ISSN:2229-6247

Stimulating the Growth Trajectory of Indian Carpet Industry through Technological Intervention: A Case Study Approach

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Abstract
Indian Carpet industry is primarily decentralized/unorganized sector, As the world trade opportunities are growing Indian carpet industry has to pace up with the world trade, for this we have to move from decentralized arena to an organized sector in order to achieve global opportunities & competitiveness. This paper is an attempt to explore capability of transformation to be brought about in the carpet industry through case study an industry situated in Rajasthan. There are many parameters to achieve this milestone; we have focused on the enterprise resource planning which plays important role in transformation. The research prerogative used is basically through case analysis & PESTEL study pre & post technological adoption. The results were establishing the technology adaptation help the organization to transform in areas of productivity level, supply chain, flow of work, quality, synchronization, optimum utilization of resources.
Key word- *Carpet process, Hand Knotted carpet, Technical Infrastructure, ERP Microsoft dynamics Navision.*

1. INTRODUCTION

[1,4]From the ancient age carpet is used for home decoration by the emperors for its elegance. The birth of carpet is a mystery but according to evidence, it was known to us from Middle East region around 2nd-3rd BC. Development of carpet started from Turkestan, Caucasus, Persia, Anatolia, China and then later to India. The jewels of this industry are the weaver who provides the cutting edge to carpet making. In late 30's the unique design and styling features of carpet raised the demand. U.S. initiated in machine made carpet and rugs which transformed process to the mechanized from traditional hand making process. Carpet is segregated w.r.t. weaving such as Persian carpets, Turkish carpets, Pakistani carpets, European carpets, Indian carpets.

Indian carpet industry is mainly the industry of exporter more than 2000 and major part i.e. 70% is unorganized. Player having 5% or more is major player in the industry. The type of the industry is the small and medium sized exporters with high export potential and crafts persons as sharp as a tack who have been weaving interactive designs of exclusive floor coverings. [2,3]In domestic market manufacturers of Bhadhoi (Mirzapur, UP), Panipat, Rajasthan, J&K, and Punjab are the major players who contribute noteworthy revenues. [5]According to carpet export promotional council U.S, Germany, U.K, Australia, France, Japan are the major countries to whom India is exporting rugs, where U.S registered the highest of U.S $ 301.12 million, secondly Germany with of U.S $ 135.85 million and U.K with of U.S $ 24.85 million. The exports trends of the Indian carpet industry witnessed a constant growth from 2001-04 and after 2004-05 the export declined due to competition with the other countries like China but during the year 2005-07 the exports again grew to Rs. 1091.24 million which is an increase of 42.23 % over the previous year of 2004-05. The export figures have decreased by 23.15% from Rs. 3524.73 to Rs. 2708.73 million in the years 2007-08 and 2008-09 successively due to economic slowdown.

1.1 Carpet Manufacturing Process

The production process follows a strict regime of a balanced vertical integration. Each process starting from the procurement of wool or silk till the final product is distributed, undergoes a streamline of multiple tasks that aid in building efficiency, quality and effective delivery.

IT- enabled Business Process Up-gradation

The carpet industry is witnessing a radical change where timely delivery, optimum pricing and quality driven initiatives can be a booster for ling term sustainability in the marketing environment. Innovative capability initiative coupled with technology intervention and business up gradation could be the primary prerogative for growth opportunities in the cut throat competitive world. [6]China being one of the key players in the area is also involved in the production of low cost carpets only, on the contrary Indian carpet industry in spite of being unorganized specializes in all varieties of carpet manufacturing. The lacunae which exist is duplication of lot of activities because of less technology being involved in the whole process. Hence, it increases the

cost of production. Also, it increases the time of delivery of carpets. An innovative reach is required. [7]Also the marketing channel is not appropriately defined. They find it very difficult to access the customers is increase the market. Therefore, they are heavily dependent upon the buying agents. The infrastructure is very poor leading to higher time for production and costs.

