	.001	2789.708380	10924.608287
		Protech	7552.8058333*	2056.2420175	.000	3485.355880	11620.255787
		Geotech	8302.6916667*	2056.2420175	.000	4235.241713	12370.141620
		Agrotech	8494.0083333*	2056.2420175	.000	4426.558380	12561.458287
		Oekotech	9107.0500000*	2056.2420175	.000	5039.600046	13174.499954
		Clothtech	11400.3083333*	2056.2420175	.000	7332.858380	15467.758287
		Sporttech	16905.5916667*	2056.2420175	.000	12838.141713	20973.041620
		Mobiletech	16342.6083333*	2056.2420175	.000	12275.158380	20410.058287
		Buildtech	18035.7166667*	2056.2420175	.000	13968.266713	22103.166620
		Hometech	14527.6833333*	2056.2420175	.000	10460.233380	18595.133287
	Packtech	Indutech	16327.4166667*	2056.2420175	.000	12259.966713	20394.866620
		Meditech	18257.4666667*	2056.2420175	.000	14190.016713	22324.916620
		Protech	18953.1141667*	2056.2420175	.000	14885.664213	23020.564120
		Geotech	19703.0000000*	2056.2420175	.000	15635.550046	23770.449954
		Agrotech	19894.3166667*	2056.2420175	.000	15826.866713	23961.766620
		Oekotech	20507.3583333*	2056.2420175	.000	16439.908380	24574.808287
		Clothtech	-5505.2833333*	2056.2420175	.008	-9572.733287	-1437.833380
		Packtech	-16905.5916667*	2056.2420175	.000	-20973.041620	-12838.141713
	Sporttech	Mobiletech	-562.9833333	2056.2420175	.785	-4630.433287	3504.466620
		Buildtech	1130.1250000	2056.2420175	.584	-2937.324954	5197.574954
		Hometech	-2377.9083333	2056.2420175	.250	-6445.358287	1689.541620
		Indutech	-578.1750000	2056.2420175	.779	-4645.624954	3489.274954
		Meditech	1351.8750000	2056.2420175	.512	-2715.574954	5419.324954
		Protech	2047.5225000	2056.2420175	.321	-2019.927454	6114.972454
		Geotech	2797.4083333	2056.2420175	.176	-1270.041620	6864.858287
		Agrotech	2988.7250000	2056.2420175	.148	-1078.724954	7056.174954
		Oekotech	3601.7666667	2056.2420175	.082	-465.683287	7669.216620
		Clothtech	-4942.3000000*	2056.2420175	.018	-9009.749954	-874.850046

		Packtech	-16342.6083333*	2056.2420175	.000	-20410.058287	-12275.158380
		Sporttech	562.9833333	2056.2420175	.785	-3504.466620	4630.433287
		Buildtech	1693.1083333	2056.2420175	.412	-2374.341620	5760.558287
		Hometech	-1814.9250000	2056.2420175	.379	-5882.374954	2252.524954
	Mobiletech	Indutech	-15.1916667	2056.2420175	.994	-4082.641620	4052.258287
		Meditech	1914.8583333	2056.2420175	.353	-2152.591620	5982.308287
		Protech	2610.5058333	2056.2420175	.206	-1456.944120	6677.955787
		Geotech	3360.3916667	2056.2420175	.105	-707.058287	7427.841620
		Agrotech	3551.7083333	2056.2420175	.086	-515.741620	7619.158287
		Oekotech	4164.7500000*	2056.2420175	.045	97.300046	8232.199954
		Clothtech	-6635.4083333*	2056.2420175	.002	-10702.858287	-2567.958380
		Packtech	-18035.7166667*	2056.2420175	.000	-22103.166620	-13968.266713
		Sporttech	-1130.1250000	2056.2420175	.584	-5197.574954	2937.324954
		Mobiletech	-1693.1083333	2056.2420175	.412	-5760.558287	2374.341620
		Hometech	-3508.0333333	2056.2420175	.090	-7575.483287	559.416620
	Buildtech	Indutech	-1708.3000000	2056.2420175	.408	-5775.749954	2359.149954
		Meditech	221.7500000	2056.2420175	.914	-3845.699954	4289.199954
		Protech	917.3975000	2056.2420175	.656	-3150.052454	4984.847454
		Geotech	1667.2833333	2056.2420175	.419	-2400.166620	5734.733287
		Agrotech	1858.6000000	2056.2420175	.368	-2208.849954	5926.049954
		Oekotech	2471.6416667	2056.2420175	.232	-1595.808287	6539.091620
		Clothtech	-3127.3750000	2056.2420175	.131	-7194.824954	940.074954
		Packtech	-14527.6833333*	2056.2420175	.000	-18595.133287	-10460.233380
		Sporttech	2377.9083333	2056.2420175	.250	-1689.541620	6445.358287
		Mobiletech	1814.9250000	2056.2420175	.379	-2252.524954	5882.374954
	Hometech	Buildtech	3508.0333333	2056.2420175	.090	-559.416620	7575.483287
		Indutech	1799.7333333	2056.2420175	.383	-2267.716620	5867.183287
		Meditech	3729.7833333	2056.2420175	.072	-337.666620	7797.233287
		Protech	4425.4308333*	2056.2420175	.033	357.980880	8492.880787
		Geotech	5175.3166667*	2056.2420175	.013	1107.866713	9242.766620

		Agrotech	5366.6333333*	2056.2420175	.010	1299.183380	9434.083287
		Oekotech	5979.6750000*	2056.2420175	.004	1912.225046	10047.124954
		Clothtech	-4927.1083333*	2056.2420175	.018	-8994.558287	-859.658380
		Packtech	-16327.4166667*	2056.2420175	.000	-20394.866620	-12259.966713
		Sporttech	578.1750000	2056.2420175	.779	-3489.274954	4645.624954
		Mobiletech	15.1916667	2056.2420175	.994	-4052.258287	4082.641620
		Buildtech	1708.3000000	2056.2420175	.408	-2359.149954	5775.749954
	Indutech	Hometech	-1799.7333333	2056.2420175	.383	-5867.183287	2267.716620
		Meditech	1930.0500000	2056.2420175	.350	-2137.399954	5997.499954
		Protech	2625.6975000	2056.2420175	.204	-1441.752454	6693.147454
		Geotech	3375.5833333	2056.2420175	.103	-691.866620	7443.033287
		Agrotech	3566.9000000	2056.2420175	.085	-500.549954	7634.349954
		Oekotech	4179.9416667*	2056.2420175	.044	112.491713	8247.391620
		Clothtech	-6857.1583333*	2056.2420175	.001	-10924.608287	-2789.708380
		Packtech	-18257.4666667*	2056.2420175	.000	-22324.916620	-14190.016713
		Sporttech	-1351.8750000	2056.2420175	.512	-5419.324954	2715.574954
		Mobiletech	-1914.8583333	2056.2420175	.353	-5982.308287	2152.591620
		Buildtech	-221.7500000	2056.2420175	.914	-4289.199954	3845.699954
	Meditech	Hometech	-3729.7833333	2056.2420175	.072	-7797.233287	337.666620
		Indutech	-1930.0500000	2056.2420175	.350	-5997.499954	2137.399954
		Protech	695.6475000	2056.2420175	.736	-3371.802454	4763.097454
		Geotech	1445.5333333	2056.2420175	.483	-2621.916620	5512.983287
		Agrotech	1636.8500000	2056.2420175	.427	-2430.599954	5704.299954
		Oekotech	2249.8916667	2056.2420175	.276	-1817.558287	6317.341620
		Clothtech	-7552.8058333*	2056.2420175	.000	-11620.255787	-3485.355880
		Packtech	-18953.1141667*	2056.2420175	.000	-23020.564120	-14885.664213
		Sporttech	-2047.5225000	2056.2420175	.321	-6114.972454	2019.927454
		Mobiletech	-2610.5058333	2056.2420175	.206	-6677.955787	1456.944120
		Buildtech	-917.3975000	2056.2420175	.656	-4984.847454	3150.052454
	Protech	Hometech	-4425.4308333*	2056.2420175	.033	-8492.880787	-357.980880
		Indutech	-2625.6975000	2056.2420175	.204	-6693.147454	1441.752454
		Meditech	-695.6475000	2056.2420175	.736	-4763.097454	3371.802454

		Geotech	749.8858333	2056.2420175	.716	-3317.564120	4817.335787
		Agrotech	941.2025000	2056.2420175	.648	-3126.247454	5008.652454
		Oekotech	1554.2441667	2056.2420175	.451	-2513.205787	5621.694120
		Clothtech	-8302.6916667*	2056.2420175	.000	-12370.141620	-4235.241713
	Geotech	Packtech	-19703.0000000*	2056.2420175	.000	-23770.449954	-15635.550046
		Sporttech	-2797.4083333	2056.2420175	.176	-6864.858287	1270.041620
		Mobiletech	-3360.3916667	2056.2420175	.105	-7427.841620	707.058287
		Buildtech	-1667.2833333	2056.2420175	.419	-5734.733287	2400.166620
		Hometech	-5175.3166667*	2056.2420175	.013	-9242.766620	-1107.866713
		Indutech	-3375.5833333	2056.2420175	.103	-7443.033287	691.866620
		Meditech	-1445.5333333	2056.2420175	.483	-5512.983287	2621.916620
		Protech	-749.8858333	2056.2420175	.716	-4817.335787	3317.564120
		Agrotech	191.3166667	2056.2420175	.926	-3876.133287	4258.766620
		Oekotech	804.3583333	2056.2420175	.696	-3263.091620	4871.808287
		Clothtech	-8494.0083333*	2056.2420175	.000	-12561.458287	-4426.558380
		Packtech	-19894.3166667*	2056.2420175	.000	-23961.766620	-15826.866713
		Sporttech	-2988.7250000	2056.2420175	.148	-7056.174954	1078.724954
		Mobiletech	-3551.7083333	2056.2420175	.086	-7619.158287	515.741620
		Buildtech	-1858.6000000	2056.2420175	.368	-5926.049954	2208.849954
	Agrotech	Hometech	-5366.6333333*	2056.2420175	.010	-9434.083287	-1299.183380
		Indutech	-3566.9000000	2056.2420175	.085	-7634.349954	500.549954
		Meditech	-1636.8500000	2056.2420175	.427	-5704.299954	2430.599954
		Protech	-941.2025000	2056.2420175	.648	-5008.652454	3126.247454
		Geotech	-191.3166667	2056.2420175	.926	-4258.766620	3876.133287
		Oekotech	613.0416667	2056.2420175	.766	-3454.408287	4680.491620
		Clothtech	-9107.0500000*	2056.2420175	.000	-13174.499954	-5039.600046
		Packtech	-20507.3583333*	2056.2420175	.000	-24574.808287	-16439.908380
		Sporttech	-3601.7666667	2056.2420175	.082	-7669.216620	465.683287
		Mobiletech	-4164.7500000*	2056.2420175	.045	-8232.199954	-97.300046
		Buildtech	-2471.6416667	2056.2420175	.232	-6539.091620	1595.808287
	Oekotech	Hometech	-5979.6750000*	2056.2420175	.004	-10047.124954	-1912.225046
		Indutech	-4179.9416667*	2056.2420175	.044	-8247.391620	-112.491713

		Meditech	-2249.8916667	2056.2420175	.276	-6317.341620	1817.558287
		Protech	-1554.2441667	2056.2420175	.451	-5621.694120	2513.205787
		Geotech	-804.3583333	2056.2420175	.696	-4871.808287	3263.091620
		Agrotech	-613.0416667	2056.2420175	.766	-4680.491620	3454.408287

*.The mean difference is significant at the 0.05 level.

Source: SPSS output

each group insignificantly differ from each other. The detailed account of pair wise difference among the group means of Production of various segments of Technical Textile is shown in Table 4.

Output

In the following table, the output for post hoc Scheffe test has been shown. The result reveals that among all the different segments of Technical Textile, the mean value of production of Packtech is statistically significant than other segments as associative significance value is 0.000. Factually, overall ANOVA result reveals significant

Table 5: Production (market size) of different segments of Technical textile in India (By Scheffe Method)

	Segment	N	Subset for alpha = 0.05	
			1	2
Scheffe[1]	Oekotech	12	118.933333	
	Agrotech	12	731.975000	
	Geotech	12	923.291667	
	Protech	12	1673.177500	
	Meditech	12	2368.825000	
	Buildtech	12	2590.575000	
	Sporttech	12	3720.700000	
	Mobiletech	12	4283.683333	
	Indutech	12	4298.875000	
	Hometech	12	6098.608333	
	Clothtech	12	9225.983333	
	Packtech	12		20626.291667
	Sig.		.063	1.000

Means for groups in homogeneous subsets are displayed.

Source: SPSS output

difference (P=0.000). The result shows that no segment is significantly differing, except only the Packtech segment.

8. Conclusion

The consumption and expansion of various end-use industries offer a bright future for the Technical textile

industry in India. Overall, the Technical textile market has great potential for the near future. It can be concluded from the above analysis that the highest mean of production of various segments of Technical textile was registered in Packtech segment, followed by Clothtech, whereas the lowest mean of production is that of Oekotech segment. The result also reveals that the mean of total production of Technical textile from all segments is approximately half of the mean of the production of Technical textile received in Packtech alone. Packtech is one of the highly promising segments among all other segments and seems to be a growth engine for Indian Technical textile industry.

Indian Packtech industry is fundamentally strong, which can be further strengthened through cost-competitive structures. In the high niche market, India has vast scope of developing a network of R&D institutions for new technologies, resources and finance, etc. There seems to be a lack of regulatory legislation, sufficient funds for high-tech machinery, raw materials and equipment, and above all, there exists a huge gap in technical knowhow which is very crucial for the growth of the Packtech industry. All these factors have to be taken into consideration for promoting the industry. Moreover, the government's support and policies must further enhance investments in the industry. Therefore, urgent actions are required to convert the opportunities into realities, enabling the country to become a world leader in this sector in future years.

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There is an urgent need to tackle the ills of the society against women through active participation of all – men, women, society, government. It is imperative to make women empowerment a people's movement.

– Sushma Swaraj

APPENDIX

Appendix 1: Production (market size) data of various segments of technical textile from 2004–05 to 2015–16

Segment	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Total
CLOTHTECH	7198.5	7583.3	7988.7	6908	8157.3	8483.1	8808.9	9454	4835	5357	16337	19601	110711.8
PACKTECH	4588.3	5152.4	5785.9	14630	11537.2	122955.3	14373.4	23710	28020	31181	43055	52527	247515.5
SPORTECH	1649.3	1773.2	1906.3	2851	2611.6	2820.2	3028.8	4297	4132	4645	6882	8052	44648.4
MOBIILTECH	1454.9	1532.1	1613.5	3183	2640.3	2885.9	3131.5	4689	6,607	7370	7510	8787	51404.2
BUILDTECH	1254.8	1332.7	1415.4	2157	1939.6	2085	2230.4	2980	2514	2819	4774	5585	31086.9
HOMETECH	1199.7	1397.8	1628.7	5025	3797.5	4321	2230.4	2980	2514	2819	4774	5585	31086.9
INDUTECH	1050.6	1447.5	1415.4	3206	2486.2	2774.7	2230.4	2980	2514	2819	4774	5585	31086.9
MEDITECH	1036.7	1152.1	1415.4	1669	1635.7	1769.6	2230.4	2980	2514	2819	4774	5585	31086.9
PROTECH	652.6	818.7	1027.1	1302	777.03	2085	2230.4	2980	2514	2819	4774	5585	31086.9
GEOTECH	591.4	999.4	1688.9	272	1189.8	1336.9	1484.1	410	683	772	744	908	11079.5
AGROTECH	337.6	375.5	417.7	553	535.7	579.3	622.9	751	826	929	1298	1558	8783.7
OEKOTECH	24.7	41.5	69.9	68	84.1	97.4	110.6	135	120	132	245	299	1427.2
Total	21039.64	23306.8	2676.1	41756	37392.6	40901.9	44411.2	63202	65920	73688	109904	132132	679730.2

(Amount in Crore)

Source: (1) Data from 2004–05 to 2007–08: Ministry of Textile. (2006). Report of the Working group on Textile & Jute Industry, New Delhi: Ministry of Textiles, Government of India. p. cxvi

(2) Data from 2007–08 to 2011–12: Ministry of Textile. (2011). Report of the Working group on Textile & Jute Industry, New Delhi: Ministry of Textiles, Government of India. p.265

(3) Data for the years 2008–09, 2009–10 and 2010–11 have been calculated by the researcher using interpolation.

(4) Data for the years 2012–13 and 2013–14: IMaCS analysis as cited in FICCI. Technotex 2016. Knowledge paper on Technical Textile: Towards a smart future, MoT, GOI. Retrieved from (http://ficci.in/spdocument/20811/1-Technotex-2016-Knowledge-Paper.pdf) on 29.8.2019.

(5) Data for the years 2014–15 and 2015–16 has been calculated by the researcher using extrapolation.

Feature

Finger Millet, the Smallholders' Livelihood and Urban Consumers' Health-food in India: An Economic Analysis[1]

B. GANESH KUMAR, N. SIVARAMANE, AND CH. SRINIVASA RAO

This study has been conducted with the aim of finding reasons why the farmers continue cultivation of finger millet and also the possible future of this important crop for its increasing consuming pattern. The study is based on both primary and secondary data which were collected from the farmers in the state of Karnataka, Tamil Nadu, Maharashtra and Andhra Pradesh and pertained to the year 2015-16.For estimating the elasticity of price and income on ragi consumption, the Almost Ideal Demand System (AIDS) model with two stages is attempted in the study. It was also observed that in all the study states, the farmers were found cultivating this crop mostly under rainfed conditions, except in Karnataka where it was being cultivated under irrigated conditions significantly. The study has found that finger millet is being replaced by other competing fine cereals and commercial crops. The profitability of ragi is being affected due to its low productivity, absence of an organized seed supply chain, high labour requirement and lack of markets. On the other hand, the study has observed a perceptible demand of ragi among the urban population because of its nutritive value. The Government of Karnataka has included finger millet in its social programmes and study has suggested that other states should also make its reach to the smallholders.

