

ICT for the renewal of a Traditional Industry: A Case Study of Kancheepuram Silk Saree

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Abstract

The silk industry in Kancheepuram is one of the fastest growing industries in India. The industry currently employs more than 30,000 weavers in the art of saree making. This was not the scenario in the past. The industry had to compete with the synthetic fiber industry in many aspects. One of the major drawbacks of the silk industry in Kancheepuram was the lack of support from technology. The industry was on the brink of extinction due to the obsolescence of the designs and design making procedures. This is because, design adds splendor to a saree and forms an integral part of its exquisiteness. The recent developments in the designing field shows the introduction of computerized Jacquard borders in Kancheepuram silk saree. The use of ICT has not only helped in creating new and complex designs but also reduce the time involved in the process. There has been an increase in the exports. The acceptance of these silk sarees by the consumers has also increased with the automation of designing process. Visualization of saree designs ahead of its production and the ability to create new color combination at the click of a mouse has increased the flexibility and reduce the time for realizing new designs. Though the materials and the techniques are changing with the market demand, the motifs are still conventional to hold the custom and tradition of the kancheepuram saree. The silk industry in Kancheepuram has transformed into a high growth industry by opening up new avenues for the traditional weavers.

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Introduction

Many of the traditional industries have not been able to compete in the market place because of lack of technology inputs for modernization and the absence of skill development efforts. Kancheepuram silk saree was one such industry. The competition from other sarees (the long cloth that ladies wear as costume) was on the rise. Recently, an industry cluster has used computer-aided design to reduce the cycle time and to enhance the design interactivity. This has helped the saree producers to reduce the time. The process has become simpler and flexible. This case study essentially is an analysis of the use of ICT in the traditional saree industry. Without changing the traditional features of design patterns the productivity has been increased in the industry.

Silk Industry Scenario – India

India is the largest consumers of silk and silk products. India is also the second largest producers of silk, largest importers of mulberry raw silk, and producers of all five commercially exploited silks in the world. India has all the well-known varieties of silk such as Mulberry, Tasar, Oak Tasar, Eri and Muga out of which Muga silk is unique to India [1]. The tremendous growth of silk industry in recent times is an indication of the giant strides India is making. The total exports of silk fabrics have increased from about 2,920 tonnes in 1997-98 to over 5,391 tonnes in 2000-01; the total value of exports was Rs.12,300 million in 2000-01. USA, Germany, UK, Hong Kong, Italy, Spain and France are some of the major markets for the Indian silk industry.

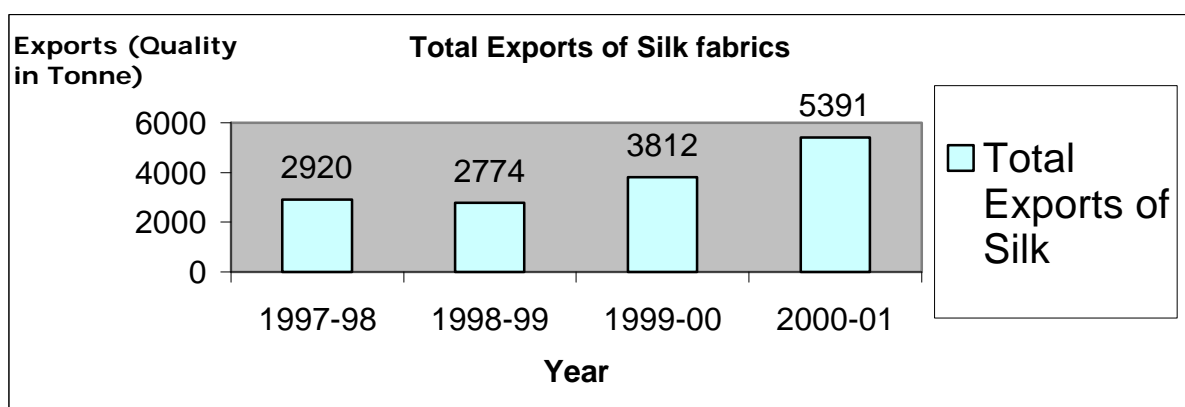


Fig. 1. Total Exports of Silk fabrics from India [2]

The trend of silk exports from India is shown in Fig. 1. The demand for Indian silk is increasing and in turn creating more avenues for the growth of traditional industries such as the Kancheepuram Silk industry in southern India. Owing to the growing demand, Government of India has laid down a new textile policy with a five-point directive comprising productivity, quality, quantity, product diversification, and competitive pricing, for the overall development of Indian sericulture and silk industry. The Central

Silk Board, and the State governments have drawn up sericulture development plans for the next five years, with considerable emphasis on increasing bivoltine silk production. The silk industry is being upgraded and new varieties of silk are being introduced, trying to bridge the gap between the present production of 15,000 tonnes and the domestic demand of 21,000 tonnes. Biovoltine, a new variety introduced by the Central Silk Board was a great success. The idea is to produce at least 5000 tonnes of this variety by the end of the tenth plan period. The following factors have been identified as the four major market opportunities available for India silk Industry in the present day scenario. They are:

- the domestic traditional demand that requires multivoltine silk
- the domestic demand for non-traditional silk fabrics which at least partly requires non-graded bivoltine silk
- the international demand for raw silk, silk fabrics and ready-mades which requires graded bivoltine silk and
- the *niche* markets for special handloom fabrics.

Recent changes in the economic environment are likely to impact the silk industry in India in a negative way. The Indian silk industry is likely to face a threat from the Chinese silk industry after China's entry into the World Trade Organisation (WTO). Silk exports from India have fallen by 23 percent to \$193 million during Apr-Sep 2001 from \$251 million during Apr-Sep 2000. As a result, the Government of India has re-introduced the duty entitlement passbook (DEPB) scheme to exports of embroidered silk garments. The total export of Indian silk in the last ten years is shown in Table 1. The share of silk textiles in total textile exports has come down drastically. There is a need to enhance the competitiveness of silk industry if it has to grow [3].