Government shall promote the establishment of Common Facility Centers for use by home-based service providers in State and District-level towns, to draw in a vast multitude of home-based professionals into the services export arena. The interconnectivity, web hosting, global expo meets and complete detail through it enabled resources would cut the service cost and invigorate the export.

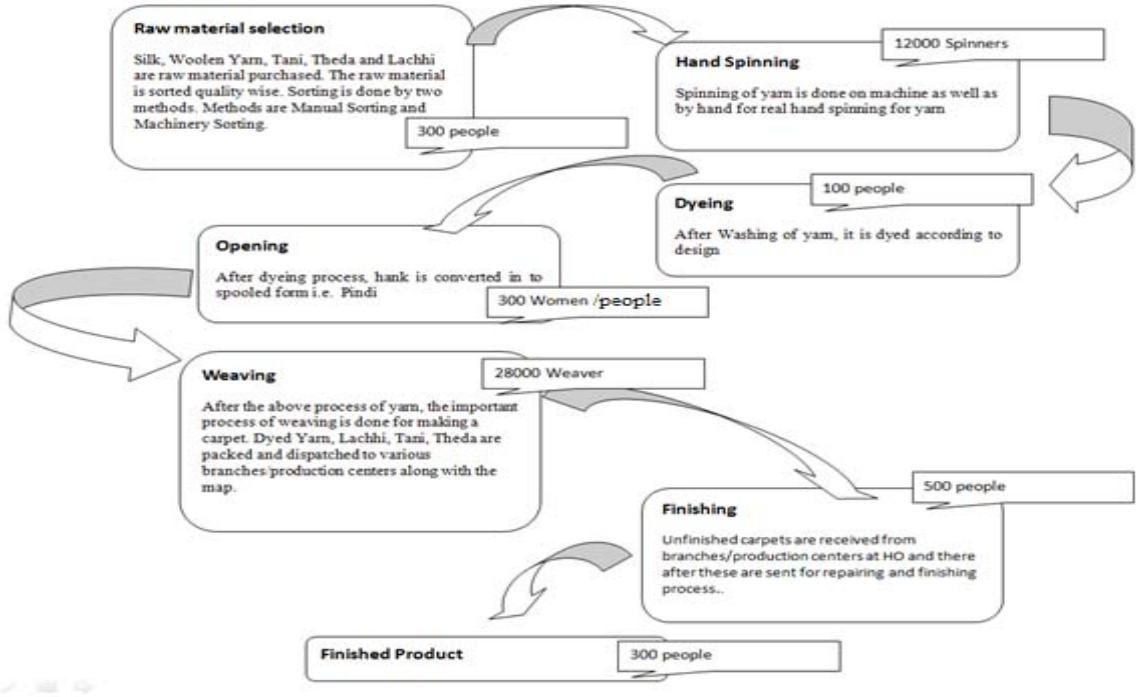


Fig: 1 Carpet Manufacturing Process

Source: Industry in Consideration

2. PRESENT STUDY

Carpet Sector is very unorganized and distributed network. This study helps to understand the difference between unorganized and organized carpet industry. To make industry organized technological up gradation of the business processes is required. [8,9,11] Present study is initiative toward technology adoption. Planning is the major area which company concern focuses upon, if the planning is not correct then competitive advantage can't be achieved. Technology in terms we have focused on the ERP software. There are various ERP software's, as the sector consists of majorly small medium sized organization; it's very difficult for them to adhere high cost ERP package. In the case study organization adopted Microsoft dynamics Navision ERP software package. Platform allows us to identify the gap in the processes and guide toward the alteration of the processes to boost up the manufacturing process. Majorly organizations in this sector lacks on inventory (raw material, work in process and finished goods), tracking of carpet, accounting, loom planning, Status of weavers, reliable data and integration of departments.