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Introduction

Millets are considered to be one of the oldest foods known to mankind. Millets are hardy crops that grow well under rainfed conditions and in less fertile soils (Michaelraj and Shanmugam, 2013). Millets, grown in resource-poor regions under arid and semi-arid conditions serve the purpose of sustainable food supply to the smallholders, as they adapt well to harsh environment, especially drought conditions (Dicko *et al.*, 2005). The growth requirements are very limited as millets not only withstand several abiotic factors like unpredictable climate; limited and inconsistent precipitation and nutrient-depleted soils, but also they are somewhat less-suffered from many biological agricultural constraints (Sharma and Ortiz, 2000; Maqbool *et al.*, 2001). Small millets as a group, includes several grain crops namely finger millet (*ragi*), kodo millet (*varagu*), and little millet (*panivaragu*). Though they are accorded a relatively lower importance among feed crops by the Indian farmers, they are quite important from the point of food security at household level in certain regions of the country, especially tribal belts, as they can be grown even in poor soil and climatic conditions. Besides, their cultivation period is short and they can be very well fitted into multiple cropping systems both under the irrigated, as well as the dry farming conditions. Additionally, they provide nutritious fodder to the livestock kept by the farmers that give them additional income from the farm household regularly. The grain being hardy and dry, could be stored for long, and hence could be considered as "famine reserves". Millets are highly nutritious, non-glutinous and not acid forming foods. Hence, they are soothing and easy to digest. They are considered the least allergenic and the most digestible grains available. Compared to rice, especially polished rice, millets release lesser percentage of glucose, and over a longer period of time. This lowers the risk of diabetes.

One of the important minor millets is finger millet (*Eleusine coracana*), an annual herbaceous plant widely grown as a cereal crop in the arid and semiarid areas in Africa and Asia. It is a tetraploid and self-pollinating species, probably evolved from its wild relative *Eleusine Africana* (National Research Council, 1996). Finger millet is native to the Ethiopian and the Ugandan highlands (D'Andrea *et al.,* 1999). Interesting crop characteristics of finger millet are the ability to withstand cultivation at altitudes of 2000 metres above sea level, its favourable micronutrient content (high iron and methionine content in particular), its high drought tolerance and the very long storage time.

In India, finger millet (locally called by various names including *ragi*, *kezhvaragu*, *ragulu*, *nachani*, *mandua* etc) is mostly grown and consumed in Karnataka, Andhra Pradesh, Tamil Nadu, Odisha, Maharashtra, Garhwal and Kumaon (Uttarakhand), Rajasthan, Dang District (Gujarat) and Goa. Karnataka contributes about 53 per cent of total production of finger millet in the country, followed by Tamil Nadu (15 per cent), Uttarakhand (10 per cent) and Andhra Pradesh (7.5 per cent) during 2013–14. Finger millet is a rich source of Ca (300–350 mg/100g), P (283 mg/100g) and Fe (3.9 mg/100g) (Gopalan *et al.,* 2000). It is also rich in vitamins viz. thiamine, riboflavin, folic acid and niacin (Vidyavati *et al.,* 2004). Ragi flour is made into flatbreads, including thin, leavened *dosa* and thicker, unleavened *roti*. Ragi grain is malted and the grains are ground. This ground flour is consumed mixed with milk, boiled water or yoghurt. In India, ragi recipes are hundreds in number and even common food such as *dosa*, *idly* and *laddu* are made out of ragi. In Southern parts of India, paediatricians recommend finger-millet-based food for infants of six months and above because of its high nutritional content, especially iron and calcium. Homemade ragi malt is a popular infant food and very good for health.

In spite of all the health benefits and the hardy nature of this millet, the area under finger millet is continuously declining in India and so is the production. This downward trend was distinctly visible from the 80's when India ushered in green revolution promoting principally rice and wheat, which was due to the policy support towards these fine cereals and their high productivity. Besides, this crop suffered further in terms of area under cultivation from the mid-90's due to diversion of lands, especially in the semi-arid tracts, towards cotton and maize, which was due to a technological breakthrough. Production of wheat, paddy and maize continues to dictate the terms in semi-arid regions of India compared with millets in general, finger millet in particular (Shukla *et al.,* 2015). The economics of its cultivation has also not helped its cause for sustenance. On the positive side, this millet is increasingly being consumed as part of diet among urban population in India, owing to its superior nutritive values.

It is in this background, that a study has been conducted on this crop to know the reasons why the farmers still continue cultivating this millet and also the possible future for this very important food crop for the ever-increasing, consuming, urban population in our country and elsewhere.

Methodology

The study used both primary and secondary data on finger millet.

(i) Selection of study area

The study used primary data on finger millet cultivation from the farmers of the principal ragi-growing states of Karnataka, Tamil Nadu, Maharashtra and Andhra Pradesh. About 400 farmers (200 each from irrigated and rainfed cultivation) from Karnataka and 200 farmers each from the other three states were interviewed to collect data on production practices, varieties grown and economics of finger millet cultivation through personal interview using pre-tested interview schedules during 2015–16. The households were chosen from the districts based on their production and productivity in all the states considered in the study.

(ii) Finger millet - consumption data

The household level data on consumption of ragi available from 50th (1993–94), 55th (1999–2000), 61st (2004–05) and 68th (2011–12) rounds of the National Sample Surveys Organisation (NSSO) were used for this analysis. The NSS consumer expenditure survey is conducted every year. However, a large sample consumption survey is conducted once in 5 years collecting information at a more disaggregate level covering all the states and union territories (UT), all economic classes and rural and urban sectors. States where consumption of ragi was less than 0.1 kg of monthly per capita, and Union Territories were not shown in the result.

(iii) Analytical tools

a. Production practices and economics of finger millet cultivation, and consumption of finger millet

Tabular and percentage analyses were used to document the production practices and estimate the economics of finger millet cultivation in the study area, and the consumption trend of finger millet among rural and urban population in India.

b. Estimation of demand elasticity and demand forecast for finger millet

For estimating the elasticity of price and income on ragi consumption, the Almost Ideal Demand System (AIDS) model (Deaton and Muellbauer, 1980) with two stages are attempted in the study. In the first stage, food expenditure as a function of food prices and total expenditure in double log form was used. In the second stage, Seemingly Unrelated Regression (SUR) model was used by considering the expenditure on food items, viz. rice, wheat, ragi, other cereals and millets and other food items as a function of their prices, and the monthly per capita expenditure, age and household size. The ragi consumption was estimated using the above mentioned demand model for all India. The consumption data from various rounds of NSSO survey, particularly Rounds 50, 55, 61 and 68 were used for estimation of elasticities of all the food items.

The demand projections of ragi for rural and urban India are obtained by using the following formula for the three time periods considered:

$$Q_{2020} = Q_{2011}(1+r)^{9} \quad \text{.....(1)}$$

$$Q_{2025} = Q_{2011}(1+r)^{14} \quad \text{.....(2)}$$

$$Q_{2030} = Q_{2011}(1+r)^{19} \quad \text{.....(3)}$$

Where,

Q_{2011} is the monthly quantity of ragi consumed in 2011–12 by the concerned group of population (rural/urban);

Q_{2020} is the projected quantity of ragi demanded for the group (rural/urban) for the year 2020;

Q_{2025} is the projected quantity of ragi demanded for the group (rural/urban) for the year 2025;

Q_{2030} is the projected quantity of ragi demanded for the group (rural/urban) for the year 2030; and

'r' is the sum of p^{o} and c^{o}

Where,

p^{o} is the population growth rate / annum

c^{o} is growth rate of per capita ragi consumption / annum

Results and Discussion

(i) Land Holding and Cropping Pattern followed by Ragi Growers in the Study Area

The land holding and cropping pattern followed by the sample farmers in the study states is presented in Table 1.

The average landholding of the ragi growers was found to be ranging from 1.21 ha to 2.69 ha in the study area, with Karnataka farmers cultivating this crop in larger area, compared to their counterparts in other states. It was also observed that in all the study states, the farmers were found cultivating this crop mostly under rainfed conditions except in Karnataka, where it was being cultivated under irrigated conditions significantly. More specifically in Tamil Nadu, about 98 per cent of the landholdings was rainfed and only 2 per cent of the land had irrigated ragi, indicating very less priority of the crop in the irrigated lands.

With respect to cropping pattern in the study states, it was observed that the ragi farmers of Karnataka followed by those from Tamil Nadu and Andhra Pradesh were growing more diversified crops than their counterparts in Maharashtra, indicating different resource endowment patterns existing among the study states. Gross cropped area was found to be the maximum in Tamil Nadu, followed by Andhra Pradesh, Maharashtra and Karnataka among the ragi farmers, while area under ragi was the maximum in Tamil Nadu followed by Karnataka, Andhra Pradesh and Maharashtra.

(ii) Resource Use Pattern in Ragi Production by the Farmers in the Study Area

The resource-use pattern followed by the growers in ragi production in the study is furnished in Table 2.

The study revealed that the seed rate practiced by the ragi growers in the study area varied from 5.8 kg/ha to about 30.7 kg/ha. The farmers in Tamil Nadu were found using 30.7 kg seeds per ha, followed those in Andhra Pradesh (14.4 kg/ha), Karnataka (10.8 kg/ha) and Maharashtra (5.79 kg/ha). These variations were due to the method of sowing by the ragi growers, who followed the direct sowing method in Tamil Nadu, while about an equal number of farmers follow both direct seeding and transplanting in Andhra Pradesh and Karnataka. Conversely, all the farmers of Maharashtra practice transplanting method of sowing, thus require less seed for sowing.

Table 1. Land holding and cropping pattern followed by ragi growers in the study states

Particulars	Karnataka			Tamil Nadu			Maharashtra			Andhra Pradesh		
Land holding (ha)	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
	1.48 (55%)	1.21 (45%)	2.69	0.03 (2%)	1.21 (98%)	1.24	0.46 (25%)	1.41 (75%)	1.87 1.87	0.28 (23%)	0.93 (77%)	1.21
Crops grown	Irrigated	Rainfed		Irrigated	Rainfed		Irrigated	Rainfed		Irrigated	Rainfed	
	Ragi, Red gram, Maize, Ground nut, Paddy, Beans, Potato, Horse gram, Vegetables, Flowers, Grapes, Mango, *Eucalyptus*, Areca nut, Coconut, Banana, Mulberry	Ragi, Red gram, Ground nut, Horse gram, Mango		Ragi, Beans, Potato, Maize, Tomato, Horse gram, Peas, *Eucalyptus*, Green gram, Lablab, Sugarcane	Ragi, Sorghum, Horse gram, Green gram, Little millet		Ragi, Paddy Sugarcane, Ground nut	Ragi, Ground nut		Ragi, Beans, Sorghum, Patato, Maize, Tomato, Horse gram, Peas, Green gram, Little millet, Lablab, Sugarcane	Ragi, Sorghum, Horse gram, Green gram, Little millet	
Ragi varieties grown	GPU-28, Indaf-5, Indaf-9, Indaf-7, Local			GPU-28, ML-365, CO-14, MR-1, PYR-1			VL-149, PES- 400, RAU-8,HR-374, DAPOLI-1, GPU-26, PR-202, B-11			RATNAGIRI, GODAVARI, BHARATHI		
Gross cropped area	430			557			445			473		
Area under ragi cultivation	237			419			97			208		
(ha)												
Share (%)	55			75			22			44		

Source: Primary survey, 2016

Table 2. Resource use pattern in ragi production by the farmers in the study area

Inputs	States			
	Karnataka	Tamil Nadu	Maharashtra	Andhra Pradesh
Seed (kg/ha)	10.8	30.7	5.8	14.4
FYM (kg/ha)	1040	1488	4513	3671
Fertilizer (kg/ha)	387	320	275	37
Human labour (man-days/ha)	93	74	169	106
Bullock labour (man-days/ha)	5.50	1.32	5.21	6.38
Machine labour (man-days/ha)	1.60	1.74	0.67	0.38

Source: Primary survey, 2016

The use of farmyard manure (FYM) by the ragi growers was observed to be more in Maharashtra (4513 kg/ha) and Andhra Pradesh (3671kg/ha) than in Tamil Nadu (1488kg/ha) and Karnataka (1040 kg/ha). Conversely, the application of fertilizers by them was found to be maximum in Karnataka and Tamil Nadu (387 kg/ha and 320 kg/ha respectively), when compared to Maharashtra (275 kg/ha) and Andhra Pradesh (37 kg/ha). Hence, in general, it is observed that this crop is cultivated under inorganic conditions in Karnataka and Tamil Nadu, while it is cultivated relatively organic in Andhra Pradesh and Maharashtra.

With respect to labour use pattern, it was found that human labour use in ragi cultivation was found more (169 man-days/ha) in Maharashtra, as compared to Andhra Pradesh (106 man-days/ha), Karnataka (93 man-days/ha) and Tamil Nadu (74 man-days/ha). Bullock labour use was higher in Andhra Pradesh (6.38 man-days/ha) followed by Karnataka (5.50 man-days/ha), Maharashtra (5.21 man-days/ha) and Tamil Nadu (1.32 man-days). Conversely, machine labour was used more in Tamil Nadu and Karnataka (1.74 man-days/ha and 1.60 man-days/ha respectively), than the other two states (0.67 man-days/ha in Maharashtra and 0.38 man-days/ha in Andhra Pradesh, respectively). This observation of more human and animal labour in Maharashtra and Andhra Pradesh were due to the transplanting and tilling operations. It is also evident that a great deal of mechanization was happening in Tamil Nadu and Karnataka, especially in the operations of tilling of land and threshing of harvested crops, as is shown by more use of machine labour by the growers.

(iii) Cost and Returns of Ragi Cultivation

The cost of cultivation was calculated based on the Commission on Agricultural Costs and Prices (CACP) concepts[2], and the details on costs and returns are furnished in Tables 3 and 4. It could be observed from Table 3 that Cost A1, which comprise all the out-of-pocket cost items were found to be the highest in Karnataka (INR.

Table 3. Cost of cultivation of ragi production in the study area

(INR./ha)

Item/Cost	States				
	Karnataka		Tamil Nadu	Maharashtra	Andhra Pradesh
	Irrigated	Rainfed	Rainfed	Rainfed	Rainfed
Cost A1	51617	42692	27729	25735	13111
Seed	495	495	615	102	79
FYM	6700	6200	1847	2535	2472
Fertilizers	5040	4700	4121	4082	541
Plant protection chemicals	0	0	0	272	0
Human labour	23350	16250	10331	11618	6298
Bullock labour	4400	4320	1049	3817	1305
Machine labour	9728	9260	8743	2259	1932
Interest on working capital			1023	1050	484
Cost A2	51617	42692	28968	25735	13111
Cost B	56617	47692	29378	27261	14320
Cost C	62057	51885	36253	43772	25269

Source: Primary survey, 2016

51,617 per ha under irrigated condition and INR. 42,692 per ha under rainfed condition, respectively), followed by Tamil Nadu (INR. 27,729 per ha), Maharashtra (INR. 25,735 per ha) and Andhra Pradesh (INR. 13,111 per ha). The major item of expenditure here is the cost of labour (69–73 per cent of Cost A1), as it is evidenced from the fact that this crop is a highly labour-intensive one on account of tedious land preparation, removal of weeds, protection from birds, manual harvesting and post-harvest operations (FAO, 1996). The other major expenses among the Cost A1 components are those on fertilizers, except in case of Karnataka where the farmers were found spending more on purchase of farmyard manure.

The leasing of land by the ragi growers was found only in Tamil Nadu. Hence, Cost A2 remained the same for all the other states. Similar trend was observed in case of Cost B, where it was found highest in Karnataka (INR. 56,617 per ha under irrigated condition and INR. 47,692 per ha under rainfed condition, respectively), followed by Tamil Nadu (INR. 29,378 per ha), Maharashtra (INR. 27,261 per ha) and Andhra Pradesh (INR. 14,320 per ha).

Similarly, Cost C was found to be the highest in Karnataka (INR. 62,057 per ha under irrigated condition and INR. 51,885 per ha under rainfed condition, respectively), followed by Maharashtra (INR. 43,772 per ha), Tamil Nadu (INR. 36,253 per ha) and Andhra Pradesh (INR. 25,269 per ha). This is because Karnataka and Maharashtra farmers were engaging more human labour in transplanting seedlings, weeding, summer ploughing and winnowing than other states. On the other side, the wage rates were relatively less for human labour in Andhra Pradesh, implying less cost on family labour.

The returns from ragi cultivation were worked out and the different forms of income for the farm households are listed in Table 4. It showed that the farmers of Karnataka were found getting more returns than their counterparts in other states. After accounting all the cost components, the farmers in Maharashtra and Tamil Nadu were incurring loss in the cultivation of ragi. Finally, the cost of production per kg of ragi was worked out to be the highest in Karnataka (INR. 25.56 under rainfed condition), followed by Maharashtra (INR. 18.12), while it was INR. 16.62 in Karnataka (under irrigated condition), INR. 12.48 in Tamil Nadu and INR. 4.75 in Andhra Pradesh. It was calculated by taking into account only the Cost A1.

