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CHAMPO CARPETS: IMPROVING BUSINESS-TO-BUSINESS SALES USING MACHINE LEARNING ALGORITHMS

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Dharm Kamboj, the IT advisor to Champo Carpets, was preparing for his weekly meeting with Rohil Mehrotra, the Managing Director of Champo Carpets. Kamboj anticipated that Mehrotra might want to discuss an important business problem Champo Carpets had been facing in the last few years. Due to his efforts, Champo Carpets was able to become one of the few carpet-weaving manufacturing units of Bhadohi to implement an enterprise resource planning (ERP) system for efficient collection of business data. The application had been running successfully since 2017, capturing data at every point of production.

As part of sales and marketing processes, Champo Carpets shared sample designs with its potential customers, based on which they placed orders. In many instances, the samples did not find favor with customers, who in turn sent different samples with similar designs.

Designing a new sample required a lot of effort and was a cost-intensive activity. It had to be accurate, addressing the needs of customers in terms of design and costing. Generally, the manufacturing cost of a carpet could be broken down into three components: raw material and its dyeing cost (30%), weaving cost (60%), and finishing cost (10%). Creating a new sample of the carpet typically doubled the weaving cost per unit area. Raw material and dyeing costs increased by 3 times and finishing cost expanded by 2.5 times. This escalation was due to the frequent set-up costs and higher cost of raw material and dyes when purchased in smaller quantities. In addition, the company also incurred a design cost, higher amount of wastage and labor costs every time a single sample was made. Hence, the conversion rate of samples into orders was important. In 2019, Champo Carpets had a conversion rate of about 20% against the prevalent 35% across the industry. This low conversion rate not only dented the overall profitability of the company, but also resulted in disruptions to the regular production schedule as they had to allocate substantial resources for sample production.

ABOUT THE INDUSTRY

In 2017, India accounted for close to 40% of the world's carpet export market.[1] The carpet industry was one of India's most important industries, and in 2018, it provided employment to nearly two million rural Indians in carpet weaving and related activities such as dyeing, raw material trading, and so on. Most artisans and weavers were from the weaker section of the society. This trade provided extra and alternative employment to even farmers and other members of a rural household. The industry was scattered across the country, with Jammu & Kashmir, Haryana, Uttar Pradesh, Rajasthan, Gujarat, and Kerala being the major carpet-manufacturing states. Carpets were also a source of major export contribution (**Exhibit 1**).

ABOUT CHAMPO CARPETS

Champo Carpets[2] was a manufacturer based out of Bhadohi, Uttar Pradesh, one of the most famous carpet-weaving clusters in India. Spread over 1000 square kilometers, the cluster comprised many villages and districts in and around Bhadohi. Champo Carpets was one of the largest carpet manufacturing companies in India, with customers spread across the world. Its clientele included several reputed stores and catalog companies, and its products were certified by leading organizations such as Wools of New Zealand and Carpet Export Promotion Council.

Champo Carpets was a vertically integrated manufacturer and exporter of carpets and floor coverings, with more than 52 years of experience and standing. The company had a large B2B clientele worldwide. In 2020, it employed 1,500 people and was capable of producing 200,000 pieces of carpets and floor coverings per month.

[1] N B Das, R K Sharma, A Pandey and B G Narayanan, "The Existence of Carpet Industry in Bhadohi, India", *Trends in Textile Engineering & Fashion Technology*", 2018, 3(3), 323-332.

[2] Youtube video: https://www.youtube.com/watch?v=k6NpdD9bTrk&t=6s&ab_channel=ChampoCarpets

CARPET MANUFACTURING

The process of manufacturing a carpet started with design and passed through several steps [**Exhibit 2**]. Designing was driven by CAD (computer-aided design), which not only produced a visual output but also calculated how much raw material was required. This raw material was next procured and stored in a warehouse and then issued for dyeing to local dyers. The dyed yarn was re-stored in the warehouse and issued for the next process, which involved preparation for weaving or hand-tufting. The yarn was opened and wound on a suitable package. After the carpet was hand-tufted or woven, it was sent for various finishing processes. If hand-tufted, latex and fabric backing was applied at the back of the carpet to protect the tuft from fraying, and edges were secured through binding. Finally, the tufts or piles were cut to reveal the design, after which the carpet was ready for inspection and dispatch. A typical carpet took anywhere between three weeks and three months to manufacture, from design to dispatch.

Champo Carpets' major products could be broadly classified into four categories, namely, hand-tufted carpets, hand knotted carpets, Kilims and Durries (**Exhibit 3**). Hand-tufted carpets had pile yarn simply anchored to the base material. These entailed the least production effort, and hence were the most popular. Hand-knotted carpets, by definition, were knotted by hand on the stretched warp and fastened with a weft. This required immense skill and production effort, and hence was the most expensive variety. Kilims were woolen flat weaves with slits, where the pattern began or ended in a different colored yarn. These were woven in tapestry style and were expensive. Dhurries or Durries were the Indian variants of Kilim. They were flat weaves traditionally used in most Indian homes.