Advantages of technology adoption

- Better inventory management
- Integration of departments
- Order tracking
- Loom planning
- Weaver management
- High quality
- Provide analysis on profits, revenues & cost
- Provide real time data
- Report generation
- Monitoring
- Less Paper works
- Time efficient manufacturing cycle

2.1 Research Methodology

For carrying out the research following methodology is being adopted:

1. Collection of the Secondary data
2. Case study approach
3. PESTEL analysis

2.1.1. Collection of the Secondary data

Secondary data was collected from the Indian institute of carpet technology Bhadoi, reports published by carpet export promotional council, newspapers, Research papers, Journals, whitepapers, Websites like Ministry of commerce, Ministry of textiles.

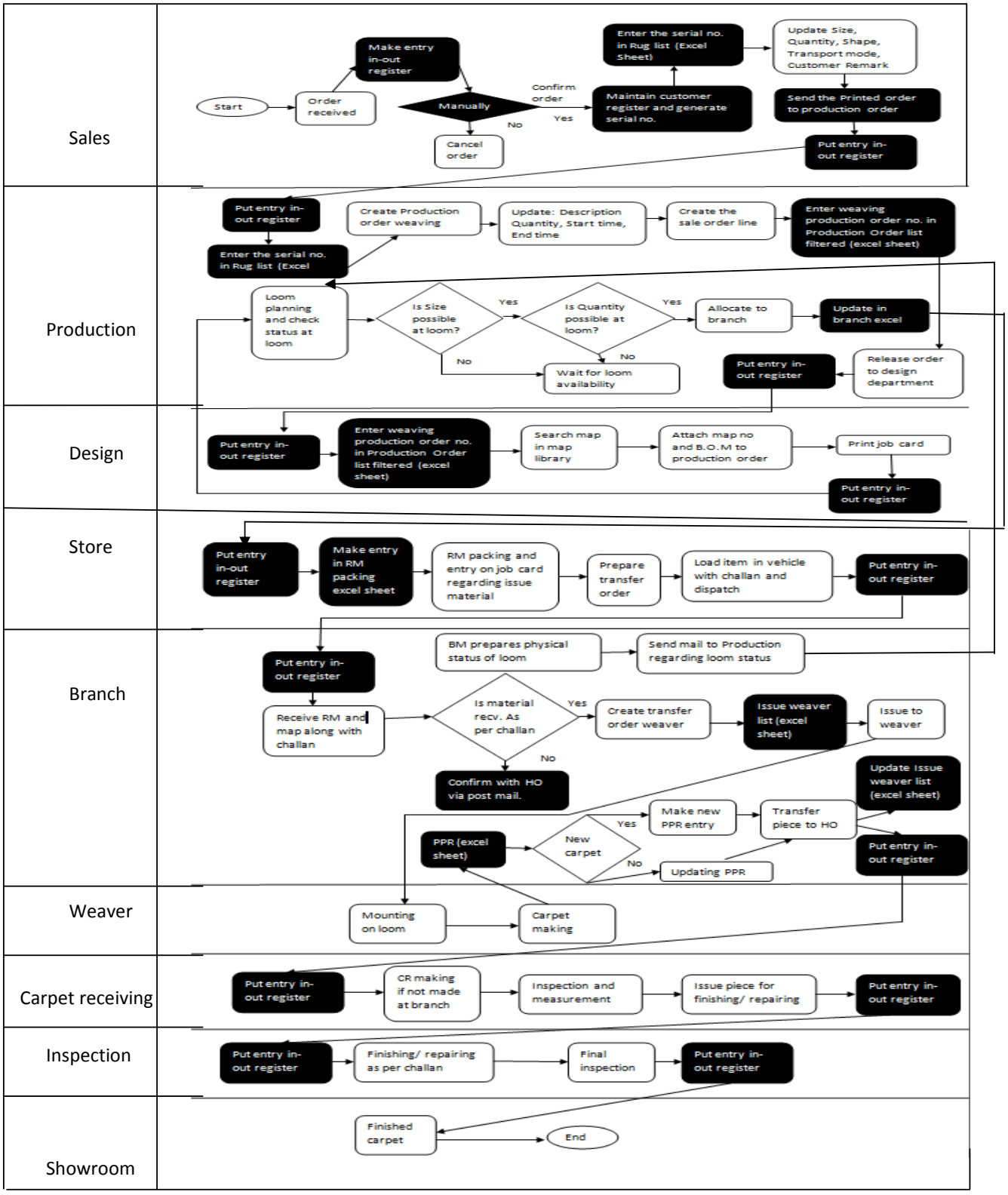
2.1.2. Case study

The company in consideration Xyz located at Jaipur in Rajasthan has its operation in Hand Knotted, Hand Tufted, Hand woven, Hand loomed, Flat weave Carpets. Company exports its products across 22 countries in the world. Production of the company is distributed across India Supported by 40,000 Artesian, having the loom capacity of around 4000. Quality is the key concern of the organization which has lead it to operate in a decentralized manner for example in Rajasthan they expertise in hand knotted carpets, tufted, Orissa for sumak, U.P. for hand tufted and sumac etc.

Company runs it whole process through its head office located at Jaipur, where different departments play vital role in the supply chain. Supply chain of the company start from the procurement of the raw material from Bikaner from where it's distributed to the different production centers. Before implementation of the technology, sales department takes the order from the customers and create the sales order, which was recorded on the excel sheet on regular basis. A report was generated by the department contain the information about sales order and a print out of which was sent to the other departments, according to the sales order design department verifies and create the map/design. Once the map is created the production department does the loom planning according to which stores department create package of raw material & map and allocate to the branch via transport. Branch is responsible for the allotment of the package to the weaver, on weekly basis branch executive inspects the carpet and maintain a log & update it .When the carpet is in the process of manufacturing, the carpet is dispatched to the Head Office (HO). At HO inspection & finishing