It is found from the table that ragi cultivation was found to be a loss making agricultural activity in Maharashtra, while it was profitable in the other three states. However, if we impute the value of family labour, it makes loss to the farmers in Tamil Nadu, indicating

Table 4. Returns from ragi production in the study area

(INR./ha)

Item/Returns	States				
	Karnataka		Tamil Nadu	Maharashtra	Andhra Pradesh
	Irrigated	Rainfed	Rainfed	Rainfed	Rainfed
Yield (kg/ha)	3105	1670	2279	1329	2582
Gross returns	102410	58985	35530	22348	38785
Profit over Cost A1 (Farm business income)	50793	16293	7801	-3387	25674
Profit over Cost A2	50793	16293	6562	-3387	25674
Profit over Cost B (Family labour income)	45793	11293	6152	-4913	24465
Profit over Cost C (Net income)	40353	7100	-723	-21424	13516
Cost of Production (INR./kg)	16.62	25.56	12.17	19.36	5.08
Net profit (INR./kg)	13.00	4.25	-0.32	-16.12	5.23

Source: Primary survey, 2016

that the family labour is spent on this farming ignoring better opportunity cost elsewhere. In other words, the ragi growers of Tamil Nadu don't appear to make a gainful employment in their farm. However, they might be continuing ragi cultivation for their consumption purpose.

(iv) Consumption of ragi over time

Table 5 shows that the consumption of ragi has declined sharply among rural population over the years from 1,811,000 tonnes in 1993–94 to 750,000 tonnes in 2011–12. A state-wise perusal reveals that this sharp decline was happening in Karnataka and Andhra Pradesh. However, Karnataka still accounts for 67.91 per cent of total consumption followed by Andhra Pradesh (12.26 percent) and Tamil Nadu (7.62 per cent) during 2011–12. Whereas, it was 52.10 per cent in Karnataka during 1993–94 followed by Tamil Nadu (15.11 per cent) and Andhra Pradesh (10.96 per cent).

The consumption of ragi among urban population revealed that it was found continuously increasing from 235,000 tonnes in 1993–94 to 272,000 tonnes in 2011–12 (Table 6). However, the state level consumption data shows that the state of Karnataka alone accounts for a major

Table 5. Consumption of ragi in rural areas of India over time

(000'tonnes/year)

State	Year			
	1993-94	1999-2000	2004-05	2011-12
Karnataka	943 (52.10)	728 (54.51)	761 (65.21)	509 (67.91)
Andhra Pradesh	198 (10.96)	120 (8.95)	106 (9.11)	92 (12.26)
Tamil Nadu	274 (15.11)	176 (13.17)	149 (12.78)	57 (7.62)
Maharashtra	122 (6.74)	134 (10.02)	62 (5.33)	35 (4.73)
Uttarakhand	NA	NA	22 (1.85)	12 (1.54)
All India	1811 (100.00)	1336 (100.00)	1167 (100.00)	750 (100.00)

Figures in parentheses indicate percentages to all India figures

Source: Various rounds of NSSO

Table 6. Consumption of ragi in urban areas of India over time

(000'tonnes/year)

State	Year			
	1993-94	1999-2000	2004-05	2011-12
Karnataka	194 (82.37)	216 (86.40)	226 (84.33)	222 (81.70)
Tamil Nadu	16 (6.82)	16 (6.60)	18 (6.77)	20 (7.26)
Andhra Pradesh	17 (15.11)	8 (3.20)	14 (5.31)	17 (6.27)
Maharashtra	0 (0.00)	0 (0.00)	0 (0.00)	2 (0.00)
Uttarakhand	NA	NA	0(0.00) (0.00)	0 (0.00)
All India	235 (100.00)	250 (100.00)	268 (100.00)	272 (100.00)

Figures in parentheses indicate percentages to all India figures

Source: Various rounds of NSSO

share during the period of analysis, ranging from 81.70 per cent in 2011–12 to 86.40 per cent in 1999–2000. This was followed by Tamil Nadu, which has a percentage share ranging from 6.60 per cent in 1999–2000 to 7.26 per cent in 2011–12 and Andhra Pradesh, which has a percentage share ranging from 3.20 per cent in 1999–2000 to 7.31 per cent in 1993–94. Other states like Maharashtra and Uttarakhand had a small share of consumption of ragi among the all India level consumption.

The average monthly per capita consumption of ragi over a period of time is presented in Table 7. The results revealed that the average monthly per capita consumption of ragi at all India level was 0.075 kg in rural areas and 0.060 kg in urban areas during 2011–12, while it was 0.240 kg and 0.090 kg respectively during 1993–94. State-level analysis on consumption of ragi reveals that Karnataka was the major state in terms of ragi consumption in rural areas (1.130 kg/capita/month) during 2011–12 followed by Uttarakhand (0.137 kg/capita/month) and Andhra Pradesh (0.136 kg/capita/month); while in 1993–94, the same was 2.530 kg in Karnataka followed by Tamil Nadu (0.620 kg) and Andhra Pradesh (0.340 kg). Similarly in case of consumption of ragi in urban areas, the average monthly per capita consumption in Karnataka was 0.754 kg, followed by Andhra Pradesh (0.050 kg) and Tamil Nadu (0.047 kg) in 2011–12; while in 1993–94, it was 1.160 kg in Karnataka followed by Andhra Pradesh (0.080 kg) and Tamil Nadu (0.070 kg).

(v) Consumption of ragi across income groups

The consumption pattern of ragi over various income decile groups of population for both rural and urban population of the major states, as well as all India are presented in Figures I and II. Decile denotes dividing the population into ten groups with equal number of persons.

It could be seen from Figure 1 that for rural population of India, the consumption of ragi was increasing from lower decile to upper decile in the earlier survey rounds. But in the recent years, it was increasing until a certain upper decile group, after which the consumption was found reducing. The same pattern was observed in urban population of India over all time periods (Figure 2). This might be due to the reason that people eat outside home at higher levels of income.

Table 7. Average monthly per capita consumption of ragi India over time

(kg/capita/30 days)

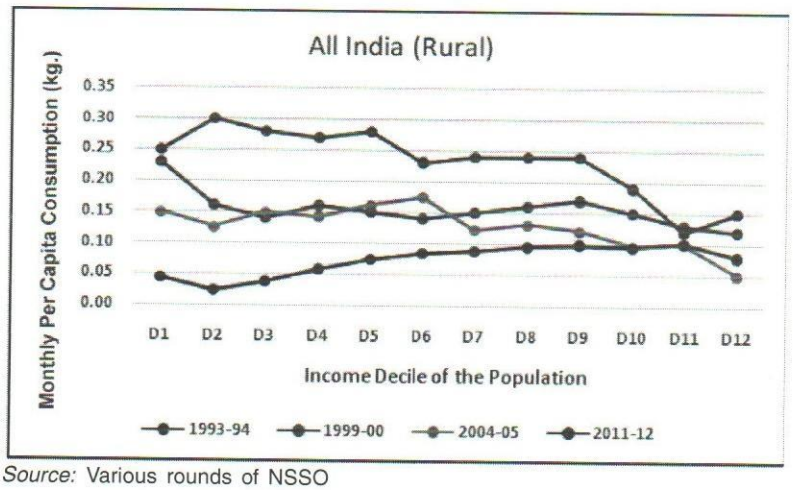
State	Rural				Urban			
	1993-94	1999-2000	2004-05	2011-12	1993-94	1999-2000	2004-05	2011-12
Andhra Pradesh	0.340	0.180	0.160	0.136	0.080	0.040	0.057	0.050
Karnataka	2.530	1.740	1.818	1.130	1.160	1.050	1.084	0.784
Maharashtra	0.210	0.200	0.093	0.048	0.000	0.000	0.000	0.003
Tamil Nadu	0.620	0.420	0.356	0.128	0.070	0.050	0.055	0.047
Uttarakhand	0.030	0.000	0.285	0.137	0.000	0.000	0.003	0.001
All India	**0.240**	**0.150**	**0.131**	**0.075**	**0.090**	**0.070**	**0.076**	**0.060**

Source: Various rounds of NSSO

(vi) Demand Projection for Ragi Production in India

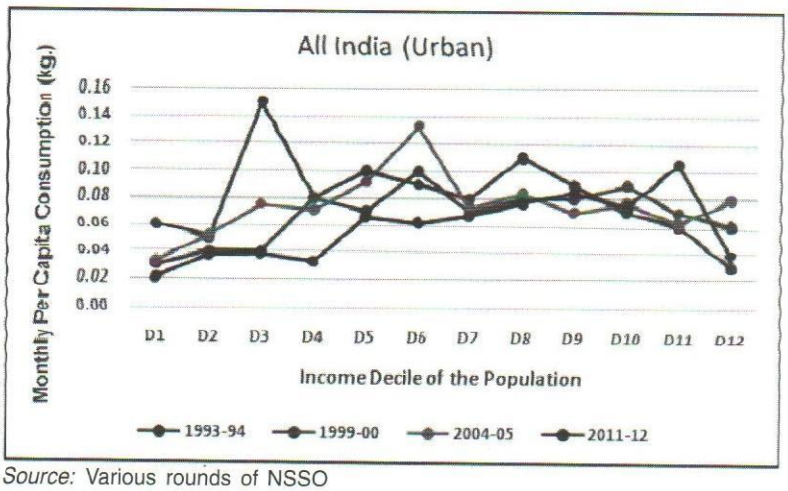
Expenditure estimates of total food items for all India (Total population)

The elasticities of demand for all India are given in Tables 8 and 9. Table 8 shows expenditure elasticity of food. Since it is evident that true per capita monthly income data is not captured during the surveys properly due to various reasons, monthly per capita expenditure (MPCE) was used as a proxy for the variable in the model. At the all India level, the expenditure elasticity indicates that, on an average, one percent increase in income leads to about 0.67 percent increase in expenditure on food. As expected, the household size is found to significantly and negatively affect the per capita food consumption. The negative signs for dummy coefficients show that, over years, the proportion of



Source: Various rounds of NSSO

Figure 1. Consumption of ragi in India (Rural) across groups



Source: Various rounds of NSSO

Figure 2. Consumption of ragi in India (Urban) across groups

Table 8. Parameter estimates of food expenditure function for all India (Total population)

Variable	Parameter Estimate	t Value	Pr > |t|
Intercept	0.98	78.62	<.0001
Food price	0.19	62.55	<.0001
MPCE	0.67	450.31	<.0001
Household size	-0.05	-34.33	<.0001
Age	0.07	31.03	<.0001
68th NSS Round #	-1.23	-124.20	<.0001
61stNSS Round #	-0.13	-72.98	<.0001
55th NSS Round #	-0.02	-8.87	<.0001

 # Dummies of National Sample Survey rounds 68, 61 and 55 pertaining to the years 1999-2000, 2004-05 & 2011-12. Round no. 50 pertaining to the year 1994-95 was used as reference.

expenditure on food is slowly coming down. As compared to the 50th round of NSSO surveys, the proportion of food expenditure has come down by 1.21 percent.

Expenditure estimates of individual food items (Total population)

It can be seen from Table 9 that the expenditure elasticities of all food items were inelastic, which means that the expenditure of food is changing less proportionately to changes in expenditure. When one percent increase in expenditure happens, ragi consumption shows an increase of 0.25 percent, which is inelastic. Similarly, one percent increase in expenditure increases consumption of rice, wheat, other cereals and all food items by 0.09, 0.09, 0.38 and 0.01 respectively. Ragi, though appears inelastic, is relatively more elastic as compared to rice and wheat.

(vii) Demand forecast for ragi in India, under existing situation

Since income elasticity of demand for ragi was found to be inelastic, it was decided not to use this factor in demand projections for ragi. Instead, it was decided to use the growth rates in per capita consumption of ragi obtained from various NSS rounds and the population growth rates from census data, employing the trend equation analysis.

Table 9. Expenditure elasticity of individual food items in India (Total population)

Food item	Expenditure elasticity
Rice	0.09
Wheat	0.09
Ragi	0.25
Other cereals	0.38
All food	0.01

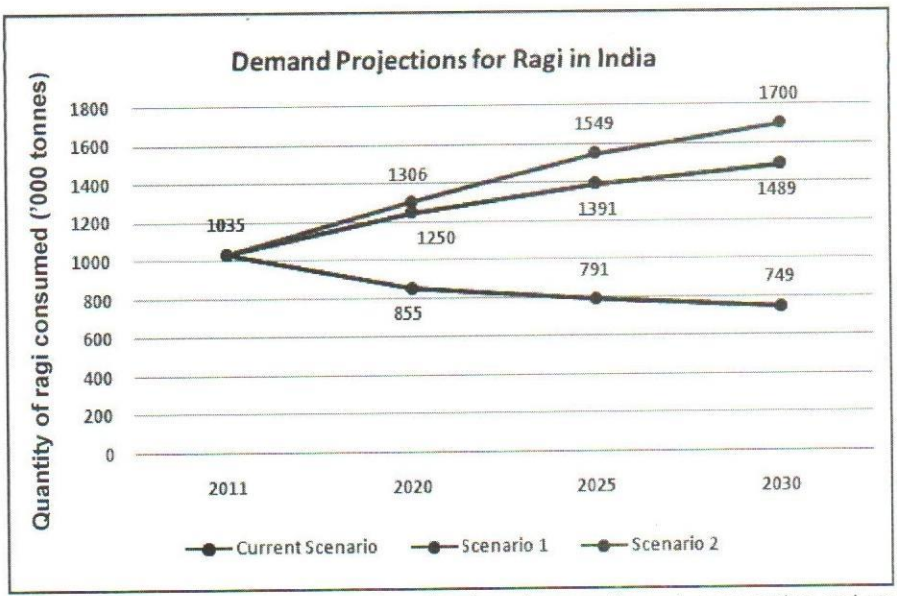
Table 10. Demand forecast of ragi among rural population in India

Particulars	States				
	Karnataka	Tamil Nadu	Maharashtra	Andhra Pradesh	All India
Per capita ragi consumption in 2011-12 (kg)	1.130	0.128	0.048	0.136	0.075
Population at 2011 (crores)	3.747	3.719	6.155	5.631	83.300
Monthly per capita ragi consumption in 2011-12 ('000 tonnes)	42.341	4.760	2.954	7.658	62.475
Ragi consumption per annum in 2011-12 ('000 tonnes)	515	58	36	93	760
Growth in per capita ragi consumption per annum (c^o)	-0.041	-0.154	-0.059	-0.063	-0.051
Growth in population per annum (p^o) Overall growth (r)	0.007 -0.034	0.006 -0.148	0.010 -0.049	0.031 -0.032	0.012 -0.040
Ragi consumption during 2020 ('000 tonnes)	378	14	23	70	527
Ragi consumption during 2025 ('000 tonnes)	318	6	18	59	430
Ragi consumption during 2030 ('000 tonnes)	268	3	14	50	351

Accordingly, the quantity demanded for the rural population is projected and presented in Table 10. It is found from the table that the quantity demanded by rural population at country level would fall from 760,000 tonnes in 2011–12 to 527,000 tonnes in 2025, 430,000 tonnes in 2025 and 351,000 tonnes in 2030. This decline is due to the negative growth rate in consumption by the rural population in all the major ragi-producing states.

Table 11. Demand forecast of ragi among urban population in India

Particulars	States				
	Karnataka	Tamil Nadu	Maharashtra	Andhra Pradesh	All India
Per capita ragi consumption in 2011-12 (kg)	0.784	0.047	0.003	0.05	0.06
Population at 2011 (crores)	2.363	3.495	5.083	2.835	37.7
Monthly per capita ragi consumption in 2011-12 ('000 tonnes)	18.526	1.643	0.152	1.418	22.62
Ragi consumption per annum in 2011-12 ('000 tonnes)	225	20	2	17	275
Growth in per capita ragi consumption per annum (c°)	-0.109	-0.006	0.001	-0.007	-0.008
Growth in population per annum (p°)	0.028	0.024	0.022	0.002	0.028
Overall growth (r)	-0.082	0.018	0.022	-0.006	0.020
Ragi consumption during 2020 ('000 tonnes)	105	23	2.3	16	909
Ragi consumption during 2025 ('000 tonnes)	68	26	2.5	16	361
Ragi consumption during 2030 ('000 tonnes)	45	28	3	15	398



Note: Current scenario represents current growth rates of per capita ragi consumption and population growth rate Scenario 1 represents 0.5% growth in per capita consumption of ragi and the current population growth rate Scenario 2 represents 1% growth in per capita consumption of ragi and the current population growth rate.

Figure 3. Demand of ragi in India

Conversely, the quantity demanded by urban population at country level would increase from 275,000 tonnes in 2011–12 to 328,000 tonnes in 2025, 361,000 tonnes in 2025 and 398,000 tonnes in 2030 (Table 11). This increase is due to the positive growth rate in urban population, but a very negligible negative growth rate in consumption by the urban population in all the major ragi-producing states.

(viii) Demand forecast for ragi under different policy scenarios

In the light of the above findings, it is further felt that there is a consistent improvement in the awareness levels about the nutritive values of this cereal among the Indian population. Hence, a scenario analysis was attempted to project the demand by the total population in the country, by assuming 0.5 per cent and 1 per cent growths in the per capita consumption of ragi. Accordingly, the demand of ragi in 2020, 2025 and 2030 under the two scenarios for the country was depicted in Figure 3.

As it is assumed that there would be a positive growth rate in ragi consumption by the population in future, the quantity demanded of ragi would expectedly increase from 1,035,000 tonnes in 2011–12 to 1,250,000 tonnes in 2020, 1,391,000 tonnes in 2025 and 1,549,000 tonnes in 2030 under Scenario 1, and the same would increase to 1,306,000 tonnes in 2020, 1,489,000 tonnes in 2025 and 1,700,000 tonnes in 2030 under Scenario 2.