CHAMPO CHALLENGE

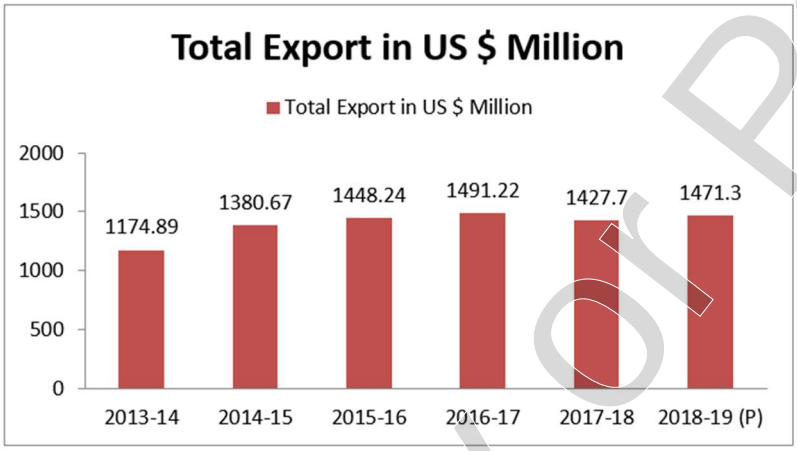
It was important for Mehrotra and his team to address the issue of the low conversion rate of sample carpets sent by them to their customers. Champo Carpets, like any traditional carpet manufacturer, was sending sample designs to the clients as per demand and anticipated need. The sample design selection was done in various ways and the process itself was costly and elaborate. To capture industry trends, a team from the company visited various trade shows and events and sent samples to the client as per the latest fiber and color trends. The company also sent samples to the client based on the color and design attributes of their past purchases. While selecting samples, the company also considered the raw material availability in the inventory, and they would prefer to upsell those products, hence samples of these materials were pushed more. They also reproduced the swatches as sent by the client into samples.

Since sampling is a costly process as mentioned before, Champo is looking for a cost-efficient way of selecting appropriate sample designs that could generate maximum revenue for the organization. Mehrotra realized that the data accumulated from ERP operations could help them toward that end. Champo collected and stored several attributes related to carpets sold by them (**Exhibit 4**). Mehrotra believed that the carpet attributes could be used for creating customer segments, which in turn could be used for developing models such as classification to identify customer preferences and recommendation systems. They also understood that if customers could be presented with samples suited to their tastes, past preferences and trends, it would lead to better conversions.

The task seemed cut out for Kamboj – to identify the most important customers and the most important products and find a way to connect the two using suitable attributes from data and appropriate analytics models. This would help Champo Carpets recommend ideal sets of samples to customers and help increase the conversion rate.

Exhibit 1

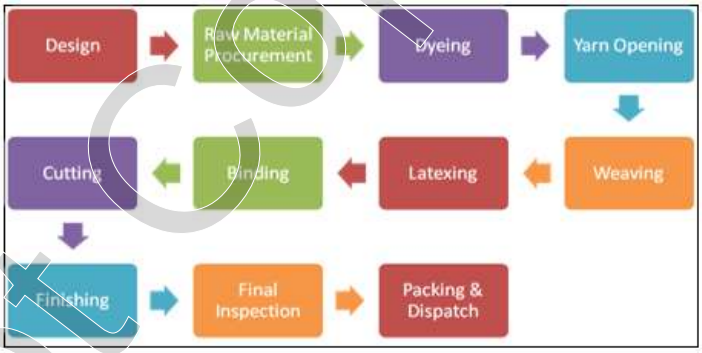
Carpet Industry Export



Source: Carpet Export Promotion Council of India (http://cepc.co.in/)

Exhibit 2

Carpet Manufacturing Process



Source: Champo Carpets

Exhibit 3

Major Products

Source: Champo Carpets

Exhibit 4

List of Attributes in the Data

Feature	Feature Type	Description
Order Type	Binary	Area-wise or piecewise
Order Category	Binary	Order or sample
Customer Code	Categorical	45 customers (B2B customers)
Country Name	Categorical	Originating country of customer
Customer Order ID	Identifier	Order identification number
Customer Order Data	Date	Date on which order was placed
Unit Name	Categorical	Unit of measurement (feet, meter, inch, piece and weight)
Quantity Required	Numerical	Number of units ordered
Total Area	Numerical	Carpet area (in feet and meter)
Amount	Numerical	Revenue generated from the carpet (in USD)
Item Name	Categorical	Hand tufted, Durry, and so on
Quality Name	Categorical	Quality of material used
Design Name	Categorical	Code assigned to describe design
Color	Categorical	Color of the carpet
Shape Name	Categorical	Rectangular (REC), square, round, octagon and oval
Total Area	Order	Total carpet area ordered (in feet)

Source: Champo Carpets