of the finished carpet is made, after which it's made available to the customer. The generation of report at each department increased the redundancy of the data, there was no instant data available, data registers were maintained by each dept, in order to communicate and at the end of the day they use to count number of transaction done by the each department. Branch Executive was responsible for weaving & used to made PPR (plan production report) on weekly basis, the status of the carpets on the looms were posted/mailed by the branch executive to the H.O. which effects the loom planning by the production department at H.O, they use to wait for the mail on the basis of which allocation of the carpets were made on different loom which result in the underutilization of the weavers, which cost company allot. Similarly different production centers in other states were affected as H.O was not updated by the flow of the work. Synchronization between the departments and various branches, planning, monitoring, data maintenance, controlling quantity & quality was becoming headache for the company.

Company implemented ERP software to improve it business process. ERP software used by the company is Microsoft Dynamics Navision. MD Nav is a module based software containing finance, manufacturing, distribution, marketing, customer relationship management, and e-commerce data modules and creates the linkage between them .MD Nav is customizable software which allows the organization to stream line it resources .As the carpet making process at each phase include multiple different phases which was a big challenge in front of the implementing team this lead them for the maximum customization. Network of branches and HO is created through integrated computer systems, which facilitates designing, maintaining inventories, updating and tracking shipments. This effective & scaled scenario eliminated the problem of the synchronization between the departments. Now, planning is the major strength of the company. Access to real time data is possible, redundancy of data was eliminated, paper work was reduced and monitoring of branches is now possible with the new tool. By ERP adoption, company recorded tremendous increase in quality of the product and maximum utilization of resource. ERP made the system integrated with all the functions to meet challenges toward growth. The pre and post processes of the entire manufacturing in being explained below:

Fig: 2: Pre implementation scenario



*Black boxes represent processes removed in the post implementation scenario.