Conclusion

Finger millet is continuously being replaced by other competing fine cereals and commercial crops due to different reasons. The profitability of ragi cultivation is also affected due to its low productivity, absence of an organized seed supply chain, high labour requirement and lack of markets. Besides, ragi is a crop that faces various myths and taboos when one comes to think of producing or consuming. There are cultural issues in adoption and diversification of food. There is a lack of technical know-how in the processing methods, while the conventional method of hand-pounding is a tedious process. Besides, there is also a lack of awareness about the nutritive value of ragi with an opinion that this is a poor man's crop. But, there are evidences that there is a perceptible demand among the urban population. Various measures are very much warranted to save and promote this much-neglected crop in our country not just to double the income of the farmers, but to sustain the current income of the farmers, especially in marginal and tribal areas where this is being cultivated. There are efforts to come out with high yielding varieties along with traits of drought resistance through All India Coordinated Project on Small Millets in India, which should be continued. There should be sincere efforts by the government to protect the price risk faced by the farmers, by developing the markets exclusively for millets, which are scattered and small at present. In Karnataka, finger millet is among the 'climate smart' crops that figures high on the agenda of the government. The state has included finger millet in its flagship mid-day meal scheme called 'Anna Bhagya Yojana' to supply this grain at free of cost to Priority Household families, which includes Antyodaya Anna Yojana (AAY) scheme beneficiaries and the Below Poverty Line (BPL) families across the state. Such proactive policy initiatives should be considered by other leading states in finger millet production. More awareness needs to be created about the health benefits of ragi and thereby remove the myth on this crop—not as poor men's crop, but rich people's diet.

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Notes :

[1] This paper forms a part of the Indo-Swiss Collaboration in Biotechnology (ISCB) Network Project on 'Genetic Enhancement & Bioavailability – Finger Millet (Ragi)' funded by Department of Biotechnology, Govt. of India.

[2] Cost A1: Out-of-pocket cost + Interest on working capital + Depreciation of assets and machinery

Cost A2: Cost A1 + Rent paid for leased-in land

Cost B: Cost A2 + Imputed rental value of own land

Cost C: Cost B + Imputed value of family labour

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Hiring and promoting talented women is the right thing to do for society – and it's an economic imperative.

–Carlos Ghosn

Feature

A Case Study on Improvement of Plant Layout for Effective Production

P. SIVASANKARAN, P. SRIDHAR, A. RAJESH AND M. UGENDIRAN

The fundamental issue with the design is the arrangement of the departments according to the material flow between them. The design criterion that is regularly used in most layout design processes does not capture the effect of layout setup on operational quality measurements such as cycle time, processing department queue times, performance and throughput rate. In a manufacturing industry, plant layout is a systematic and functional arrangement of various departments, machines, equipments and services. It is vital to have a well-developed plant layout in an optimal way for all available resources and to obtain the facility's highest production ability. Production effectiveness relies on how well the different machines and services are produced. This research paper aims at studying and improving the current layout of the plant, and is analyzed and designed using string diagrams. An attempt is made to use systematic layout planning (SLP) to measure the current and proposed factory layout and to calculate the efficiency of the current and the proposed layout of the plant.

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1. Introduction

The conventional plant design issue in assembling businesses is characterized as the assurance of relative areas and portion of the accessible space among a given number of workstations. Albeit most plant format arrangements have in the past concentrated on limiting the measure of transportation, the impact of a given design structure on the creation capacity of an assembling industry is considerably more than simply the expense of material taking care of. While material taking care of cost stays basic, shorter process durations have turned out to be considerably more significant in the present assembling industry. Fast improvements in new items combined with short conveyance times requested by clients are the basis of the time-sensitive, focused methodologies quickly being embraced by stock and short assembling process durations as handy contemplations that directly impact the format and ought to be fused into the design configuration process as genuine concerns. Be that as it may, the trouble in connecting the format designs and operational execution measures by means of numerical or logical models has been recorded in writing by different specialists and experts until a couple of years. In any case, we require new plan models and arrangement methodology that record for vulnerability and fluctuation in structure parameters, for example, item blend, generation volumes and item life cycles, for complex assembling framework investigation and sound basic leadership while dealing with. So, plant format can be expanded by decreasing the procedure stream and material taking care of times, by this diminished creation cost and further incrementing the generation rate. One of the most significant elements to consider in planning the assembling offices is finding a compelling format. Spreading out a production line includes choosing where to put every one

of the offices, machines, hardware and staff in the assembling task. Format decides the manner by which materials and different data sources (like individuals and data) course through the task. Moderately little changes in the situation of a machine in a manufacturing plant can influence the progression of materials impressively. This, thusly, can impact the expenses and viability of the general assembling task. Failing to understand the situation can prompt wastefulness, firmness, huge volumes of stock and work in advancement, staggering expenses and despondent clients. Changing a format can be costly and troublesome, and hence it is ideal to take care of business the very first time itself.

1.1. Types of Plant Layout

Once the type of operation has been selected (jobbing, batch or continuous) the basic layout needs to be selected. There are three basic types:

- Process layout
- Cellular layout
- Product layout

1.1.1. Process Layout

In procedure design, comparable assembling forms (cutting, penetrating, wiring, and so on) are found together to improve usage. Various items may require various procedures, so, material stream examples can be unpredictable.

1.1.2. Cellular Layout

In cell format, the materials and data entering the activity are pre-chosen to move to one piece of the task (or cell) in which every one of the machines to process these assets are found. Subsequent to being handled in the cell, the part-completed items may go on to another cell. As a result, the phone format carries some request to the intricacy of stream that describes procedure design.

1.1.3. Product Layout

Item design includes finding the machines and gear with the goal that every item pursues a pre-organized course through a progression of procedures. The items stream along a line of procedures, which is clear, unsurprising and generally simple to control. To structure a procedure format, the creator has to realize the region required by each work focus, the imperatives on the state of the region apportioned for each work focus, the degree and heading of stream between each work focus (for instance number of adventures, number of burdens, and cost of stream per separation voyaged) and the attractive quality of work focuses being near one another.

2. Objective of Plant Layout

To structure an improved plant format within the guidelines of association, machines and working territories with progressively viable path and simultaneously increase the attractiveness and wellbeing.

2.1. Problem Statement

From the current plant design, we observe that the current plant format stream is not viable for creation. Because of inappropriate procedure stream, process duration maybe higher than the recommended time, so its prompts decrease underway rate. Along these lines improve the procedure stream, legitimate usage of spaces and stockpiles, process duration may diminish and expand the creation rate.

3. Literature Review

K. Balasundaram et al., [1] - So as to accomplish a proficient creation stream plant format is significant in an assembling process. A contextual analysis directed on a medium occupation type industry situated in Ethiopia, which fabricates Sacks (Jute Packs). The current plant design and the grouping of activity procedure of each work station have been explored. This paper plans to upgrade the plant format in this manner to get the most extreme viable creation. This outcome demonstrated that new structure of plant format to diminish the separation of material stream, which builds the creation and decreased the aggregate coat.

Chandra Shekhar Tak et al., [2] - The paper exhibits a utilization of the SLP (Framework Design Arranging) strategy for setting up, in an effective way, the design of a profitable undertaking. A contextual analysis is portrayed in the paper, alluding to an industrial facility assigned for assembling steel cupboard. The periods of the SLP technique application are depicted in the paper together with the introduction of one specific item given as model. The ideal arrangement of the profitable framework's design is chosen by examining three conceivable recognized options.

Amir. J. Khan et al., [3] - Office design is a methodical and practical plan of various offices, machines, types of

gear and benefits in an assembling foundation. It is imperatively critical to have an all-round created plant design for all the accessible assets in an ideal way and get the greatest output from the limit spaces of the offices. The issue is of specific significance for Small and Medium Enterprises (SMEs) as a result of the significant requirements that incorporate expense and space. Determination of right strategy is a significant step in format plan. In this paper, techniques for format configuration are examined thinking about the particular issues and restrictions of SMEs.

Swathi Jain et al., [4] - Because of globalization and consistent mechanical upgrades and other aggressive weights, the associations need to increment the pace of progress. The target of this examination is to consider the current plant format of Heartbeat Preparing Factories, and also to plan an improved plant design utilizing SLP (Deliberate Format Arranging) to build its efficiency. Examination of the existing plant design was made by analyzing stream of materials, movement connections and space prerequisites. New plant format choices were structured and contrasted with the current format. The usage of new plant format demonstrated a critical increase of material and work process travel and came about in expanding the efficiency of the Heartbeat Handling Factories.

Abhishek dixit et al., [5] - For any sort of work, one needs men, material and hardware. Men chip away at material with the help of tools and instruments. During the time spent, creation in any one of the three, viz., men, material or apparatus must be moved relying on the procedure and the item. In the event that men, material and apparatus all remain, stationery there can be no generation in the mechanical sense. At that point, what is to be moved is the issue for the design engineer. The most widely recognized component that is moved here and there is material, or when there is just one piece included, or when the completed item is to stay fixed where it is to be delivered. Whenever devices and hardware are small, it is common to move the devices and hardware, and when machines and materials can't be moved, the third component of creation—the men—are moved. There are different techniques for gathering and creation apparatus, the normal and old styles of the game plan are fixed position design, process format and item design. These old style designs are utilized with manufacture tasks just as in get together, however most plants today are spread out utilizing a blend of these old style designs and are never found in their unadulterated structure. The paper fundamentally is engaged upon these various designs and their effective usage in the creation businesses. The paper will illuminate various formats and will likewise attempt to bring the best design for various existing states of the enterprises.

From the above literatures authors have made significant contribution in the plant layout and facility planning by using various optimization models like Mixed integer, some used simulation models to study the performance of plant design and its special features.

4. Data Collection

The following are the basic information collected from the machine shop in order to optimize the distance between the machineries by reducing the space requirements.

4.1. Machine shop

A machine shop is a room, building or company where machining (see Table 1), a form of subtractive manufacturing, is done in a machine shop (see Figure 1).

Details about machine shop

No. of machines	- 11
Total space	- 1160 square meters
Machine occupied space	- 358.25 square meters
Movement space	- 801.75 square meters
No. of workers	- 33
No. of supervisors	- 2
No. of fork lift	- 1

SKD (Semi knocked down kit)

It is a kit for the partially assembled parts of a product (see Figure 2 and Table 2). It is also called as incompletely Dis-assembled kit.

Details about SKD in shop 2

No. of fixtures	- 12 (shop -2),
No. of welding machines	- (15)
Total space	- 900 square metres (shop-2), 800 square meter (shop -4)
No. of workers	- 6 (shop-2), 18 (shop-4)
No. of supervisors	- 1 each shop

Shot blasting

Shot blasting is the process of removing various impurities from surfaces by using abrasives (see Table 3). It is used for surface protection and also for preparation of surface for further process.

Details about shot blasting

No. of guns	– 1
No. of workers	– 1
No. of supervisors	– 1
Space occupied	– 60 square meters
Abrasive used	– Grind and ball
Abrasive tank capacity	– 200 kg
Pressure used	– 6 bar

Primer painting

It is a preparatory coating put on components before painting; primer painting ensures better adhesion of paint to the surface, increase paint durability and provides additional protection for the components being painted (see Table 4).

Details about primer booth

No. of workers	- 3
Total space	- 168 square meters
Primer colour	- Grey
No. of guns	- 2

Cubing

It is an assembly of all the SKD parts to get a complete body for tipper (see Figure 3 and Table 5).

Details about cubing process

No. of fixtures	– 3
No. of mountings	– 14
No. of workers	– 47
No. of supervisors	– 3
Total space	– 2700 square meters
No. of welding machine	– 15 (Shop-2), 25 (shop-4)

Painting (see Table 6)

Details about painting booth

No. of guns used	– 10
No. of workers	– 4
Total space	– 493.52 square meters

Paint details

Paint material	– Polyurethane
Surface thickness	– 60 to 80 microns
Paint Colours	– Traffic grey

Trimming and PDI (pre-delivery inspection)

Trimming is the process of fixing trimming components while pre-delivery inspection is the process of inspecting the final tipper body.

Trimming components

- Tipping gear
- Electrical fittings
- Sticker and
- Suppressor

Details about trimming and PDI (pre-delivery inspection)

Space occupied	– 840 square meters
No. of workers	– 22
No. of supervisors	– 4

4.2. Problem identification

- Improper storage
- Distance between storage and machine is too long
- Flow rate is high
- Some of the space is unutilized
- Time taken for shot blasting is high
- Time taken for priming and painting also high
- Distance between the shearing machine and punching machine is high (see Figure 5) and
- Setting time also high.

We considered

- Travelling distance between the shearing machine and punching machine is high.
- In SKD (shop - 2) components travelling flow is high.

4.3. Case study of plant layout:

Description

A punching machine is a tool for punching and embossing flat sheet-materials to produce form features needed on an element (see Figure 4). In this company, it is used for producing a punch on some of the parts of tipper body (front-end stiffener, rear-end stiffener, mudguard etc.) It is operated by pneumatic; this machine was installed in 1986.

Problem identified in machine shop

Initially, we studied the machine shop and observed the material travelling flow is high (see Table 7). So we suggest changing the location of pneumatic punching machine to reduce the travelling flow.

Observation

- Distance between the shearing machine and punching machine is 83 meters.
- Area occupied by the machine is 5 square meters.
- Area covered by the punching templates is 9 square meters.
- Maximum length of jobs handled in the punching machine is 3 meters.
- We analyzed the pneumatic and electrical supply lines.
- Area covered by the scrap is 2 square meters.

Mathematical calculation

Prescribed travel length – 72 meter

Current travel length – 83 meter

Efficiency of current flow (A) =

$$\frac{\textit{prescribed travel length by (DGCA)}}{\textit{current travel length}} \times 100$$

Efficiency of current flow (A) = $\frac{72}{83} \times 100$

Efficiency of current flow (A) = 87 %

From the existing machine shop, we observed that distance between the shearing machine and the punching machine is too long. Hence, we suggest to change the punching machine from its position mentioned in the below layout (see Table 8).

After modification

Note: changed the position of punching machine from distance of 83 meters to 26 meters (see Figures 6 and 7, and Table 9).

Observation after modification

- Travelling flow time is reduced.
- Material travelling flow distance is reduced.
- Forklift usage reduction.

Mathematical calculation

Prescribed travel length – 72 meters

Modified travel length – 26 meters

Efficiency of Modified flow (B) =

$$\frac{\textit{prescribed travel length by (DGCA)}}{\textit{modified travel length}} \times 100$$

Efficiency of current flow (B) = $\frac{72}{26} \times 100$

Efficiency of current flow (B) = 277 %

Percentage improvement = $\frac{(B - A)}{A} \times 100$

Percentage improvement = $\frac{277}{87} \times 100$

Percentage improvement = 218 %

5. Analysis of SKD for Tipper Body

SKD (semi-knocked down kit) is the partially assembled components of a tipper body product such as floor, sub frame, integration parts, sideboard, front door, tail door etc (see Figure 8 and Table 10).

Problem identified

- Material travelling distance is more.
- Excess of space.

Mathematical calculation before observation

Prescribed travel length – 150 meters

Modified travel length – 300 meters

Efficiency of Modified flow (A) =

$$\frac{\textbf{prescribed travel length by (DGCA)}}{\textbf{current travel length}} \times 100$$

Efficiency of Modified flow (A) = $\frac{150}{300} \times 100$

Efficiency of Modified flow (A) = 50 %

Mathematical calculation after observation

Prescribed travel length – 150 meters

Modified travel length – 230 meters

Efficiency of Modified flow (A) =

$$\frac{\textbf{prescribed travel length by (DGCA)}}{\textbf{modified travel length}} \times 100$$

Efficiency of Modified flow (B) = $\frac{150}{230} \times 100$

Efficiency of Modified flow (B) = 65 %

Conclusion

This study has provided good exposure to planning and layout designs for the improvement of efficiency (see Figures 9 and 10, and Tables 11 and 12). The choice of the type of plant layout to adopt, can have a significant impact on the long-term success of a firm. This decision, therefore, should not be considered lightly, but only after a thorough analysis of the operational requirements has been completed. A major issue to be addressed in plant layout decisions in manufacturing is, how flexible should the layout be in order to adjust to future changes in product demand and product mix? The study of layout has become extremely important. The most common objective of layout design, that is to minimize distance travelled, is not always suitable for all the manufacturing industries. Congestion in a specific area may have to be tolerated while maintaining minimum separation between facilities. Instead of minimizing total distance travelled, one may wish to minimize the total distance of the material travelled.

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"Gender Equality is a precondition for poverty reduction, sustainable development & Good Governance."