Year	Silk Textiles		Total Textile Exports		Share as % of Total Exports
	Rs. Crore	US \$ Million	Rs. Crore	US \$ Million	
1991-92	670.98	270.78	14409.50	5796.80	4.7
1992-93	734.20	253.51	19114.20	6599.60	3.8
1993-94	789.26	251.63	25010.70	7973.90	3.2
1994-95	937.31	298.52	31336.30	9980.20	3.0
1995-96	846.07	253.58	35526.10	10685.10	2.4
1996-97	880.62	248.06	41828.20	11839.10	2.1
1997-98	926.29	245.30	46092.50	12342.10	2.0
1998-99	1036.28	246.20	52814.80	12558.80	2.0
1999-2000	1274.53	294.00	57736.70	13324.80	2.2

Table 1: India's Exports of Silk Textiles: From 1991-92 To 1999-2000

Source: Central Silk Board [4,6]

A recent paper by Exim Bank recommends that scientific ways of increasing silk productivity and adhering to international quality are the two important requirements for penetrating into developed country markets. But India continues to be the second largest producer of silk in the world and has the distinction of producing all the four varieties of silk. Before looking into the history of Kancheepuram saree a brief history of silk is given.

History of Silk

Silk is the softest fabric known to mankind. Silk, *Kauseya* in Sanskrit has a very ancient history. Records indicate that silk was used as early as 1725 B.C, which is supposed to have been discovered by a Chinese princess. Sericulture was a Chinese art centered on the mulberry worm. An old name for silk was "*Chinansukh*" after the country of its origin. In India, silk came from three indigenous sources, the "wild silks" of tussar, eri and muga. One of the finest wild silks is the textured golden muga of Assam. The Bodos of Assam are believed to be the people to have brought silk reeling art along with them to India. The knowledge of mulberry silk reached India and soon became a symbol of royalty and prestige. Silk was also considered a "pure" fabric and used for all religious, ritual and ceremonial occasions. Silk was offered to gods and goddesses and is believed to be the main reason for the growth of temple town of Kancheepuram. The artisans of

Varanasi were the first people to use silk thread in production. Gradually, owing to ever growing demand for silk, more artisans in the country started using silk.

Background of Kancheepuram Saree industry

“Conjeevaram” is the English name for ancient Kancheepuram. Kancheepuram, situated on the banks of river Vegavati is surrounded by historical places like Sholingar, Thiruthani, and Thirupati. In the past, Yuan Chwang, the famous Chinese traveller visited the place and praised the people of Kancheepuram for their bravery and love for justice. The place finds its name in Patanjali’s Mahabhasya written in the second century B.C and hence its history can be traced back to centuries before the advent of the Christian era. Buddhists, Jains, and Hindus consider Kancheepuram, the city of thousand temples, a very sacred pilgrim center.

The place, apart from its temples, is also known as the silk city as the main profession of the people living here is weaving silk saree. Many families are engaged in the industry and the saree are famous all over the world. Kancheepuram silk saree is known more as a hand-woven saree. It is woven with dyed silk yarn with interleaved designs made with ‘zari’ – a silk thread twisted with thin silver wire and then gilded with pure gold. In fact, the silk thread used for weaving Kancheepuram sarees is made up of three single threads twisted together. This gives more strength to the Kancheepuram saree than other sarees like Dharmavaram and Arni. It is the designs in the Kancheepuram saree that bring whole fame to the saree and is considered to be one of the finest pieces of art.

Kancheepuram is known as the “Silk Paradise” of the world. The Sarees, woven from pure mulberry silk and embellished with fine Gold thread (zari) are known for its dazzling colors and are available in every design and variety that one can think of in the early years, till a century and a half back, Kancheepuram was a cotton weaving center primarily. Silk is actually a new entrant into Kancheepuram. It was the Thanjavur – Kumbakonam belt and Arvi along with Salem that produced the “Pattu Pudavai”. The Scenario has changed today. The pinch, better-woven and more expensive silk sarees are from Kancheepuram.

Kancheepuram Sarees are very heavy and gorgeous Sarees and are used specially for marriages in South India as their traditional wedding Saree. The ‘zari’ that is used in this Saree is bought far away in Surat while silk is bought from Bangalore and its adjoining areas. In fact, Karnataka meets the silk needs of whole of India. Most of Kancheepuram’s weavers are well trained in the cultural centre of ‘Kalakshetra’ during the 1970’s. They produce Sarees with designs that are heavy in both style and fabric

weight with very wide borders. In fact, the main feature of Kancheepuram Saree is the time consuming method of interlocking its weft colors as well as its end piece in the process of creating solid borders and a solid "Mundhi". Introduction of computerized Jacquard borders in Kancheepuram Silk Sarees has proved to be a boon to Kancheepuram, which is getting its past glory. Today, about 13,500 kg of raw silk and 8,000 marcs of gold zari per month are required by the silk industry in the cooperative sector. Under the private sector, the monthly requirement of silk is, 1,20,000 kg and 45,000 marcs of gold zari. The requirement usually goes up during festivals, due to more demand for saris.

Scenario prior to the computerization process

The process of weaving is a long and tiring process. It takes five years to master the art of weaving. The weaving process starts with the first and the most important step of selecting the ideal thread for weaving. Kora silk threads are mostly used in the process. The threads are then dyed in a variety of colors and are left out in the sun to dry for about three days. Afterwards, they are dipped in Kanji (rice water) for making the thread stronger and easier to weave. Extreme care is taken to dip each color separately. The threads are dried again and tied on the looms from one end to the other. The actual process of weaving involves using Tar for the process of weaving the thread. According to the nature of the design, the movements follow. Normally it takes about 30 days to complete a saree. The changes that have taken place after the introduction of computerized Jacquard borders can be summarized in the Table.2.