Fig: 3: Post implementation scenario

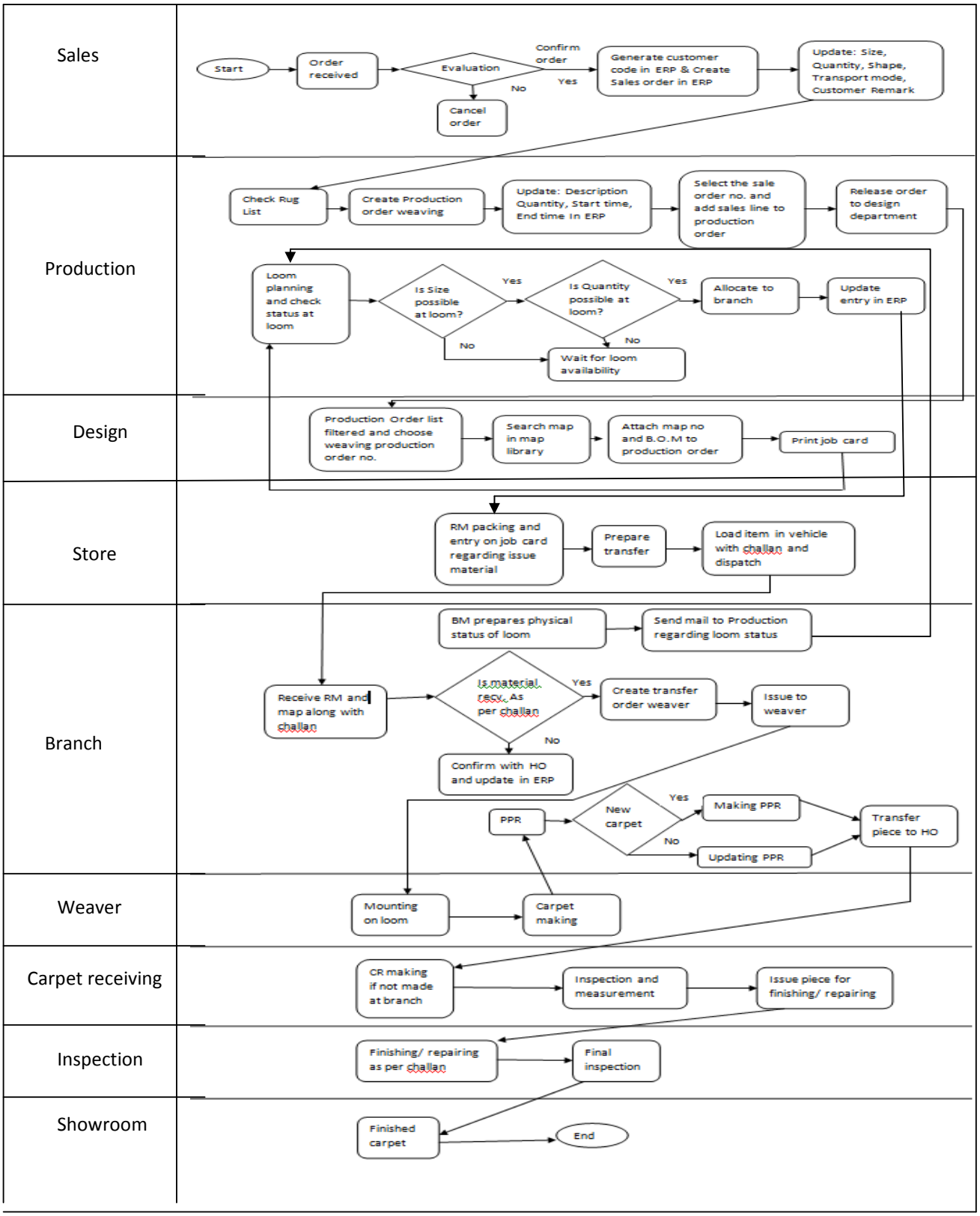


Table 1: Comparison between Pre and Post Implementation of Technology

Department	*Pre-implementation*	*Post-implementation*
Sales	• Logs were maintained through In-out Registers. • Manually Inspection of order. • Separate log of Customer through Registers. • Excel sheet for Sales order.	• Direct Sales order entry in ERP. • Add customer profile in ERP. • Assign customer to order no. automatically in ERP. • Inspection of order is done through ERP. • No excel sheets. • No In-out logs.
Production	• Logs were maintained through In-out Registers. • Excel sheet for Sales order to be processed. • Manually assign sales order line to Production order. • Separate excel sheet for production order weaving. • Maintain branch issue excel sheet. • Wait for loom planning till branch executive post mail arrives. • Manually release production order to Design department.	• Production Order weaving is attached directly to Sales order line in ERP. • Show the dependency in the branch via update. • No wait for loom planning, as communication via e-mail. • When Release directly shows pendency in Design in ERP.
Design	• Logs were maintained through In-out Registers. • Excel sheet for production orders and manually map no are assigned.	• Search map no and update to relevant production order via ERP.
Store	• Logs were maintained through In-out Registers. • Excel sheet for RM packing • Manually generate Transfer order & challenge.	• Assign RM and update to relevant production order via ERP. • Generate Transfer order & challenge via ERP.
Branch	• Logs were maintained through In-out Registers. • Maintain weaver issue excel sheet. • Manually write PPR. • Record Status of loom manually.	• Update the weaver issue in ERP. • Update PPR in ERP. • Update status of loom via e-mail.
Weaver	• No change.	• No change.
C.R	• Logs were maintained through In-out Registers.	• Direct update in ERP to respective order.