–Kofi Annan

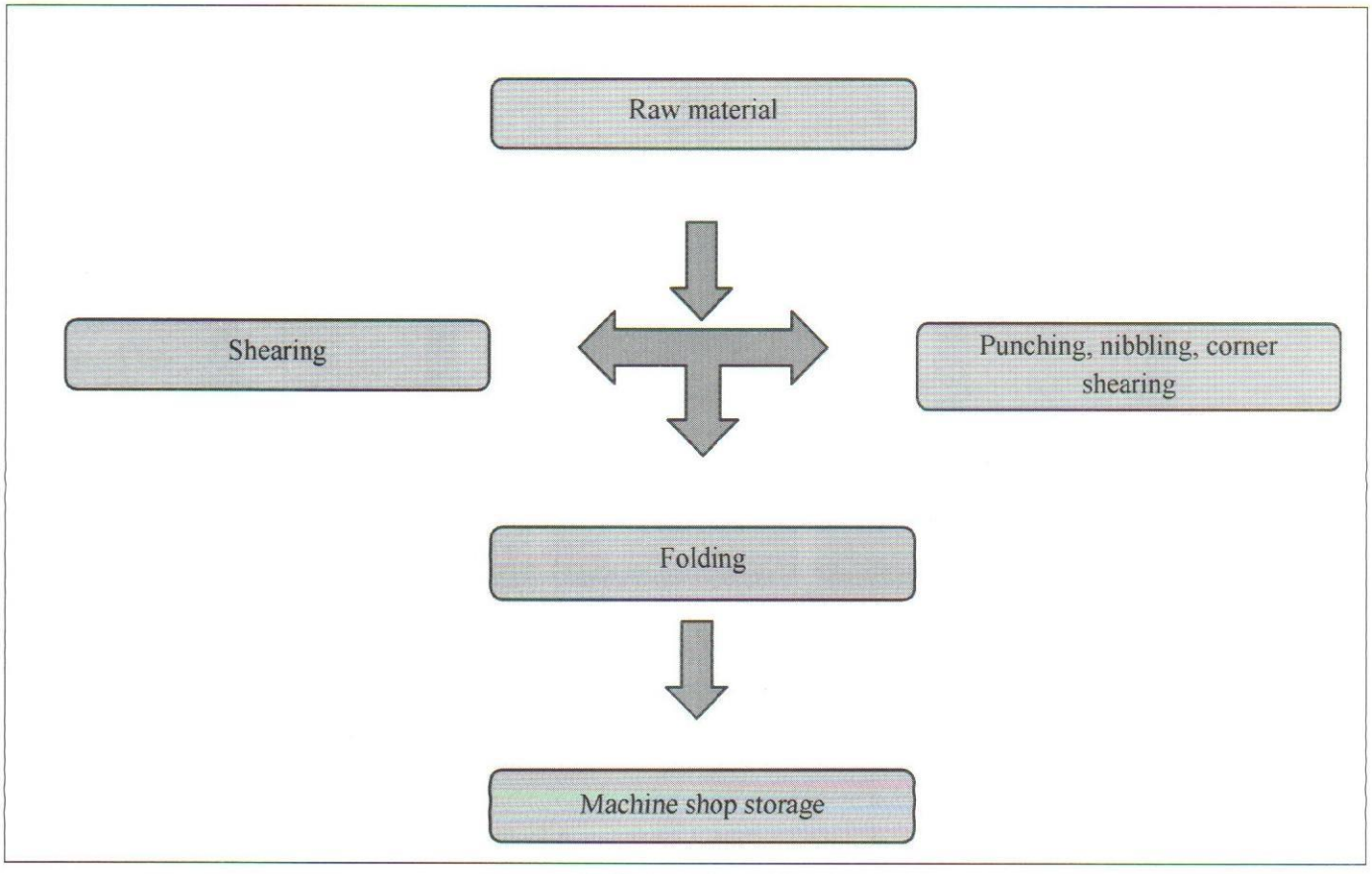

Figure 1: Process flow in machine shop

Table 1: Data about material flow in machine shop

Process Flow		Distance (meter)	Time taken
From	To		
Raw material	Shearing (1410020)	118	2 min 40 sec
Raw material	YSD shearing (1410056)	70	1 min 40 sec
Shearing (1410020)	Bending (1550018)	20	1 min 20 sec
Shearing (1410054)	Bending (1550018)	3	40 sec
Shearing (1410020)	Punching (6513)	83	1 min 45 sec
YSD Shearing (1410056)	YSD Bending (1410055)	16	1 min
YSD Shearing (1410056)	Punching (6513)	40	40 sec
Total	350	10 min 15 sec	

Table 3: Time taken for shot blasting process

Product	Time taken
Floor	30 min
Side board (2)	25 min
Tail door	15 min
Head board	20 min
Total	1 hr 30 min

Details about primer booth

No. of workers - 3

Total space - 168 square meter

Primer colour - Grey

No. of guns - 2

Table 4: Time taken for primer painting process

Product	Time taken
Floor	25 min
Side board (LH & RH)	30 min
Tail door	15 min
Head board	20 min
Total	1 hr 30 min

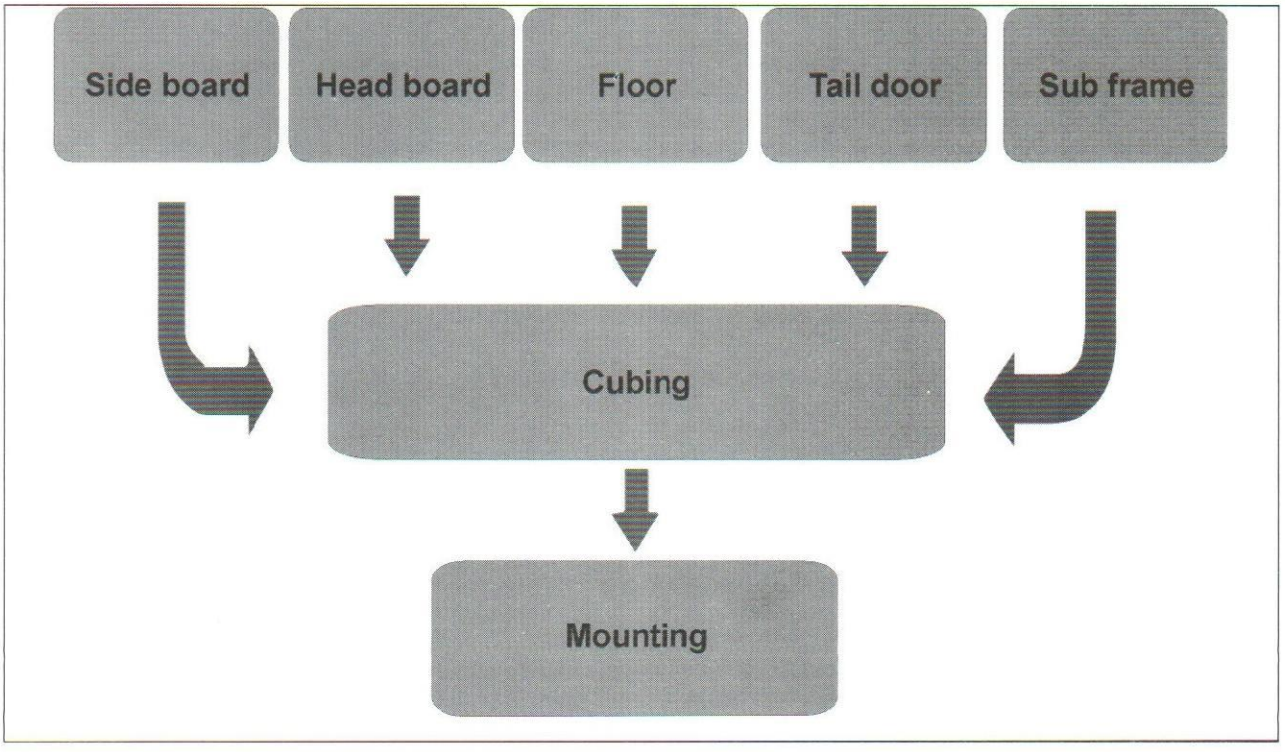

Figure 3: Process flow in cubing

Details about cubing process

No. of fixtures	– 3
No. of mountings	– 14
No. of workers	– 47
No. of supervisors	– 3
Total space	– 2700 square meter
No. of welding machines	– 15 (Shop-2), 25 (Shop-4)

Table 5: Time taken for complete cubing

Cubing size	Time taken
8.5	1 Hr
10.5	1 Hr 15 min
12.5	1 Hr 30 min
14	1 Hr 45 min
16	2 Hr 15 min
24	2 Hr 30 min

Details about painting booth

No. of guns used – 10

No. of workers – 4

Total space – 493.52 meters

Paint details

Paint material – Polyurethane

Surface thickness – 60 to 80 microns

Paint Colours – Traffic grey

Table 6: Time taken for painting process

Cubing size	Time taken
8.5	1 Hr
10.5	1 Hr 15 min
12.5	1 Hr 45 min
14	2 Hr
16	2 Hr 15 min
24	2 Hr 30 min

ANALYSIS ON PUNCHING MACHINE

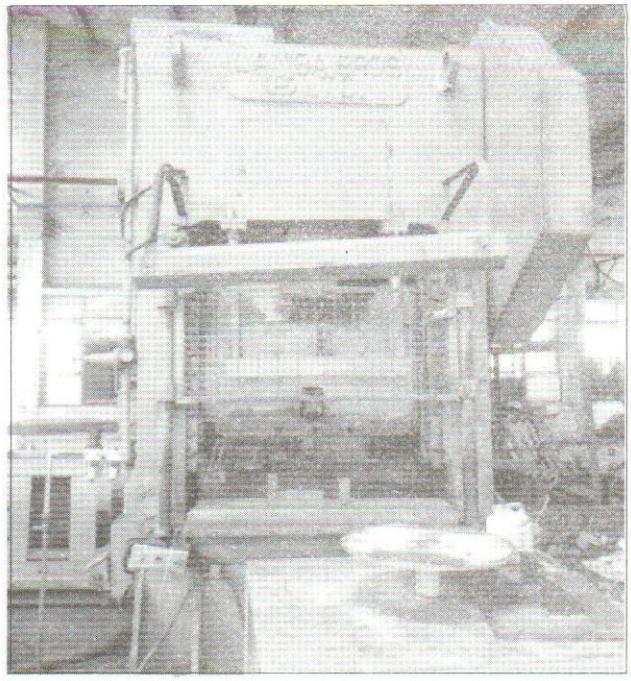

Figure 4: Punching machine

Problem identified in machine shop

Before modification

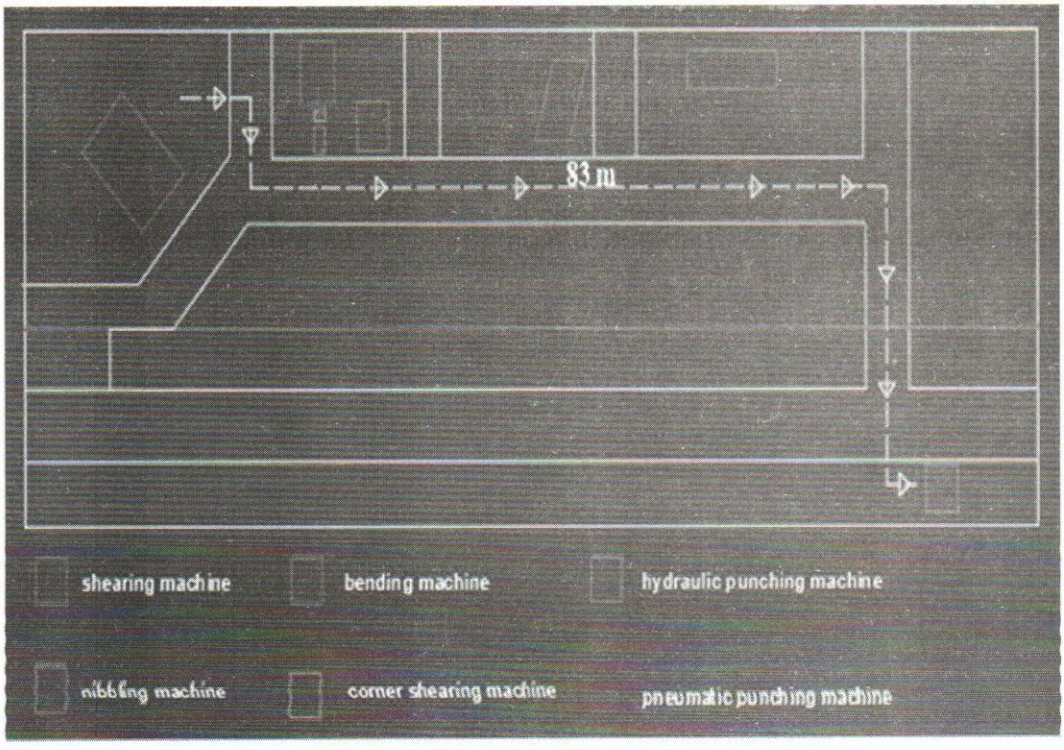

Figure 5: Current flow between shearing and punching

Table 7: Analysis of material flow in punching current

S. No	Jobs from shearing to punching	Time taken
1	Cradle oil tank mounting bracket	1 min 50 sec
2	Front vertical stiffer side board	1 min 40 sec
3	Head board canopy show piece	1 min 55 sec
4	Head board stiffer	1 min 30 sec
5	Mudguard mounting bracket	1 min 45 sec
6	Mudguard mounting panel	1 min 50 sec
7	Body guide	1 min 35 sec
8	Rear hinge stiffener	1 min 45 sec
9	Outer valence	1 min 30 sec
10	Lamp mudguard	1 min 40 sec
	Average	1 min 42 sec

After Modification

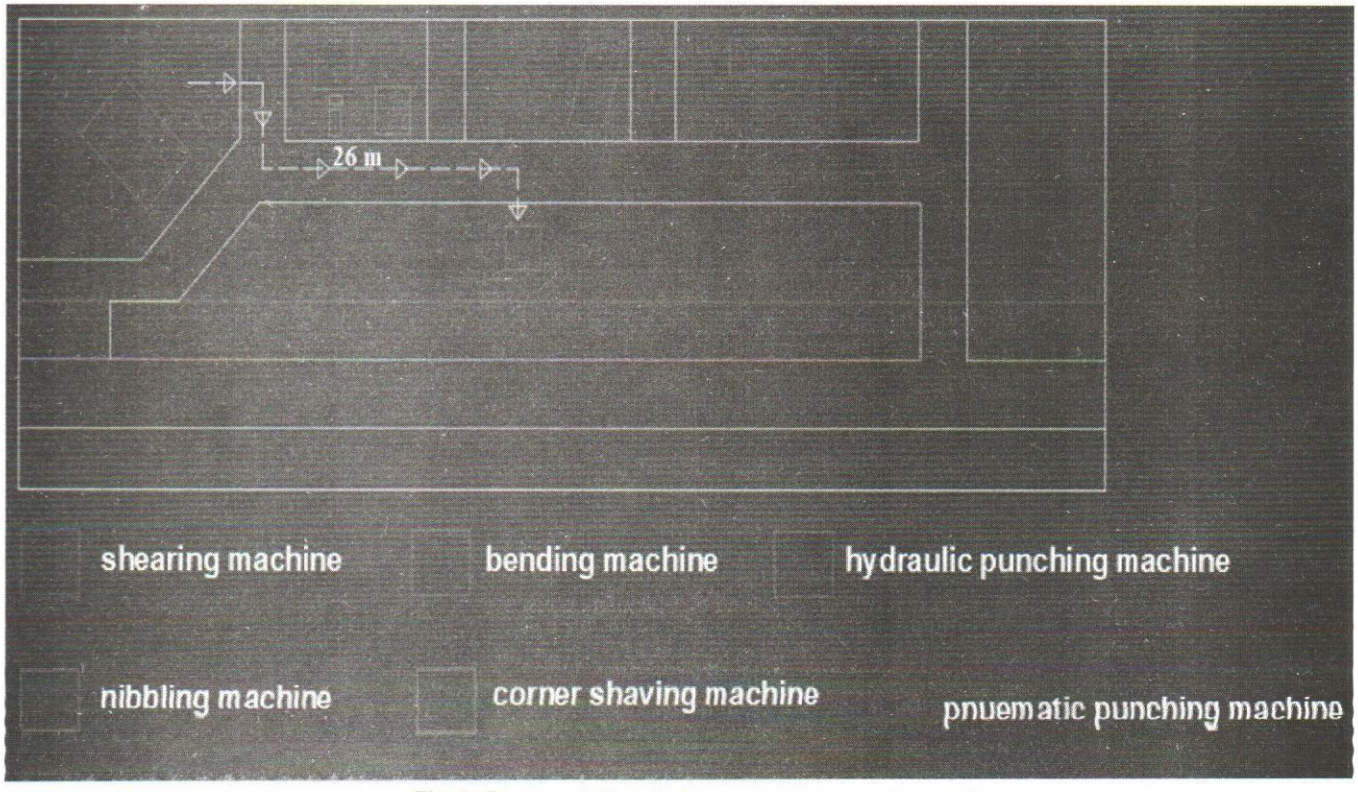

Fig 6. Proposed flow between shearing and punching

Table 8: Analysis of material flow in punching proposed

S. No	Jobs from shearing to punching	Time taken
1	Cradle oil tank mounting bracket	45 sec
2	Front vertical stiffer side board	40 sec
3	Head board canopy show piece	47 sec
4	Head board stiffer	39 sec
5	Mudguard mounting bracket	42 sec
6	Mudguard mounting panel	52 sec
7	Body guide	46 sec
8	Rear hinge stiffener	50 sec
9	Outer valence	45 sec
10	Lamp mudguard	40 sec
	Average	45 sec

Analysis of solutions

Table 9: Comparison of punching material flow

Description	Time	Length (meter)	Efficiency (%)
Current travelling flow	1min 42sec	83	87%
Proposed travelling flow	45sec	26	277%