Features	Before computerization	After computerization
Number of designs	500	3872
Time required (to complete a saree)	1 month	15-20 days
Time required (to complete a design)	5 hours	1 hour
Exports	Rs. 7 million	Rs. 2.6 crore
Effort required (to produce a good design)	100%	40%
Market acceptability	35%	70%

Table 2: Changes due to computerization

Weavers in Kancheepuram are divided into two broad groups.

1. **Cooperative fold:** Some weavers have come together to form cooperative societies, called The Weavers' Cooperative Societies. There are 23 such cooperative societies today in Kancheepuram town providing employment to more than 30,000 silk

weavers. These cooperative societies supply raw materials to the weavers and also arrange for the sale of the saris produced by them. The Weavers Service Center at Kancheepuram, established in 1956, monitors the activities of these cooperative societies. This centre is a collection of technocrats, skilled crafty persons and designers catering to the needs of the whole handloom industry. The three different sections of the Centre viz. Art Section, Weaving Section and Dyeing Section form the core departments of the Centre.

2. **Private Sector:** Large wholesalers and retailers of silk saris usually engage these weavers to get saris woven for them. They supply the raw material required for the master weavers and pay them wages for the work done. These retailers form their own small medium firms and sell the saris at a profit. This is a flourishing business and has gained lot of mileage due to improvisation in design making. This business is reaching greater heights with more and more firms coming into the industry. The market for these saris is expanding at a rapid pace as a result of computerization. Today, nearly 40,000 weavers are engaged in the handloom industry in the private sector.

Traditional design process

Initially, a design was drawn using a trace paper or a graph sheet. It was then rubbed and float checked. The same design used to appear on the Saree but in a reduced format when compared with the graph sheet. The design was then punched and the punch card prepared. The punch card was made manually and this was the most difficult part of this process. The punch card or the design pattern was then given to the weaves for the Saree to be woven. The whole process used to take around 5 hrs and was very complex and tedious.

The new computerized design process

Such a complex and tedious process required very skilled and people with ability to work long hours. Most of the weavers that Kancheepuram had were trained in the 1970s and were getting too old to carry out this work effectively. So, there arose the need and the whole process has now been automated. The process of designing now starts with the scanning of the image or picture onto the computer. The scanned design is now traced and filled with bitmaps. The image is then transferred to the punching card software known as "Techmen". The punch card gets ready here and then put in the Jacquard Machine by the weaver to weave the Saree. The flow of traditional and new designing process is depicted in the following Fig.2.

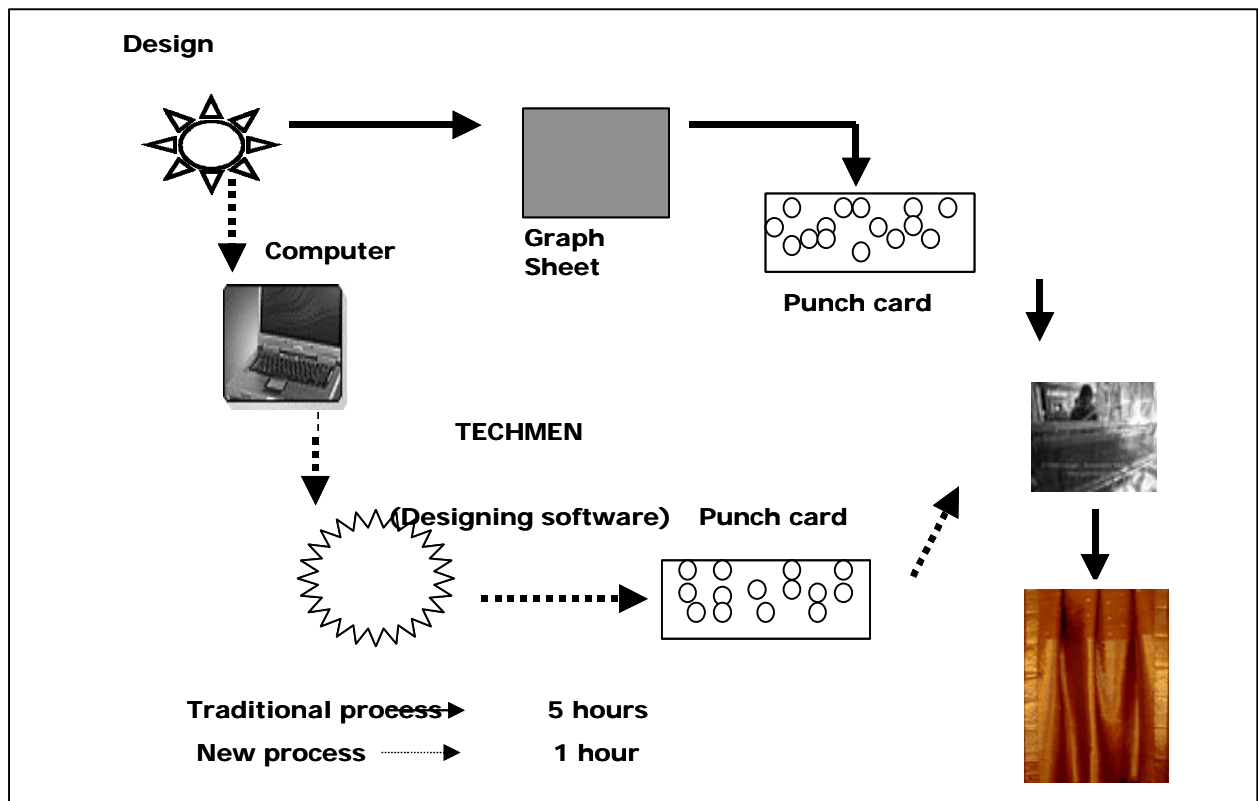


Fig 2: Process flow chart

Origin of the Project Idea

This project originated with an idea to help the traditional craft of weaving Kancheepuram saree to survive and face the growing demand. Ideas and designs that went into the making of Kancheepuram saree were found to be stagnating and not coping up with the growing demand. Also, the designers and the weavers were not equipped with the modern tools to provide more choice to the customer. Hence, the need was felt to use the power of computerized tools to develop innovative designs and in the process facilitate this industry survive and prosper [5]. Some of the problems faced by the industry were:

- The cumbersome process of designing took a toll on productivity in terms of the time and cost that went into it. The need was to reduce the amount of time and cost.
- Competition was heating up because of high competitive nature of other traditional industries and customers started looking for more variety and design. Customer had enough to choose from other sarees and as a result Kancheepuram sarees were facing threat from substitutes.

- The manufacturers and the retailers of the saree realized that they had to serve the customers in order to survive. They could do this only by providing the customers with the designs they preferred.
- Most important was the motive to keep alive the traditional art of weaving Kancheepuram sarees. Only selling more sarees could do this and this required perfect understanding of customers' tastes and choices.

The industry was troubled by all these problems five years back. It was also the time when "computerization" and "Information Technology" were the buzzwords in every nook and corner of India. So, it was only a matter of time before the idea of taking the help of computerization to overcome these pertinent problems came about.

The idea that was born out of the circumstances prevailing led to a whole new era of Kancheepuram Sarees. This was the birth of a more sophisticated and exquisite Kancheepuram Saree. Computerization also eliminated the skills required for designing a saree manually. The time that went into training a person was saved as a result.

Implementation of the Project

"Necessity is the mother of invention". The need for adding more variety led to the automation of the designing process. The unique feature of this process is that it is an indigenously designed process. This project is a wonderful case of an endeavor that started more as an experiment and reached the pinnacle of success in a very short span of 5yrs. There wasn't any technical performance that was envisaged in the beginning and this is another unique feature of this. People were sure of the success of this project but the magnitude of the success was an unprecedented achievement. This was the reason for no predetermined goals that were set up implementing the project for the first time. The time required to complete a saree before and after computerization can be seen in fig. 3.

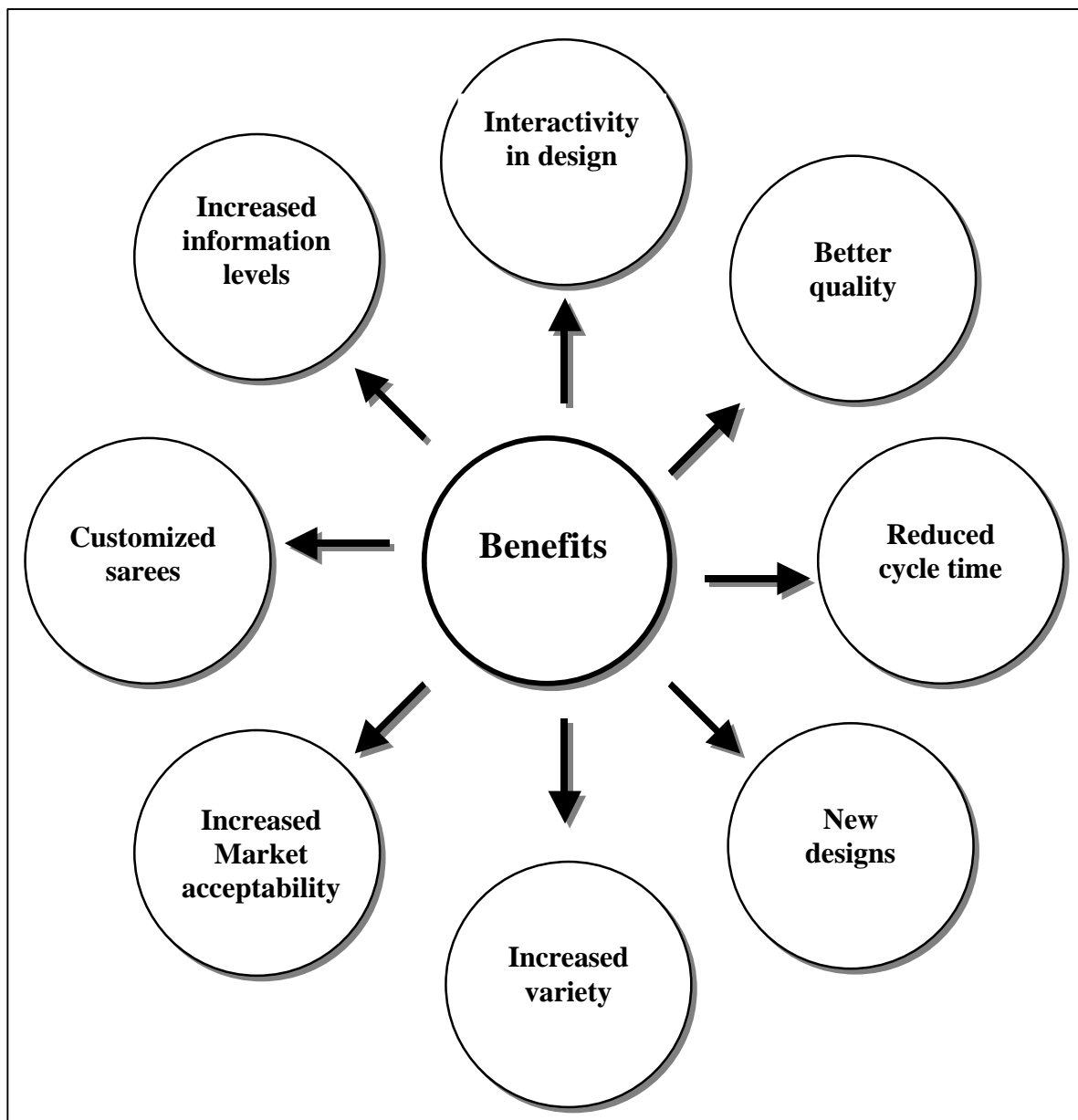
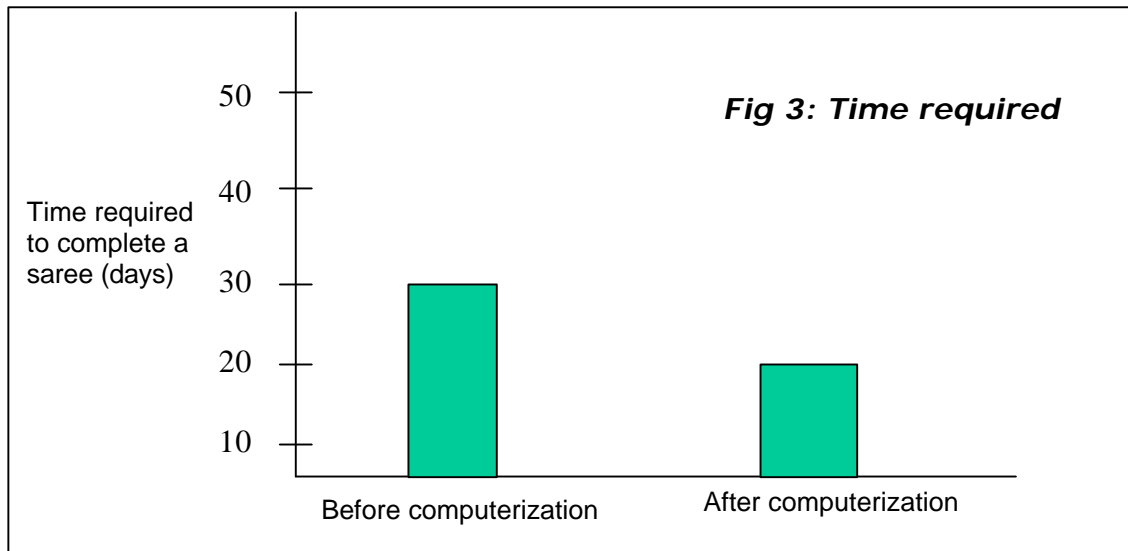