Inspection	• Logs were maintained through In-out Registers.	• Direct update in ERP to respective order.
Showroom	• No change.	• No change.

2.1.3. PESTEL Analysis

[10]By using this tool we have tried to find out the importance of technological factor on the organization with reference other five factors. The input is the table with list of factor for each area is mapped with the company. Factors are judge on the basis of potential impact. (The Pestle analysis complete chart is attached in appendix A)

The rating chosen are:

- High=5
- Medium=3
- Low=1
- Undetermined=0

#Weight is calculated on the basis of factor.

Table2: Factor and Weight

Impact	*Weight*	*Rating*	*Weighted Score*
Political			
High	.36	5	1.8
Medium	.29	3	.87
Low	.07	1	.07
Undetermined	.28	0	0
Sum			**2.74**
Economical			
High	.68	5	3.4
Medium	.26	3	.08
Low	.06	1	.06
Undetermined	0	0	0
Sum			**4.4**
Social			
High	.48	5	2.4
Medium	.52	3	1.56
Low	0	1	0
Undetermined	0	0	0
Sum			**3.96**
Technological			
High	.52	5	2.6
Medium	.33	3	.99
Low	.11	1	.11
Undetermined	.04	0	0
Sum			**3.7**
Environmental			
High	.36	5	1.80
Medium	.64	3	1.92
Low	0	1	0
Undetermined	0	0	0
Sum			**3.72**
Legal			
High	.63	5	3.15
Medium	.37	3	1.11
Low	0	1	0
Undetermined	0	0	0
Sum			**4.26**

Factors	*Weight*	*Rating*	*Weighted Score*
Political	.12	1	.12
Economical	.20	5	1.0
Social	.17	4	.68
Technological	.16	5	.80
Environmental	.16	2	.32
Legal	.19	3	.57
Sum			**3.49**

- Contributions of Various factor are
  - ✓ Political =3.44%
  - ✓ Economical=28.65%
  - ✓ Social=19.48%
  - ✓ Technological=22.92%
  - ✓ Environmental=9.17%
  - ✓ Legal=16%
- Highest possible weighted score for the organization is 5.0, the lowest 1.0, Average = 3.0
- XYZ has a total weighted score of 3.49 indicating that the firm is above average in its effort to pursue strategies that capitalize on global opportunities.
- PESTEL analysis shows that technology adaptation i.e. 22.92% play significant role in the organization.