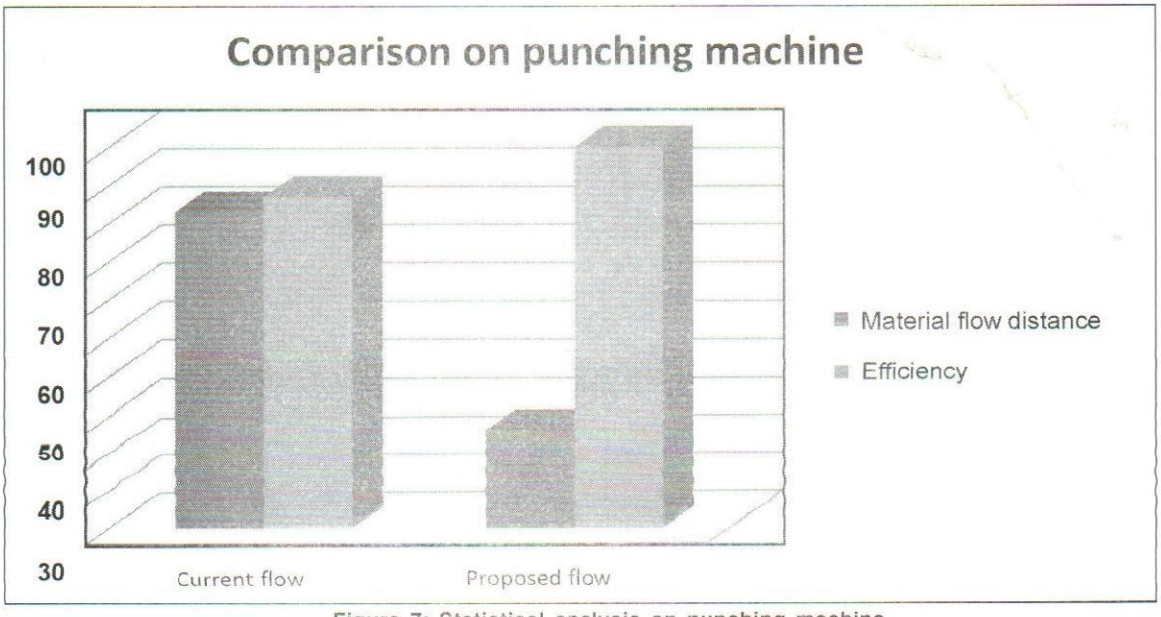

Figure 7: Statistical analysis on punching machine

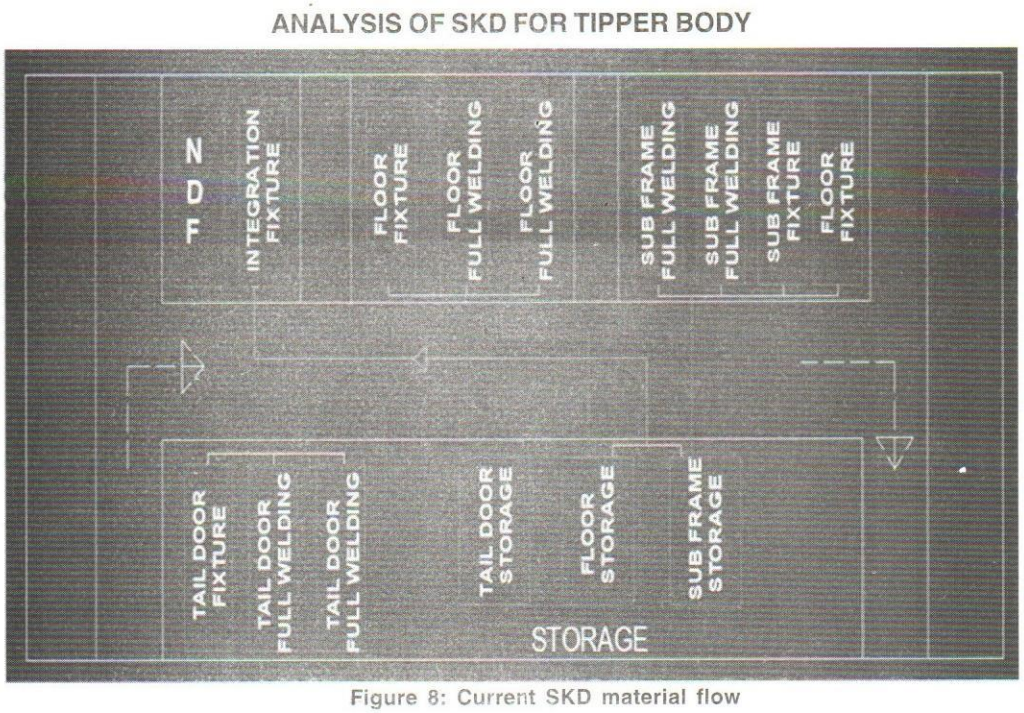

Figure 8: Current SKD material flow

Table 10: Analysis of material flow time in SKD current

Process flow		Distance (meter)	Time taken
From	To		
Raw material	Sub frame	85	4 min
Sub frame	Full welding	38	2 min 12 sec
Raw material	Floor assembly	60	2 min 39 sec
Floor assembly	Full welding	8	1 min
Floor	Integration	20	1 min
Sub frame	Integration	31	2 min 12 sec
Raw material	Tail door	42	2 min 20 sec
Tail door	Full welding	10	1 min 10 sec
Total		300	16 min 33 sec

AFTER MODIFICATIONS

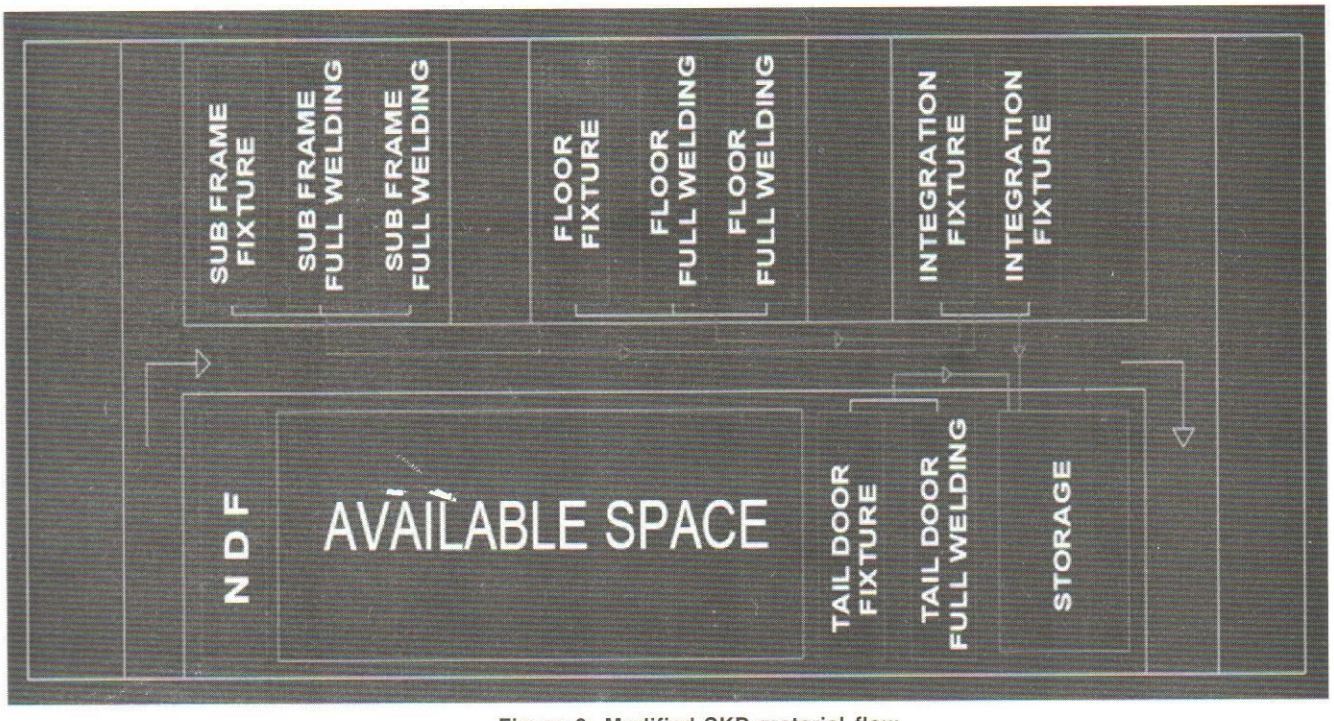

Figure 9: Modified SKD material flow

Observation after modification

Table 11: Analysis of material flow time in SKD current

Process flow		Distance (meter)	Time taken
From	To		
Raw material	Sub frame	45	2 min 20 sec
Sub frame	Full welding	6	1 min 10 sec
Raw material	Floor assembly	55	3 min
Floor assembly	Full welding	2	1 min
Floor	Integration	20	1 min 25 sec
Sub frame	Integration	40	2 min
Raw material	Tail door	50	2 min 12 sec
Tail door	Full welding	3	40 sec
Raw material	Head board	60	2 min 15 sec
Raw material	Side board	45	2 min 15 sec
Side board	Full welding	5	1 min
Total		330	18 min 31 sec

Analysis of solutions

Table 12: Comparison of punching material flow

Description	Time	Length (meter)	Efficiency (%)
Current flow	300	17 min	50 %
Modified flow	230	14 min	65%

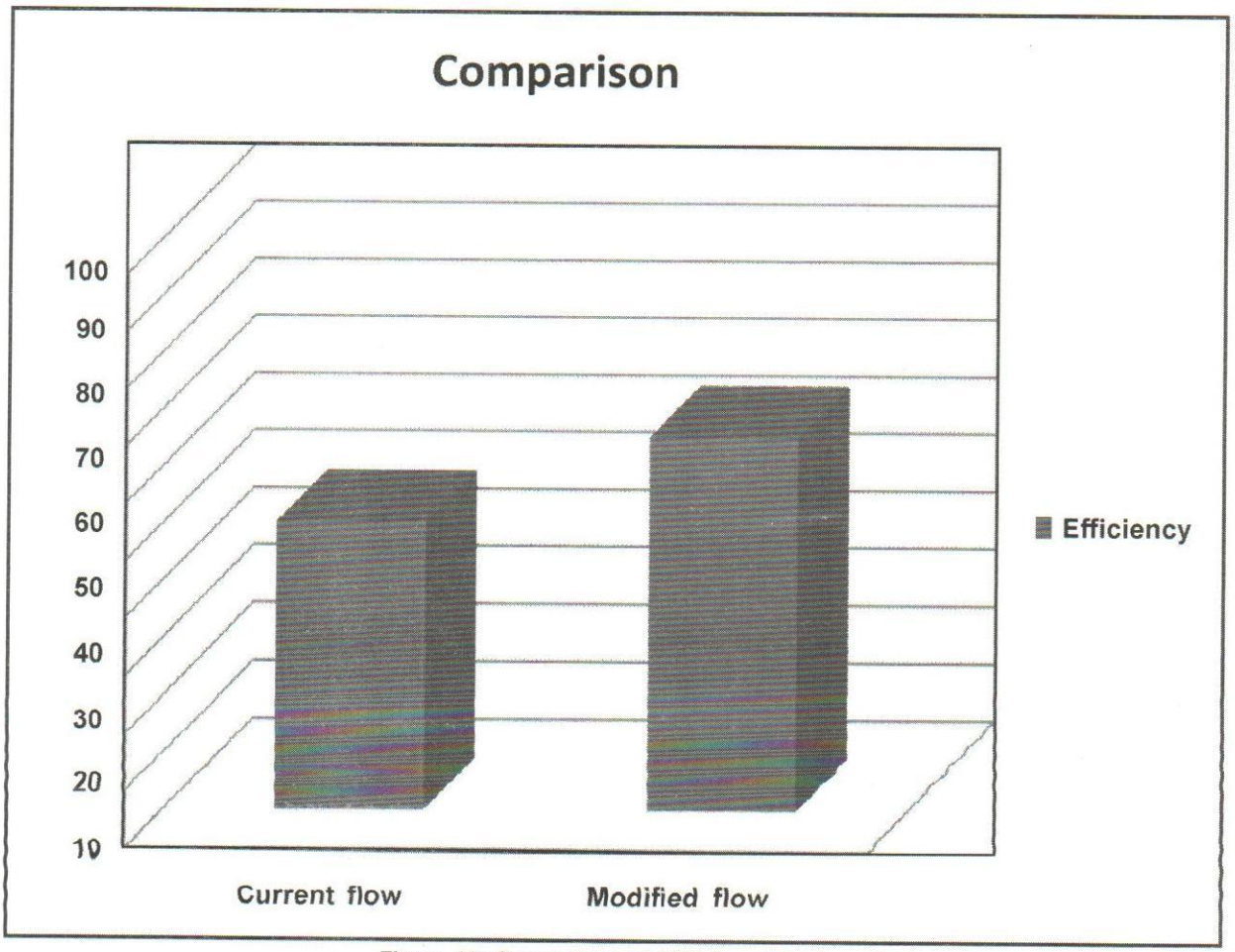

Figure 10: Comparison of SKD layout by bar chart

Feature

Milk Production Sector in India: Analysis of Trend and Pattern

S. MOHANA KUMAR

India is the largest producer of milk in the world and one of the potential and growing markets for milk and milk products in the world. The demand for milk products has substantially increased with the rise in per capita income over the years. However, India's share in world trade of dairy products is not commensurate with her size of milk production and domestic market. The low productivity of milch animals—measured in terms of milk produced per day per animal in India—is one of the major constraints in the expansion and diversification of trade of dairy products in the international market. It has a bearing on the international competitiveness of the dairy sector too, as the quantity and value of dairy products imported have been on the rise. It is argued in the paper that the competiveness of the dairy farmers in India would deteriorate unless the domestic market is protected from external competition and the production is reorganized from its current status of family labour-based small farms for subsistence into a commercialized farm with advanced technology in production, distribution and value addition.

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Introduction

The farming system in India is known for its mixed crop-livestock production. The livestock economy of India houses 58 per cent of buffalos and 15 per cent of cows in the world, and ranks top in cattle and buffalo population. India is the largest producer of milk in the world with a share of 20 per cent in world production. However, the dairy farmers in India have been under severe stress for the last quarter of a century as the crisis of reproduction of small producers percolated into the milk production sector too since the introduction of economic liberalisation in 1991. Annual rate of growth in milk production in India was 6.8 per cent for the last two years and grew at 4 per cent during the last two decades (Govt. of India, 2017). It is more than double the rate of growth of milk production in the world. The issue of reproduction of small capital with the dairy farmers, to a great extent, is different from the crop production sector. On trade liberalisation, studies specific to dairy products present diverse views (Kumar, 2009; Joshi, 2012). As cattle rearing in India has long been characterised as an offshoot of the crop production sector, studies on trade related reforms for the agriculture and allied sectors, to a great extent, holds valid for the dairy sector as well.

The prominent pro-liberal views argued that domestic market would be liberalised further to make agriculture more competitive in the international market. It would eliminate supply side bottlenecks, and the liberalised exports of agricultural commodities would help farmers access the wider international market and realise a better price (Gulati, 2019). On the other hand, there exists plethora of literature on negative impact of trade reforms on agriculture and allied sectors. It is argued that stringent protection from external competition in the domestic market coupled with active state's support is required for the

sector, while the current crisis in the crop production sector is attributed to policies of trade reforms (Mohanakumar, 2008; Mohanakumar, 2018).

In the international trade scenario, productivity and scale of production matter more than the size of the bovine stock. The numero uno status in milk production is not a sufficient condition for trade in the global market. Productivity of animals (cow and buffalo) in India is on a much lower side as compared to that of the major milk producers in the world. The low productivity of cow and buffalo in India is attributed to both intrinsic (genetic potential) and extrinsic variables including management, poor veterinary and extension services and substandard breed improvement programme. Although the extrinsic variables can be improved with advanced management practices, intrinsic factors are difficult to be changed in the short run, especially for small producers or subsistence farmers, who produce for the market in the neighbourhood. It has been estimated that informal sector handles more than 80 per cent of the milk marketed in developing countries and India is not an exception to it (FAO, 2018). The change in the breed of milch animals involves substantial investment and it is hard for the major chunk of milk producers in India to make that substantial investment in the short run. However, a remunerative price supplemented with development of infrastructure for cattle rearing calls for active intervention of the state, for, it is difficult to come by under the present economic dispensation. In the light of the above, the study examines the following: (i) What is the structure and composition of milk production and milch animals in India? Are milk producing farmers in India prepared to compete in the international market? (ii) What does the trend in the foreign trade of dairy products forecast for farmers in India? The discussion is organised in three sections. In section 1, production structure and trend in the dairy sector is analysed and the section 2 analyses the trend and structure in the foreign trade of dairy industry during the trade liberalisation phase. The findings are summarised in Section 3.

Section I

1.1 Structure and Trend in Milch Animal Population and Milk Production

It has been sufficiently explored in the Indian context that there has been abnormal decline in the relative contribution of agriculture and allied sectors, including livestock too, in the Gross Value Added (GVA) in India. While the share of agriculture and allied sectors decline in GVA, the relative contribution of the livestock sector has been increasing over the years and it is indicative of the importance of the sub-sector within agriculture (Figure 1). The structure, composition and changes in regional concentration of milch animal population assume special significance in the international trade in dairy products. As mentioned elsewhere, competitiveness of dairy products from India in the international market is influenced primarily by its quality and the competitiveness. In the international market, buffalo milk based products are preferred to cow milk. Further, Domestic Resource Cost (DRC) of exporting cow milk based items from non-descript and indigenous cow is not competitive as the productivity of animals are much below the exotic breeds. In cattle population, there exist mainly three varieties, viz., exotic breed, nondescript (*Murrah*) and indigenous. Similarly, two varieties are more common in buffalo population, viz, nondescript and

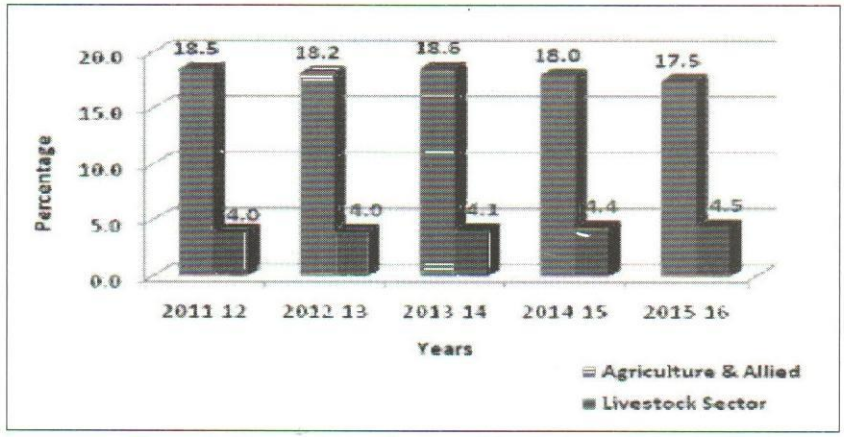


Figure 1: Share of Livestock and Agriculture Sector in GDP

indigenous. Productivity does vary significantly across different types of cattle as well as buffalo, and therefore, the change in the composition of population has a bearing on the competitiveness of dairy products in the domestic and international markets.

During the cattle inter-census period (2007 and 2012), there was a marginal increase in the population of buffalo by 34,000 while the cow population registered a fall by 82,000. The cow population registered a negative growth rate to the tune of about -0.32 per cent while the buffalo population registered an increase of 0.62 per cent during the quinquennial period.