Fig 4: Benefits of the ICT platform

Benefits of ICT implementation

What usually determine the success of project like this are the benefits that it gets along with it. This project mainly aimed at improving the designing part of the saree. So, most of the benefits that came about were in this area. Computerization in the designing field has been helpful in many ways. Some of them are as follows:

- **Number of designs:** The most noticeable benefit that came out of the project was the number of designs that were produced during a year. The number of designs produced increased from a meager 500 per year to a whopping 3900 per year. It takes nearly one month to complete a sari, if the conventional process is used. The developments have helped in reducing this time to 15 to 20 days.
- **Types of designs:** The other benefit this technology has brought is that weavers are now able to weave better and complicated designs with the same effort. A weaver in Kancheepuram is paid on an average Rs.700/- for a simple design and Rs.3,000/- for a complicated design. Weavers are now in a position to weave good and complicated designs in the same time and in turn earn more money every month. These new designs have caught the fancy of customers all over the world. The exports have increased almost four-fold from Rs. 7 million in 1998-99 to Rs. 26 million in 2002-03. The overseas market for these saris is growing rapidly, but will take more time for the sellers to concentrate on this market completely, due to huge market within the country.
- **Time:** Reduced production time was a major reason for such a massive increase in the production of designs. The cycle time for production of design came down from 5 hrs to 1 hour.
- **Cost:** The punch card, that cost around Rs.5 started costing only Rs. 1.40 on an average.
- **Project Evaluation Systems:** The "Techmen", the Punch Card software has not left any leaf unturned. It provides an option to float check the distance between the grid points in a punch card. This helps the 'zari' in staying intact. It also has made the designs more accurate and durable by eliminating most of the problems that arise in the course of making these designs manually.