PESTEL Analysis Chart

PESTEL Analysis factors	*Potential Impact:* H – High=5 M – Medium=3 L – Low=1 U - Undetermined=0	**Time** Frame: 0-6 mths 6-12 mths 12-24 mths 24 + mths	*Implication and importance* **Type:** Positive + Negative - Unknown	**Impact:** Increasing > Unchanged = Decreasing < Unknown	**Relative Importance:** Critical Important Un-important Unknown
Political					
Trading policies	High		Unknown	Unknown	Important
Funding, grants and initiatives	Medium		Positive	Increasing	Important
Home market lobbying/pressure groups	Undetermined				Un-important
International pressure groups	Medium		Unknown	Unknown	Important
Wars and conflict	High		Negative	Decreasing	Important
Government policies	High		Unknown	Unknown	Critical
Government term and change	Medium		Unknown	Unknown	Critical
Elections	Undetermined		Unknown	Unknown	Un-important
Inter-country relationships/attitudes	High		Unknown	Unknown	Important
Terrorism	High		Negative	Decreasing	Important
Governmental leadership	Low		Positive	Increasing	Important
Government structures					Important
Internal political issues	Medium		Unknown	Unknown	Important
Shareholder/ stakeholder needs/ demands	Undetermined				Un-important
Economic					
Home economy situation	Medium				Important
Home economy trends	High				Important
Overseas economies and trends	High		Unknown	Unknown	Important
General taxation issues	Medium		Unknown	Unknown	Important
Taxation changes specific to product/services	Medium		Unknown	Unknown	Important
Seasonality/weather issues	High		Unknown	Decreasing	Important
Market and trade cycles	Medium		Unknown	Unknown	Important
Customer/end-user drivers	High		Unknown	Unknown	Critical
International trade/monetary issues	High		Unknown	Unknown	Important
Job growth/unemployment	Medium		Unknown	Unknown	Important
Exchange rates	High		Unknown	Unknown	Critical
Tariffs	High		Unknown	Unknown	Unknown
Inflation	Low		Negative	Unknown	Critical
Interest and exchange rates	High		Unknown	Unknown	Important
Consumer confidence index	High		Unknown	Increasing	Critical
Import/export ratios	High		Positive	Unknown	Important
Production level	High		Positive	Unknown	Important
Internal finance	High		Unknown	Unknown	Important
Internal cash flow	High		Unknown	Unknown	Important
Social					
Consumer attitudes and opinions	High		Positive	Increasing	Important
Media views	Medium		Positive	Increasing	Important
Law changes affecting social factors	Medium				
Brand, company, technology image	High		Positive	Increasing	Important
Consumer buying patterns	Medium		Unknown	Unknown	
Major events and influences	Medium		Unknown	Unknown	
Buying access and trends	Medium				
Ethnic/religious factors	Medium				
Advertising and publicity	High		Positive	Increasing	Important
Ethical issues	High		Positive	Increasing	Important
Demographics (age, gender, race, family size,)	High		Positive	Increasing	Important
Lifestyle changes	Medium		Positive	Increasing	Important
Population shifts	Medium		Unknown	Unknown	Important
Education	Medium		Positive	Increasing	
Immigration/emigration	High		Negative	Decreasing	Important
Health	High		Negative	Decreasing	Important
Living standards	High		Negative	Decreasing	Important
Attitudes to work	Medium		Negative	Decreasing	Important
Attitudes to people doing certain types of work	Medium		Negative	Decreasing	Important
Leisure activities	Medium		Unknown	Unknown	Unknown
Occupations	Medium		Unknown	Unknown	
Earning capacity	High		Positive	Increasing	Important
Staff attitudes	High		Positive	Increasing	Important
Management style	High		Positive	Increasing	Important
organizational culture	High		Positive	Increasing	Important
Technological					
Competing technology development			Positive	Increasing	Important
Research funding	High		Positive	Increasing	Critical
Associated/dependent technologies	Medium		Positive	Increasing	Important
Replacement technology/solutions	Medium		Positive	Increasing	Important
Maturity of technology	Low		Positive	Increasing	Important
Manufacturing maturity and capacity	High		Positive	Increasing	Important
Information and communications	High		Positive	Increasing	Important