Among 28 states considered for the analysis, 18 states experienced a negative rate of growth both in cow and buffalo population between 2007 and 2012, and those 18 states included, among others, major milk producing states, viz., Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Tamilnadu, Uttarakhand and West Bengal. The trend in milch animal population broadly provides a pointer to the current phase of the animal husbandry sector in India. Table 1 shows changes in the relative share of cow and buffalo by states (milch animal) in 2007 and 2012. Cow population accounted for 63 per cent of the total milch animals in India and there has been a regional concentration and preference for milch animals in India. In the north east and south India, cow is the preferred milch animal as compared to buffalo. Five states, viz., Andhra Pradesh, Gujarat, Haryana, Punjab and Uttar Pradesh have a buffalo population above 50 per cent of the total cow-buffalo population and in 12 states, the relative share of cow population is more than 75 per cent of the total milch population. It may be noted that animal preference is rooted into socio-cultural aspects and further warranted by a handful of other enabling factors as well. More than 25 per cent of milch animal population is reared in two states, viz., Uttar Pradesh (16 per cent) and Madhya Pradesh (10 per cent) followed by Rajasthan (8 per cent), Maharashtra (7 per cent), Gujarat (7 per cent), Andhra Pradesh (6.6 per cent), Bihar (6.2 per cent), West Bengal (6 per cent), Karnataka (4 per cent), Odisha (4 per cent) and Tamilnadu (3 per cent). Those nine states in the second group accounted for more than 50 per cent of the milch animal population in India. About 40 per cent of the buffalo population in India are reared in two states, viz., Uttar Pradesh (28 per cent) and Rajasthan (11 per cent). At the national level, population of exotic breed cow registered a rate of growth of 5.39 per cent between 2007 and 2012. Broadly, there has been a shift in the structure of milch animal population in India. Animal concentration and spatial distribution of milch animal have two aspects demanding special attention in the context of trade liberalisation. Liquid milk being a highly perishable commodity, and given the nature of consumption pattern in India, geographical concentration of liquid milk production and its trend assume special significance. Table 1 shows the regional concentration of milch animals in India.

States can be classed under three categories, based on the relative share of cross breed and indigenous cow (Table 2). Category 1: A relatively high share in indigenous cow population as compared to cross breed cow population; Category 2: A high share of cross breed cow population as compared to indigenous cow population; Category 3: More or less equal share in both types of cow population. Assam, Chhattisgarh, Jharkhand, MP, Odisha, UP and West Bengal fall under category 1 states. Bihar, Karnataka, Maharashtra, Tamilnadu, Haryana, Himachal Pradesh, Jammu and Kashmir, Kerala and Punjab are in the advantageous group as the relative share of crossbreed is higher than indigenous, as compared to category 1 states.

Two broad trends emerging from the geographical concentration of milch animal population are: (i) there has been a concentration of milch animal population by type of animals; and (ii) buffalo population in relation to cow population has been on the decline for most of the states, not with standing the fact that the buffalo population has marginally increased in India during the reference period.

Spearman Rank Correlation is estimated with a hypothesis that there is a positive correlation between the population density of cross breed cows and indigenous cows for the period 2007 and 2012 for important 25 states/ union territories in India. It implies that the shift from indigenous to crossbreed animal is a gradual process and that the transition involves different stages. Table 3 shows per capita availability of milk in India by states for the period 2009 to 2016. The Coefficient of Variation of Per Capita Availability of Milk remains more or less unchanged for the last 15 years and it implies that geographical distribution of production of milk remains unaltered. Important observations emerging from Table 3 are: (i) Per capita availability of milk showed significant differences across states in India. Out of 28 states and union territories considered in the analysis, only nine states recorded a higher per capita availability in milk production as compared to the national average. It is worth mentioning that the

Table 1: Distribution of Cattle and Buffalo Population by States in India - 2007 & 2012 (percentage share)

State	2007		2012	
	Cow	Buffalo	Cow	Buffalo
Andhra Pradesh	45.82	54.18	47.46	52.54
Assam	95.26	4.74	95.95	4.05
Bihar	65.24	34.76	61.78	38.22
Chhattisgarh	85.54	14.46	87.59	12.41
Gujarat	47.62	52.38	49.01	50.99
Haryana	20.68	79.32	22.91	77.09
Himachal Pradesh	74.87	25.13	75.01	24.99
Jammu & Kashmir	76.63	23.37	79.11	20.89
Jharkhand	85.36	14.64	88.04	11.96
Karnataka	70.82	29.18	73.28	26.72
Kerala	96.77	3.23	92.85	7.15
Madhya Pradesh	70.59	29.41	70.54	29.46
Maharashtra	72.71	27.29	73.46	26.54
Manipur	84.62	15.38	79.90	20.10
Meghalaya	97.51	2.49	97.60	2.40
Nagaland	93.06	6.94	87.78	12.22
Odisha	91.19	8.81	94.12	5.88
Punjab	25.98	74.02	32.00	68.00
Rajasthan	52.21	47.79	50.66	49.34
Tamil Nadu	84.78	15.22	91.87	8.13
Tripura	98.53	1.47	98.87	1.13
Uttar Pradesh	44.23	55.77	38.97	61.03
Uttarakhand	64.70	35.30	67.01	32.99
West Bengal	96.17	3.83	96.51	3.49
Delhi	24.83	75.17	34.77	65.23
India	65.40	34.60	63.72	36.28

Source: Department of Animal Husbandry, Dairying & Fishing. Ministry of Agriculture and Farmers Welfare. Out of 25 states considered for the analysis, relative share of buffalo population in the milch animal population has registered a fall in 14 states (Table 1). However, a silver lining in the otherwise disparaging trend is that, major milk producing states like Rajasthan and Uttar Pradesh have recorded increase in buffalo population.

major milk producing states like Uttar Pradesh recorded a per capita availability less than the national average; (ii) there are states with milk availability less than 100 grams per day and in those states, there is less possibility that the production can be increased in the short run. In such states, different forms of milk will meet the demand and the possibility looms for large-scale imports, as cheap imports are posing a threat to the sustainability of dairy sector in India.

Trends in Milk Production

For food items, it is the precondition for trade to take place that there should be sufficient production of marketable surplus, defined in terms of excess of production over own consumption. Milk production still continues to be an engagement of small capital owners, governed by the purpose of subsistence or livelihood rather than commercial activity for profit. However, milk production in India has been growing faster in both absolute and relative terms. Per capita availability of milk has increased from 160 grams per day to 355 grams per day between 1985–86 and 2016–17. During this period, milk production in India has increased from 44 to 165.44 million tonnes; the annual rate of growth in milk production has surpassed the population growth, and it drove the per capita availability up. Milk and milk products being income elastic,

Table 2: Regional Distribution of Crossbreed and Indigenous Cow Population by states in India-2012 (Percentage share)

State	Crossbreed	Indigenous
Andhra Pradesh	5.90	4.05
Arunachal Pradesh	0.05	0.28
Assam	0.95	6.38
Bihar	8.87	6.84
Chhattisgarh	0.38	5.44
Goa	0.05	0.03
Gujarat	5.14	5.64
Haryana	2.48	0.56
Himachal Pradesh	2.44	0.67
Jammu & Kashmir	3.34	0.94
Jharkhand	0.61	4.47
Karnataka	8.02	4.29
Kerala	3.30	0.07
Madhya Pradesh	2.02	11.99
Maharashtra	9.50	5.66
Manipur	0.10	0.15
Meghalaya	0.08	0.58
Mizoram	0.03	0.02
Nagaland	0.25	0.07
Odisha	2.92	5.39
Punjab	5.40	0.19
Rajasthan	4.61	9.60
Sikkim	0.26	0.01
Tamil Nadu	16.20	1.93
Tripura	0.30	0.56
Uttar Pradesh	8.73	13.16
Uttarakhand	1.24	0.99
West Bengal	6.68	10.01
Delhi	0.15	0.03
India	100.00	100.00

Source: Same as Table 1.

marketable surplus depends on the difference between income level and growth in milk production. The economic growth in India is one of the highest in the world with the second largest population and these two factors dampen the prospects of milk trade from marketable surplus in the domestic economy while the possibility of imports of dairy products loom large. Yet, per capita availability of milk in India is on a much lower side as compared to the same in major milk producers and exporters in the world. There are few factors influencing per capita consumption of milk and milk products in a country like India, where a substantial segment of the population is vegetarian and the required nutrients are derived from dairy products and milk.

Table 4 gives the geographical spread of milk production and its composition in 2016–17. The relative share of buffalo and cow milk is almost the same in India, albeit there exists significant differences across states. It may also be noted that more than 50 per cent of buffalo milk production is concentrated in five major states while cow milk production is more evenly distributed. Another important observation emerging from Table 4 is that buffalo milk producing states are those with surplus milk production in terms of per capita availability. Table 5 shows

Table 3: Per capita Milk Availability by States (per day/Gram)

State	2009-10	2016-17	Growth Rate
All India	273	355	3.34
Andhra Pradesh	342	522	5.43
Arunachal Pradesh	59	109	7.97
Assam	69	71	0.36
Bihar	175	228	3.36
Goa	96	68	-4.22
Gujarat	418	563	3.79
Haryana	662	930	4.34
Himachal Pradesh	397	521	3.46
Jammu & Kashmir	379	400	0.68
Karnataka	226	291	3.21
Kerala	201	189	-0.77
Madhya Pradesh	278	468	6.73
Maharashtra	190	243	3.12
Manipur	88	75	-1.98
Meghalaya	83	83	0.00
Mizoram	29	62	9.96
Nagaland	96	91	-0.67
Orissa	112	128	1.68
Punjab	944	1075	1.64
Rajasthan	509	785	5.56
Sikkim	200	228	1.65
Tamil Nadu	278	294	0.70
Tripura	77	114	5.03
Uttar Pradesh	283	348	2.62
West Bengal	133	148	1.34
A&N Islands	137	89	-5.25
Chandigarh	95	76	-2.75
Dadra & Nagar Haveli	86	62	-4.01
Daman & Diu	15	5	-12.83
Delhi	72	35	-8.62
Lakshadweep	84	110	3.43
Puducherry	96	107	1.37
Chhattisgarh	110	141	3.15
Uttarakhand	387	440	1.62
Jharkhand	130	157	2.39

Source: Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare, Government of India.

the per capita monthly expenditure on milk and milk products in India. In 1970–1, relative share of milk and milk products in total food expenditure in rural India was 11.67 per cent. It has increased to 18.72 per cent in 2012–13. In the case of urban India, per capita monthly expenditure on milk and milk products in total food expenditure has increased from 14.71 per cent to 20.25 per cent during the reference period. The observed increase in expenditure on dairy products pulls down the available marketable surplus for export, while it widens the scope for large-scale imports to India.

Table 4: Percentage Share in Milk Production in States by Type of Animals-2016–17

States	Milk production (Million Tonnes)	Share of Buffalo milk	Share of cow milk	Buffalo milk Production (States' Share)	Cow milk Production (States' Share)	State's share in total milk Production
Andhra Pradesh	12175	68.2	32	10.2	5.0	7.64
Assam	843	13.6	86	0.1	0.9	0.53
Bihar	8508	39.5	61	4.1	6.6	5.34
Chhattisgarh	1321	25.5	74	0.4	1.3	0.83
Goa	51	33.7	66	0.0	0.0	0.03
Gujarat	12478	53.6	46	8.2	7.4	7.83
Haryana	8926	81.4	19	8.9	2.1	5.60
Himachal Pradesh	1283	29.4	71	0.5	1.2	0.80
J & K	2300	20.2	80	0.6	2.3	1.44
Jharkhand	1764	19.6	80	0.4	1.8	1.11
Karnataka	6482	29.6	70	2.4	5.8	4.07
Kerala	2394	0.5	99	0.0	3.0	1.50
Madhya Pradesh	12753	48.6	51	7.6	8.4	8.00
Maharashtra	10182	39.4	61	4.9	7.9	6.39
Manipur	79	17.9	82	0.0	0.1	0.05
Meghalaya	84	1.6	98	0.0	0.1	0.05
Mizoram	24	0.0	100	0.0	0.0	0.02
Nagaland	78	8.0	92	0.0	0.1	0.05
Odisha	1999	13.0	87	0.3	2.2	1.25
Punjab	11222	71.9	28	9.9	4.0	7.04
Rajasthan	18801	59.1	41	13.7	9.8	11.80
Sikkim	54	0.0	100	0.0	0.1	0.03
Tamil Nadu	7442	4.9	95	0.4	9.1	4.67
Telangana	4675	70.5	30	4.1	1.8	2.93
Tripura	147	1.2	99	0.0	0.2	0.09
Uttar Pradesh	26455	66.9	33	21.8	11.2	16.60
Uttarakhand	1641	46.2	54	0.9	1.1	1.03
West Bengal	5051	4.9	95	0.3	6.2	3.17
A&N Islands	15	10.2	90	0.0	0.0	0.01
Chandigarh	36	53.3	47	0.0	0.0	0.02
Lakshadweep	1	0.0	100	0.0	0.0	0.00
Puducherry	48	4.6	95	0.0	0.1	0.03
India	159365	51.09	49	100.0	100.0	100.00

Note: Total milk production does not include goat milk, which accounts for 3 per cent of the total milk production in India

Source: Derived from Basic Statistics of Animal Husbandry and Fisheries, Government of India, 2017.

The per capita consumption of different types of milk and milk products in India is on a much lower side as compared to other developed countries in the world. Over the years, as income increases, the per capita consumption will catch up with other countries as evidenced from Table 6. An important observation emerging from Table 6 is that the per capita consumption of milk and milk products is 53 kg per annum in India and it is less than 1/4th of the per capita consumption of milk equivalent of developed countries like USA, Australia and Canada. It in turn implies that the quantity of milk and milk products would substantially increase, as income

Table 5: Per capita Monthly Consumer Expenditure on Milk and Milk Products in India

NSS Round/Year	% Share of Milk and Milk Products in Total Food Exp.		% Share of Milk and Milk Products in Total Expenditure	
	Rural	Urban	Rural	Urban
25th (1970–1971)	11.66	14.72	8.58	9.48
38th (1982)	11.46	15.62	7.51	9.24
46th (1990–1991)	14.28	17.42	9.42	9.91
56th (July 2000–June2001)	15.43	18.95	8.68	8.30
66th (July 2009–June2010)	16.04	19.16	8.60	7.80
68th (July 2011–June2012)	18.72	20.26	9.10	7.80

Source: NSSO, Various Rounds.

Table 6: Per capita Consumption of Different Types of Milk and Milk Products (Milk Equivalent) in India and other Countries-2017

Country	Milk equivalent (Kg)	Excess consumption of Milk in Kg equivalent in Other countries compared to India (in KG)
New Zealand	238.72	185.44
Australia	251.20	197.92
USA	240.50	187.22
Canada	207.84	154.56
EU-28	246.21	192.93
RussiaIndia	146.87	93.59
China	23.22	(-) 30.06

Source: CLAL Dairy Forum, October 5, 2018.

increases in India. Increasing demand for dairy products would be met through imports, if the dairy products are made available through competitive pricing in the international market. It would mark a death bell for the waning livestock sector in the country. Uttar Pradesh, Rajasthan, Gujarat, Karnataka, Maharashtra, Punjab and Kerala, accounted for 52 per cent of total milk production in India. Among these states, except Punjab, compound growth rate of milk production during the last five years is less than the rate of growth in national average. Moreover, Punjab recorded the lowest growth rate, followed by Kerala. The major milk producing states can be grouped into three, viz., (i) best performing states; (ii) moderate performing growth; (iii) poor performers in milk production. The classification is based on last five years compound growth rate in milk production. The best performers include Madhya Pradesh, Andhra Pradesh, Chhattisgarh, Karnataka, Tripura, Haryana and Himachal Pradesh. All these states have a compound growth rate ranging between 4 per cent and 6 per cent. Poor performers include Punjab, Odisha, Assam, Uttarakhand, Kerala, Bihar and West Bengal. These states have registered a growth rate less than the national average. It is worth noting that most of the milk producing states have a growth rate between 1 per cent and 4 per cent.

Table 5 shows the trend in the consumption of milk and milk products in relation to the total food items and total expenditure on all items as reported in the consumer expenditure survey. There has been a significant increase in the relative share of milk and milk products in total food expenditure in both urban and rural area. However, in total expenditure of households, there has only been a marginal increase in the share of milk and milk and milk products while the same has registered a decline in urban India over the years. Table 6 gives per capita consumption of different types of milk and milk products in major milk producing and export countries in the world. Per capita consumption of milk and milk products in India is significantly on a lower side as compared to major milk producers in the world. Its policy implication is that India provides a large market for dairy products for traders in

the international market and in the context of trade liberalisation, there is a possibility that large scale imports of milk and milk products from major producers may destroy the fragile domestic producers in India.

It is important to know if there is any endogenous or exogenous break during the period of the movement in milk production in India. Econometric tool of structural break is employed to detect any break in the long run movement of milk production in India. It was found that there was a break in the long run movement of milk production in India and the break was in 2001–02. Table 7 shows the rate of growth in milk production during the period between 1985–86 and 2015–16. During the period of analysis, milk production in India grew at the rate of 4.08 per cent per annum and the period can be broadly divided into two phases: (i) 1985–86 to 2001–02 and (ii) 2001–02 to 2016–17. In the first phase, there was marginal decline in milk production. The phase wise growth rate was estimated using kinked exponential function. The observed break in the long run movement of the trend warrants close scrutiny. It has been documented in the literature that the farmers produce more milk for subsistence during the crisis period and the crop production sector in India underwent a deep crisis in the late 1990s and early 2000s.

The trend growth rate was estimated using the semi-log or log-lin model of the following

form (Gujarati and Sangeetha, 2007)

$$Y_t = Y_0 (1+r)t \text{ —} \quad (1)$$

Where 'r' is the rate of growth of milk production.