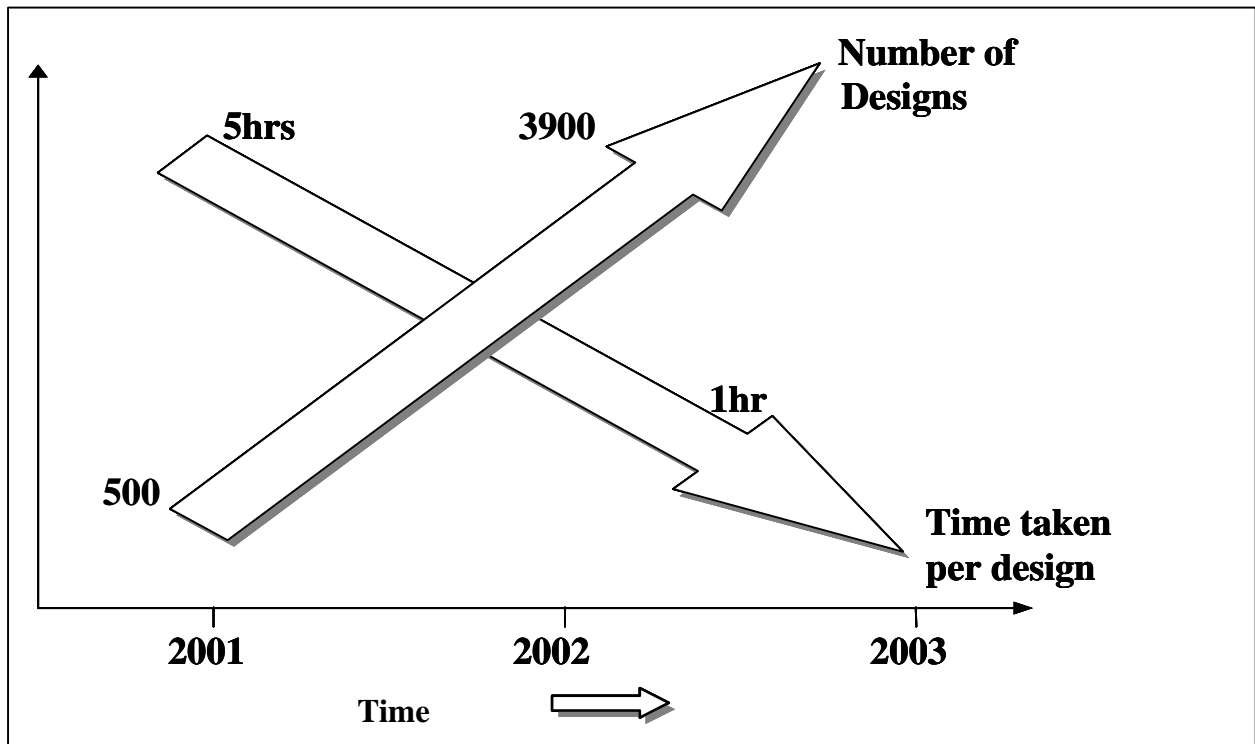


Fig.5. Increase in number of designs and reduced time

Critical Success Factors

The computerization of designing process has not only enhanced the speed of the process but also helped in variety to the designs. The designs can now be changed as per the requirements of the customers. The designs can now be tested for colour, size and shape before they are finalized and brought out in the form of a punch card. The automation is now catering to the unique demands of the customers. The use of technology has undoubtedly added more competitive strength to the firms that sell and market Kancheepuram sarees. The automation has done a great service to the mankind by saving an ancient art form from dying due to growing obsolescence and redundancy. The customers who buy these sarees can now look forward to more customized sarees with excellent colors and designs. Simply, this technology has given up tremendous scope for innovation in every aspect that goes into making a design.

Some small and medium firms in Kancheepuram have adopted this technology. One such firm is "Shreenivas silks" which has pioneered this technology under the leadership of Mr. Varadan. He was the first person to buy this unproven technology and bring it into limelight. Efforts are now on by various firms not only to make the most of this technology but also to upgrade this technology. The firms that use this technology in saree making have gained an edge over their competitors in terms of the quality, design and sale of the Kancheepuram sarees. But the fact remains that the skill and the creativity of the artist cannot be under rated because a design that is liked by the

customer has to be created on the machine (computer). The machine will not create designs on its own, it will only help in creating designs.

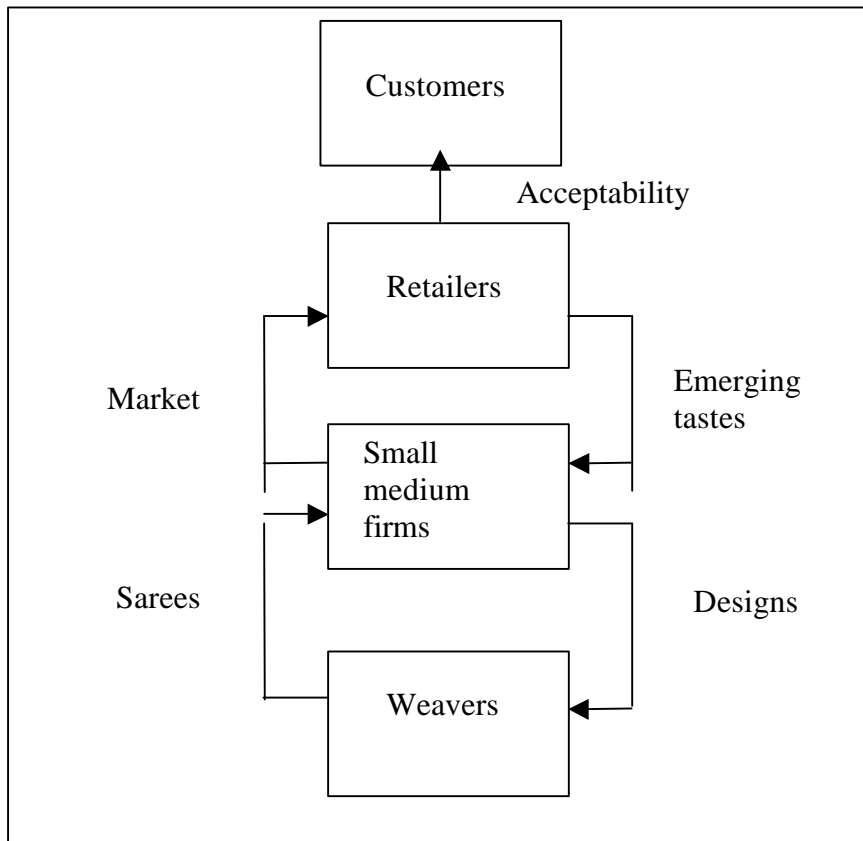


Fig 6: Information and Product flow

The acceptability of the sarees has gone up in a big way after the automation and customization of designs. The acceptability rate has gone up to 70 percent from somewhere around 35 percent. And all this, with only 40 percent effort.