PESTEL Analysis factors	***Potential Impact:***		***Implication and importance***		
	H – High=5 M – Medium=3 L – Low=1 U - Undetermined=0	**Time** Frame: 0-6 mths 6-12 mths 12-24 mths 24 + mths	**Type:** Positive + Negative - Unknown	**Impact:** Increasing > Unchanged = Decreasing < Unknown	**Relative Importance:** Critical Important Un-important Unknown
Consumer buying mechanisms/technology	High		Positive	Increasing	Important
Technology legislation	Medium				
Innovation potential	High		Positive	Increasing	Important
Technology access, licensing, patents	Low				
Intellectual property issues	High		Positive	Increasing	Important
Global communications	High		Positive	Increasing	Important
Inventions	Medium		Positive	Increasing	Important
Innovations	Medium		Positive	Increasing	Important
New discoveries	Medium		Positive	Increasing	Important
Research	High		Positive	Increasing	Critical
Energy uses/sources/fuels	Low		Positive	Increasing	Important
Communications	High		Positive	Increasing	Important
Rate of obsolescence	Medium		Positive	Increasing	Important
Manufacturing advances	Medium		Positive	Increasing	Important
Information technology	High		Positive	Increasing	Important
Internet	High		Positive	Increasing	Important
Transportation	High		Positive	Increasing	Important
Waste removal/recycling	Medium		Positive	Increasing	Important
Email	High		Positive	Increasing	Important
Software changes	High		Positive	Increasing	Important
Legal					
Current legislation home market	High		Unknown	Unknown	Important
Future legislation	Medium		Unknown	Unknown	Unknown
European/international legislation	Medium		Unknown	Unknown	Important
Regulatory bodies and processes	Medium		Unknown	Unknown	Important
Environmental regulations	High		Unknown	Unknown	Important
Employment law	High		Unknown	Unknown	Important
Consumer protection	High		Unknown	Unknown	Unknown
Industry-specific regulations	High		Unknown	Unknown	Important
Environmental					
Environmental issues	Medium		Positive	Increasing	Important
International	Medium		Positive	Increasing	Important
National	Medium		Positive	Increasing	Important
Local	Medium		Positive	Increasing	Important
Environmental regulations	Medium		Positive	Increasing	Important
Customer values	High		Positive	Unknown	Critical
Market values	Medium		Positive	Increasing	Important
Stakeholder/ investor values	Medium		Positive	Increasing	Important
Staff attitudes	Medium		Positive	Increasing	Important
Management style	Medium		Positive	Increasing	Important
organizational culture	High		Positive	Increasing	Important
Staff morale	High		Positive	Increasing	Important
Staff engagement	High		Positive	Increasing	Important
Global factors	High		Positive	Increasing	Important

3. CONCLUSION

In the above research we have studied the Technical architecture of the organization which focuses on the IT infrastructure shaping toward organized industry, to achieve the high productivity level , removal of wastage achieving , minimize its supply chain, flow of work, developing a scale and quality control. We have focused on the technology factor which in the analysis contributes to 22.19% in growth of the organization. Technology helps in the find-out the gap in the business process and improvement of business process. The Gaps identified are the following:

1. Synchronization
2. Access to Real time data
3. Redundancy
4. Strong Planning
5. Proper utilization of resources
6. Quality
7. Quantity
8. Robust Report making
9. Supply chain optimization
10. Monitoring
11. Controlling

[12] India is the highest handloom producing country in the world which is around 4.0 million and which contributes 30% of total export income. An innovative and inclusive Handlooms portal on carpet industry, dedicated to support and encourage all the weaver artisans would add necessary impetus to energize the market. It will provide necessary support in the areas such as latest trends, colors, fashions, branding,

documentation and logistics to facilitate and improve Indian handloom Industry**.** It can be said that the carpet industry is presently going through a major change. Traditional markets are saturated while new markets are officering opportunities for growth. Modern designs and low end carpets like Hand-tufted carpets are attracting new customer base. Product mapping with the consumer preferences is necessary for the future growth in the industry. Indian carpet industry will find it difficult to compete with Chinese industry in terms of volumes and prices. Innovative range of products with lower volume is going to be mantra for success in Indian Carpet industry. Hence, efficient coordination and management of activities is a key for success for any Indian carpet business. This offers an opportunity for consolidation of activities for reduction in costs, improvements in quality standards, better product development and timely delivery of products thereby driving the growth.

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