Taking natural logarithm of both sides in Eq.1, it takes the form as in Eq.2.

$$\ln Yt = \ln Y_0 + t \ln (1+ r) \text{ —} \quad (2)$$

Substituting $\beta 1$ for $\ln Y_0$ and β_2 for ln (1+r) the model (1) can be rewritten as

$$ln\ Yt = \beta_1 + \beta_2 t + u_t \text{ —} \quad (3)$$

Where: ln Yt stands for natural logarithm of milk produced and β_1 is the initial production or constant, β_2 is the rate of growth or slope coefficient, 't' is the time, u_t is the error term. In order to estimate the rate of growth in a series characterised by numerous unknown breaks (Balakrishnan and Parameswaran, 2007), kinked exponential growth model is used. (Boyce, 1986). The advantage of estimating log-lin growth model with a single equation is that it allows the estimation of growth rate for relatively smaller periods without loosing the degrees of freedom. The kinked exponential growth rate in linear regression with a single break at point 'K' in time series data for milk production takes the following form:

Table 7: Rate of Growth in Milk Production by phases

Period	Coefficient	T-value
1985-86 to 2013-14	4.08	145.88
1985-86 to 2001-02	4.04	75.13
2001-02 to 2016-17	4.14	55.13

$$ln\ Yt = \alpha_1 D_1 + \alpha_2 D_2 + (\beta_1 D_1 + \beta_2 D_2)\ t + u_t \text{ —} \quad (4)$$

where D_1 is dummy and it takes the value '1' for the period 1985–86 to 2001–02 and '0' for the rest of the period. The discontinuity is eliminated with the linear restriction as given below:

$$\alpha 1 + \beta_1 K = \alpha_2 + \beta_2 K \text{ —} \quad (5)$$

$$\text{Whereas: } \alpha_1 D_1 + \alpha_1 D_2 = \alpha 1 \text{ —} \quad (6)$$

Substituting Eq.5 in Eq.4, the restricted form is transformed into a linear regression form as Eq.7.

The Eq. 7 is applicable for a series with single break point at 'K'.

$$\ln Yt = \alpha_1 + D_1 + \beta_1 (D_1 t + D_2 K) + \beta_2 (D_2 t - D_2 K) + ut \text{ —} (7)$$

Foreign Trade of Dairy Products

India has been growing as an important player in the international market for agricultural commodities, with a relative share of 2.69 per cent in total exports and 1.31 per cent in imports in the world trade in 2016–17. During the period from 2008–09 to 2016–17, agricultural exports as percentage of Gross Domestic Product (GDP) from agriculture has registered an increase from 9.10 per cent to 15.75 per cent (Govt. of India, 2017). Alongside, import of agricultural commodities as percentage of agricultural

GDP increased from 3.94 per cent to 6.5 per cent during the reference period. The share of dairy products in agricultural imports has increased from 0.05 per cent to 0.26 per cent between 2002–03 and 2015–16 (Elumalai, 2007 and Elumalai and Sharma, 2008). In the case of export of dairy products, its relative share in the total value of exports of agricultural commodities is still below 1 per cent. In 2003–04, dairy products accounted for 0.51 per cent of the value of agricultural exports and it increased to 0.78 per cent in 2015–16. In the value of national exports, share of dairy products increased from 0.06 per cent to 0.09 per cent during the reference period. The trend broadly indicates that dairy products have been mostly confined to domestic market and its extension to international market has limitations, and it calls for a detailed scrutiny.

The foreign trade of milk and milk products in India may be viewed against hard facts elaborated above. In the international market, global commodity prices of both spot and futures markets have been on the decline and the commodity prices are likely to remain weak on account of low demand in the international market coupled with excess supply (Govt. of India, 2017). During the last two years, there has been surplus production of milk in major milk producing countries, and in the international market, it has led to a fall in the price of dairy products. India has comparative advantage over other countries, particularly of Europe and North America, on milk production on account of her low cost of production. Moreover, India is the single largest producer of milk with a share of 18.5 per cent of the world production. The annual average growth rate was 6.26 per cent in 2014–15 over the previous year. Since the introduction of trade liberalisation in 1991, there has been a change in the structure and pattern of foreign trade of milk and milk products in India. The shift can be broadly described as from supply driven to demand driven (Joshi, 2012). Dairy sector is one of the sectors in agriculture with sustained price and market. Since the World Trade Organisation (WTO) came into operation in the agricultural trade, domestic market access for dairy products has significantly widened for dairy products from major milk producers in the world, due to the reduction in import tariff. However, it has also been widely reported that relaxations in trade restrictions have been increasingly used by the US and the European Union to prevent low cost producing countries like India from entering the world market. In the last decade, the volume of trade in dairy products grew at the rate of 3 per cent per annum, which was on a higher side compared to the production of dairy products (2.4 per cent). It has been estimated that the observed increase in demand for dairy products in developing countries would reduce the volume of trade by 6 per cent in the next decade (Joshi, 2012). In the next decade, the world milk production is expected to increase by 164 MT, of which India's contribution is projected to be 29 per cent (Joshi, 2012). However, the projected milk production in developing countries is 2.5 per cent per annum as against 1 per cent growth of the same in developed counties. It is indicative of the widening market opportunities for developing countries, while the structural limitations in developing countries—including India—to make use of the opportunity to expand its market poses challenges in the external market for dairy products. Another limitation in international trade of dairy production from India is the difference in milk yield as compared to major milk producers of the world. Table 8 compares the milk yield per animal in India and other countries. It can be seen from Table 8 that the average yield per animal in India is much lower than other countries in the world, particularly of developed countries. It is indicative of the fact that the productivity of animals in India, which is one of the major factors determining the competitiveness of the international trade, has been at a disadvantageous position.

Composition of World Trade of Dairy Products

In the international trade, cheese, curd, milk and cream concentrates accounted for about 70 per cent of the exports in 2017 (DGCIS, 2018). Other items of importance in terms of value of exports are non-concentrated and non-sweetened milk, butter, cheese and curd, whey and natural milk. It is important to note that India has not yet figured as an important player in the international market for dairy products. Germany is the major exporter (13 per cent) followed by New Zealand, Netherlands, France and USA (6 per cent).

Although the price of dairy products in the international market does not fluctuate as in the case of agricultural commodities, there are fluctuations in the price of milk. The price of dairy products has declined since 2011 as is the case of agricultural commodities in the international market. In real terms, price of milk and milk products have flattened over the years since 2011. Though India is the largest milk producer in the world with a share of more than 18 per cent of world production, India still remains an importer of dairy products. It is contributed, in part, by her large population size and partly by rising income. Milk and milk products being white goods, income elasticity of demand for white goods are

more than unity. India's share in world milk export was 0.68 per cent in 2016 against a share of import of the same of 0.04 per cent in the same year. As mentioned elsewhere, imports of dairy products continued until 1993 and India became a net exporter of dairy products by early 2000s. There is no significant difference between export structure of India and the world. In the total value of dairy products exported from India, 89 per cent was

Table 8: Average milk production per animal per day in India and other Countries

Countries	2010–12 (Kg)	2022 Projection	India's yield ratio in 2010–2012 with reference to other countries	India's yield ratio in 2012–2022 with reference to other countries
USA	9.7	11.6	0.11	0.12
European Union	6.6	7.2	0.17	0.19
Australia	5.9	6.6	0.19	0.21
Mexico	4.7	5.0	0.23	0.28
Argentina	4.6	5.8	0.24	0.24
New Zealand	3.9	4.3	0.28	0.33
Russian Federation	3.5	4.9	0.31	0.29
China	3.3	3.6	0.33	0.39
Ukraine	2.9	3.8	0.38	0.37
Brazil	1.4	1.4	0.79	1.00
Pakistan	1.2	1.5	0.92	0.93
India	1.1	1.4	1.00	1.00

Source: Derived from Joshi, 2012.

accounted for milk and cream concentrates in 2017. Further, relative share of the item in the export basket has been on the increase and it shows lack of diversification in the export basket of India. Moreover, structure of exports from India does follow the world pattern. Bangladesh, United Arab Emirates and Egypt are major destinations of India's export and it can be also stated that the destinations are concentrated in Asia. It means, India has not yet succeeded in advancing its exports to developed markets of the world or where the large markets for dairy products are concentrated. On the contrary, major countries from where India imports its dairy products are developed nations, viz., USA, New Zealand and the Netherlands.

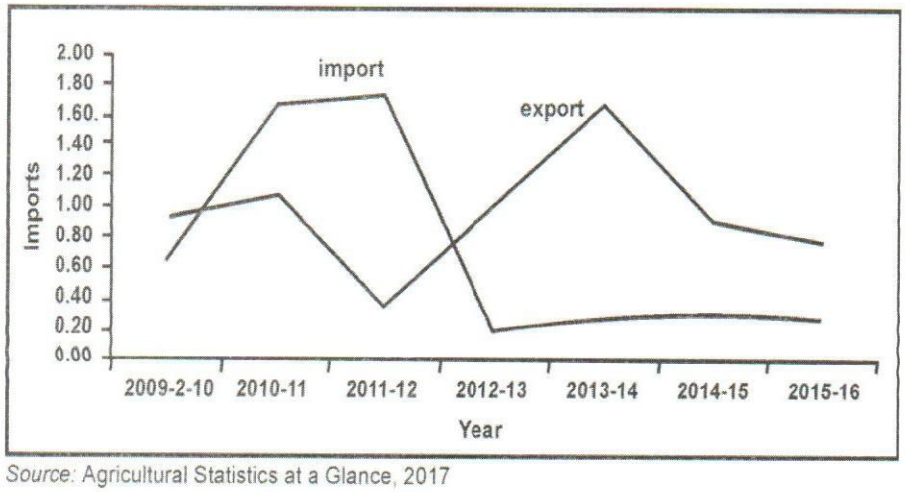
Tariff Structure and Unit Price of Dairy Products in India

Competitiveness of dairy products for external trade is crudely measured with the ratio of unit price of import to export. Import price can be considered as boarder price and the protection is measured in terms of its nominal import value as ratio of export value. In this case, import value represents international or boarder price and export price is representative of the domestic market price. Dairy products comprising mainly five commodity groups enjoyed domestic protection of more than 200 per cent in the pre-WTO regime. The bound rate of import duty for dairy product under WTO varied between 100 per cent and 150 per cent. Similarly, basic customs duty ranged between 30 per cent (fresh milk and cream) and 60 per cent for cheese.

Figure 2 shows percentage share of dairy products in the value of agricultural imports and exports in India. It is clear that relative share of imports of dairy products have been negligible during 2000s while it has started rising by 2010–11. Similarly, relative share of export of dairy products, particularly milk and concentrated milk, remained high until the end of 2010s and it has started declining thereafter. There were intermittent jumps in quantity and value of imports of milk and milk cream or concentrated milk to India. Often, quantity of imports to India increases when unit price declines and in contrast to the observed trend, the unit price too has increased along with the rise in quantity of imports of milk and milk products during the last few years. The value of exports of dairy products and its share in total value of agricultural exports remain relatively high as compared to the share

of value of imports of dairy products in agricultural imports. There are exceptional years such as 2008–09 and 2012–13 during which the value of exports has markedly increased. In the total value of the export of agricultural product, the share of dairy product is still 0.77 per cent. It may also be noted that there have been wild fluctuations in the unit value of exports of dairy products, and the observed trend is indicative of the non-sustainability of the sector in India in the international market.

Table 9 provides details of the relative share of dairy products in the exports for the years 2001–2017. In the value of exports, milk and milk cream concentrates (IFSC code 0402) accounted for 75 per cent of the total value of exports in certain years, but the relative importance of the product group in the export basket is inconsistent and has been on the decline for the last few years. The decline in the total value of exports of dairy products from India consecutively since 2014 is partly attributable to the decline in the export quantity and value of the item. The content and value of import basket of dairy products are given in Table 10. Interestingly, major items of imports of dairy products to India are the same as the product



Source: Agricultural Statistics at a Glance, 2017

Figure 2: Share of Dairy exports and imports in agricultural trade in India

that India exports, and it poses a threat in the context of trade liberalisation. It has already been mentioned elsewhere that the commodity characteristics of exports of dairy products in India are more or less the same as the product composition of trade in the international market reveals. Moreover, dairy products have relatively less scope for diversity and the diversification is distinguished based on quality of the product. The export from India faces the challenge in the light of the above. Although there has been a decline in the value of imports of dairy products into India during the last few years, the rate of decline in imports is much less than that of exports. Whey, cheese, curd, butter and ghee still remain the major items of imports into India.

Conclusion

Even though India is the largest producer and consumer of milk in the world, large chunk of the milk is consumed without value addition. A large part of the segment producing milk is comprised of small and marginal farmers, rearing cattle either as supplementary/complementary to their crop production or source of livelihood for wage labours. As a result, the sector remains, by and large, non-commercial in character and further, there are evidences that the crisis in the crop production sector has percolated down to the milk production sector. Though India still remains a net exporter of dairy products, the price of liquid milk and the form in which major part of the production is sold by farmers, remain non-remunerative. The very nature of production and the characteristics of the ownership of capital of majority of cattle rearing farmers in India indicate that the sector is not yet prepared to withstand the onslaught of trade liberalisation as well as neo-liberal policies effected through the crop production sector. There has also been a significant fall in the number of milch animals reared in India across states during the period between the last two Cattle Census periods, and India's share in world trade of dairy products is not commensurate with its share in production. Further, productivity of animals in India is much

Table 9: Export Value and relative share by product of Milk and Milk Products from India- 2001 to 2017 (Percentage share)

Year	Total Exports in 000 US$	Butter	Milk and cream, concent rated	Milk and cream, not concentrated	Cheese and curd	Butter Milk, curdled milk and cream, yogurt and other fermented or acidified milk	Whey, whether or not concentrated or containing added sugar or other sweetening matter, product	Annual Change
2001	39713	12.68	83.51	0.03	0.84	0.15	2.79	
2002	24889	19.23	76.30	0.35	1.84	0.26	2.02	-37.33
2003	25782	21.73	70.00	0.75	3.66	1.99	1.87	3.59
2004	50533	16.70	78.44	1.12	1.00	0.39	2.36	96.00
2005	147163	10.50	84.78	0.67	1.46	0.19	2.41	191.22
2006	109154	12.55	80.98	1.94	1.95	0.80	1.78	-25.83
2007	155877	14.00	65.84	2.46	3.08	6.71	7.91	42.80
2008	269994	22.74	67.58	1.91	4.65	1.06	2.06	73.21
2009	88950	29.49	56.99	4.22	8.00	0.20	1.11	-67.05
2010	115333	35.07	52.76	2.15	7.53	0.43	2.06	29.66
2011	75446	64.62	15.25	7.15	11.06	1.13	0.78	-34.58
2012	157320	22.20	64.25	4.00	8.52	0.32	0.71	108.52
2013	575360	7.45	88.65	0.77	2.49	0.54	0.10	265.73
2014	311558	14.89	75.40	3.30	6.22	0.15	0.04	-45.85
2015	121455	36.25	44.91	3.28	15.23	0.30	0.02	-61.02
2016	130531	34.34	43.53	2.55	18.69	0.79	0.11	7.47
2017	161406	50.49	25.59	4.36	18.38	0.91	0.27	23.65

Source : Trade Map

Table 10: Import Value & relative share by product of Milk and Milk Products from India- 2001 to 2017

Year	Total Imports in 000 US$	Why, whether or not concentrated or containing added sugar or other sweetening matter'	Cheese and curd %	Butter, incl. dehydrated butterand ghee, and other fats and oils derived derived from milk; dairy %	Milk and cream concentrated or containing added sugar or other sweetening matter (%)	Butter Milk, curdled milk and cream, yogurt kephir and other fermented or acidified milk (%)	Milk and cream, not concentrated nor containing added sugar or other sweetening matter (%)	Annual Change in value (%)
2001	4861	19.61	19.95	41.56	18.21	0.49	0.19	
2002	13135	5.95	13.28	73.24	6.59	0.93	0.01	170.21
2003	27106	6.57	7.17	28.46	57.61	0.15	0.03	106.36
2004	13069	13.90	15.23	48.83	20.78	0.88	0.37	-51.79
2005	7648	23.43	30.30	26.54	18.28	1.45	0.00	-41.48
2006	21671	15.08	13.78	63.44	6.64	0.86	0.19	183.36
2007	13636	30.00	30.11	17.40	19.88	2.12	0.49	-37.08
2008	15177	28.25	32.87	12.70	20.75	3.20	2.23	11.30

2009	63398	7.97	7.00	69.31	14.07	1.32	0.34	317.72
2010	183777	6.17	3.71	40.21	49.52	0.30	0.09	189.88
2011	177392	11.15	4.18	1.34	82.99	0.19	0.15	-3.47
2012	101238	17.02	7.91	24.46	50.04	0.34	0.23	-42.93
2013	34609	57.78	23.33	6.46	11.26	0.67	0.50	-65.81
2014	47117	59.27	18.40	6.65	13.76	0.50	1.43	36.14
2015	45025	46.06	15.99	27.91	8.94	0.14	0.96	-4.44
2016	40437	46.76	18.69	29.85	3.28	0.28	1.14	-10.19
2017	41436	51.18	19.99	12.72	10.39	3.58	2.15	2.47

Source : Trad Map

on a lower side as compared to the same in major milk producing and consuming countries. It is one of the major limitations of expanding the market for dairy products from India to the world market. Moreover, India's export basket of dairy products is highly concentrated to milk and cheese, while India's import is concentrated in yogurt and other dairy products with value addition. The commodity composition of world trade in dairy products are more or less the same as that of India, and it is yet another constraint in the world market. In spite of the marginal increase in the export value of dairy products from India, import of the same has also increased particularly during the last few years. The content of import basket for dairy products underline that items of exports and imports converge to a great extent and it poses a threat to the existence of milk production sector in India in future, unless the domestic market is protected with quantitative and qualitative tariffs. Alongside, state support to match the domestic price on par with the cost of production is a must to sustain the sector.

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Economic freedom is very important for women empowerment. They must be partners in economic development also. I have seen that women are very good at adapting to latest technology. We should link women and technology up-gradation.

–Narendra Modi

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