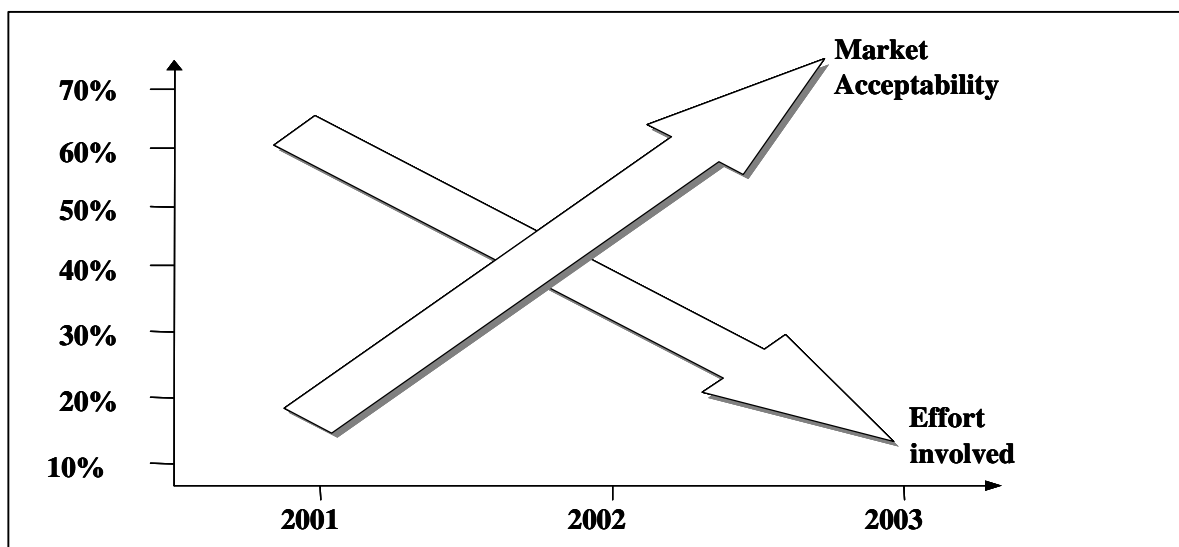


Fig. 7. Market acceptable and effort involved

Replicability of the platform

This technology can be used for other products as well. Mr.Varadan plans to get into manufacturing fabric for furnishing cloth using this technology. This technology has created new avenues in the textile industry, specially the saree market of Kancheepuram, which has seen a fall from glory of past years. The SWOT analysis of the Kancheepuram saree industry can be seen in Fig. 8.

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> • Most preferred saree for auspicious occasions • Eco-friendly and natural product • Entry of corporates and foreign investment in this industry • Image of high quality high price product 	<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> • Usage of conventional rearing, reeling, throwing and dyeing technologies • Fewer designs • Number of skilled weavers coming down • Unavailability of a suitable method for non- destructive testing of zari used in silk sarees
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> • Adoption of eco-parameters as identified by many European countries to ensure safety, reliability and customer satisfaction • Anti dumping duty on imported raw silk yarn • Allowing liberal import of second hand power looms • Reduced land allocation for sericulture practice in China and Korea. 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> • Large scale imports of pure silk fabrics from China • Emergence of new synthetic fibers

Figure 8: SWOT analysis of Kancheepuram saree industry

ICT platform creation

ICT platform endows a number of features to any industry and enhances its competitiveness. The digitization of processes helps in reducing interface problems and endows interactivity. ICT also allows collaborative business processes and provide market access with marginal investments. In this case, two entrepreneurs, one who has interest in exporting and another who has create the necessary software have been the major catalysts for enhancing the technology diffusion, creating the required awareness, facilitating the development of required skills. Also, the ICT platform helped in improving the business processes, improving the design productivity, enhancing the market access, and making the design interactive. There has been substantial increase in customer satisfaction and improvement as well as customer acceptance.

Benefits to the ICT platform

The ICT platform helped the industry in a number of ways. The platform enables collaboration, endows flexibility and enables visualization.

- **Variety enhancement through CAD:** The traditional Kancheepuram silk sarees have gone hi-tech. Customers need no longer limit themselves to the usual designs like mango, peacock or temple bell motifs. Instead, they can take their pick from a catalogue of computer-aided designs (CAD) or even suggest their own patterns. The development is a result of a demonstration on computer-aided textile designing conducted by Gurubrahma Concerns under the auspices of the Central Silk Technological Research Institute. CAD has helped in increasing the patterns and saree designs.
- **Diffusion:** This automation of designing process has not been taken up at a highest level in Kancheepuram. The designers belonging to the cooperative sector in Kancheepuram are yet to use this technology. There is still lot of scope for improvement at a micro level and this can be achieved once these weavers start getting the benefits of this technology. ICT allows for networking and collaboration but the adoption rate has been low.

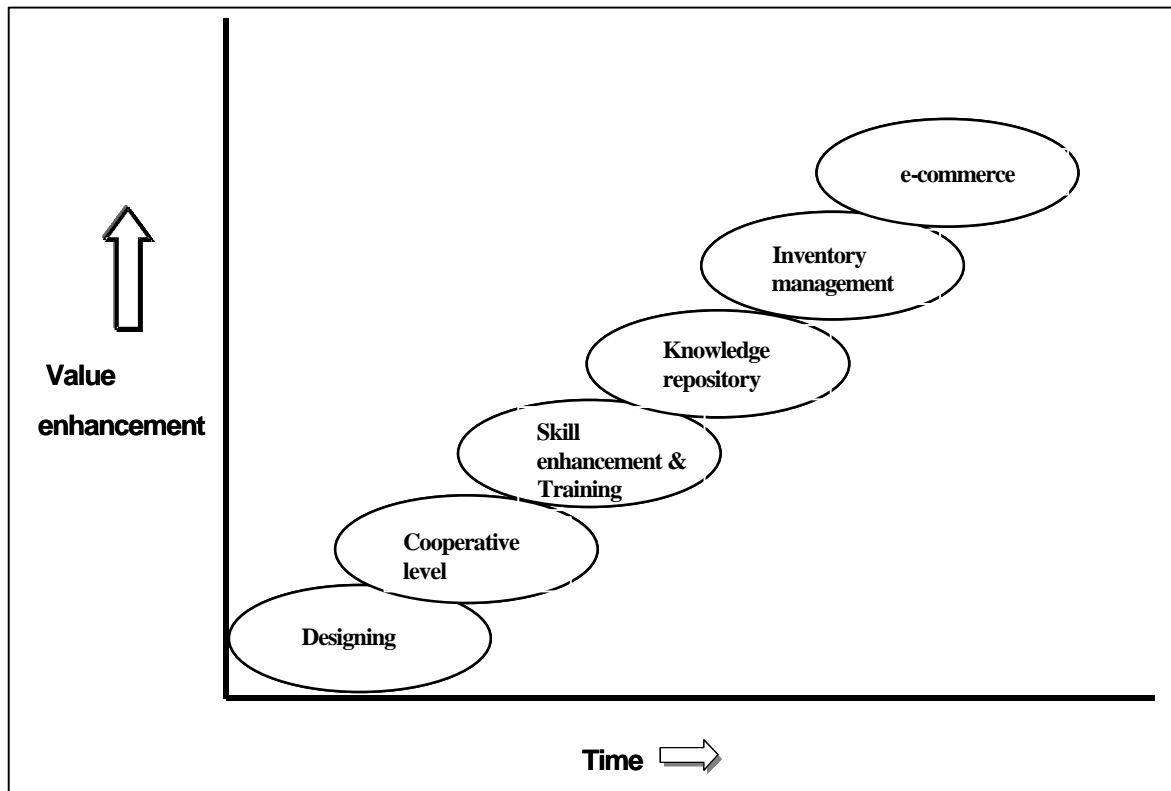


Fig 9. The Change Process

- Skill enhancement and training:** The Government of India is set to promote the silk industry to greater heights in the coming years. Central Silk Board organized a number of training programmes at its Research and Training Institutes. The total number of persons trained during 1999-2000 and 2000-01 (upto Sept' 2000) is detailed in the following table:

Training Course 1999-2000	No. of Courses Conducted	No. Trained	Category	No. of Courses Run	No. Trained	Category
1. Structured Courses	4	46	DOS / NGO	2	16	DOS / NGO
2. Capsule Courses	31	567	CSB / DOS / NGO	19	165	CSB / DOS / NGO
3. Adhoc Courses	1	1171	Students / Staff / Entrepreneurs	-	346	Students / Staff / Entrepreneurs

Table 3: Number of Persons trained during 1999-2000 and 2000-01

- **Knowledge repository:** Information Communication Technology can be used to develop a database where all the designs are stored for the benefit of the weavers. A system could be developed where a weaver, in need of a design can obtain the design from the database by paying a small amount. This system will have a two-fold benefit on the people involved in the saree making process. First, it will give more scope for the designers to create innovative and new designs. Second, the weavers will have access to more number of designs in the process.
- **Inventory management:** The computer-based technology can be used to increase the productivity of the weavers by enabling them to get acquainted with the latest techniques and best practices in raw material management. Weavers need to be trained to make optimum utilization of the raw materials by eliminating wastages. The weavers could also be trained to eliminate all the unnecessary movements in the process of weaving, thereby increasing their efficiency.
- **e-commerce:** The latest development in the field of marketing is the use of internet to sell the products. Today, companies are not far behind when it comes to using this medium to promote and endorse their products. There are already many firms in the saree industry that are taking advantage of this development. Firms have hosted their products on websites to advertise them. This is one of easiest ways of reaching the customers in today's e-savvy world.

The market gaps need to be removed completely for the Kancheepuram saree industry to flourish in the coming years. Right use of Information communication technology will not only assist in stopping the market for Kancheepuram saree from shrinking but also help the traditional craft to prosper. Use of ICT will facilitate in tapping newer markets for Kancheepuram Saree.

Conclusion

There was a time when Kancheepuram sarees enjoyed huge popularity as the most suitable saree for any auspicious occasion. As time passed by, the saree started facing tremendous competition from synthetic sarees. Computerization had to be introduced to save the industry from collapse. Today, the quality, style and design of Kancheepuram sarees have got a boost with computer-aided design. The process of design has undergone an unprecedented change. Though the techniques and materials are changing with customers' tastes and preferences, the motifs are still the same, holding intact the custom and tradition of Kancheepuram sarees. The automation of design process has helped Kancheepuram sarees turn over a new leaf. The inputs from weavers, designers and weaver service centers have led to an increasing variety of designs and colors. Kancheepuram has now created a special market for itself. Today, Kancheepuram not only promotes sarees, but also traditional art. The number of export orders for these sarees from abroad has increased and only time will say how much niche market these sarees will garner.

The success of adoption of the ICT platform in this case could be attributed to a number of factors:

- the entrepreneurial orientation of both the exporter and software developer take the lead role to ensure the success of the project
- understanding the user perspective and blending the traditional technology and computer aided design contributed to the rapid adoption of the new technology
- the adoption of new design technology was smooth as the area selected was socially a homogeneous location and social distances within the community were not large
- the decentralized set-up operating new technology also facilitated the building up of trust among the various constituents and this also helped the rapid diffusion of technology
- the incremental cost of introducing CAD designs have been marginal.
- ICT platforms if conceptualized properly, can make a difference. ICT has enormous potential to improve a traditional industry. Skill development efforts to train people helped in having a critical number of people using the new technology leading to fast technology adoption. The critical success factor in this case has been with the entrepreneurial orientation of the individual who could foresee the potential of the technology.

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