

ANALYTICAL SUPPLY CHAIN OPERATIONS OPTIMIZATION

Mwanga Company Limited is a company that has been in the ceramics industry for more than fifteen (15) years and had a leading reputation in the Boko Republic for manufacturing ceramic products. The company used to perform well in the industry because they offer durable and quality ceramic products at affordable costs. The ceramic products offered by the company were mainly floor tiles, wall tiles, bath-ware, toilet ware, and basins. The company manufactures ceramic products using a manufacturing system that was built on the premise in order to meet fast-growing and rapidly changing customer demand on a timely basis whilst providing bespoke ceramics based on customers' requirements.

The ceramic industry is fast growing industry in Africa and in the world in general. The reason for the growth of the ceramic industry in Africa is that the consumption of ceramic products is steadily on the rise. The consumption of ceramic products in Africa has increased due to the rapid urbanization experienced in African countries, the increase in disposable incomes, and the growth of private consumption. In 2022, it was recorded that ceramic consumption in Africa reached 920 million square meters. In the same period, it was recorded that local production of ceramic products increased from 308 million square meters in 2018 to 700 million square meters in 2022.

Despite the increase in the production of ceramics products in Africa, local production is still insufficient to fully meet demand. Hence, African countries continue to be the third largest region for world ceramic imports with the majority of the imports emanating from India, China, and Spain which accounts for 77% of ceramic imports in Africa.

The growth of the importation of ceramics has been a threat to the Mwanga Company. Apart from the threats of imports, Mwanga Company and the ceramics industry in general experience difficulties due to late poor economic conditions, restrained consumer spending, and limited public and private sector investment in the industry. Further, the ceramic industry is highly related to and dependent on the construction industry. To put matters worse, the construction industry is greatly dependent on government infrastructure development projects which have been slow in recent times.

Mwanga Company used to own and operate 32 retail ceramic stores countrywide. The management of the company recognized that depending on government projects to sell their ceramic products may be such a naïve decision they opted to focus also on selling ceramics to consumers. Hence, the company decided that it will open 10 to 15 new retail stores so as to increase its breadth and reach to consumers. When the management was thinking about expanding the list of their retail stores, the government opted to invest extensively in railway infrastructure reconfiguration by entering into a contract with a contractor to construct a speedy and electric-powered railway track.

With the impending construction of an electric-propelled rail track, the time taken to move ceramics and other products from one region to another will be reduced significantly. Apart from reducing the traveling time, also the cost of transporting heavy and bulk products like ceramics will be substantially slashed. Moshi (Pty) Ltd which is a company registered and trades in China recognizing that Africa has the potential to produce and consume ceramic opted to establish a manufacturing plant in the Boko Republic so as to efficiently and effectively serve its customer base instead of exporting ceramics from far to Africa. Moshi systematically established that erecting a manufacturing plant in Boko Republic will also help the company to serve easily its customers from neighboring countries.

Apart from *downstream logistical factors*, Moshi chose to establish a manufacturing plant in Africa as part of the company's strategy of offshoring production to African countries with strong commercial and investment ties with the parent country – China.

In a few years, since Moshi started operating in the Boko republic it began to win customers over by offering ceramics that are of equally similar quality as compared to ceramic offered by Mwanga Company. Mwanga Company which was considered a major player in the ceramic industry in the country had foreign competition in their backyard. The competition of Moshi led Mwanga to lose its stake in ceramic industries which stood at 95.4% to a staggeringly low 59.1%. Mwanga Company which used to manufacture every one of two tiles, baths and toilets had now a battle to regain its leading position keeping in view the threat of new competition, Moshi which is a giant company in its own right as well a pre-existing tendency to import ceramics.

Mwanga Company analyzed its supply chain, and its competitor's (Moshi) and compared them to the most ideal supply chain practices for the ceramic industry. The company realized that currently, the supply chain for ceramics is made up of *ceramic manufacturers* at the center position. The ceramic manufacturer provides themselves with materials and technology. Thereafter, ceramic manufacturers collaborated with numerous service companies to ensure efficiency in the supply chain. The service companies include *graphic studios* that develop the graphics with which the tiles are decorated; *end of line processing companies* that provides final products cuts, grinding, and lapping; *display systems producers* that provide display systems for exhibition rooms and sales points or retail stores and *supplier of logistical services* that provides logistical solutions for the finished products. To that end, Mwanga Company realized that it was wrongly handling its supply chain activities by clinging to singlehandedly perform every supply chain activity.

From the lessons learned, the company devised a distribution system that involved delivering ceramics through the direct sales network of the ceramic producer (commercial agents) who deliver ceramic to the downstream traders. In addition, Mwanga Company assessed how best the individual activities of the ceramic supply chain can be conducted. The company realized that in the ceramic industry it is paramount that a ceramic manufacturer doesn't work with multiple suppliers of the same commodity at the same time but also long-term contracts should be rare. Hence, in the ceramic industry, it is important to have more than one supply channel active at the same time. With regard to transportation, for ceramic, it was found that the preferred transportation mechanism is multi-modal transport. However, when transporting ceramic and considering the heavy weight of ceramic products and the limitation of road tonnage, the road transportation costs tend to be high, and since this is reflected in product prices the company could reduce freight costs by using rail transport.

As far as distribution is concerned, the company learned that long distribution channels in the ceramics supply chain affect the quality of products and brings about losses, and hence digitization of the distribution system is inescapable. Mwanga Company after learning important lessons decided to dismantle all of its retail stores in various regions and halted the plans to add other retail stores.

Instead, the company authorized a selected number of commercial agents to aid in distributing ceramic products to its customers. In addition, the company opted to capitalize on the advantages of transporting ceramic products using the newly improved railway system in the country. Also, the company decided to optimize the supply chain processes by investing in digital systems to facilitate order placement, order picking, and delivery. Towards computer-enabled optimization of the company's supply chain operations, the company commissioned Big Data Technologies to develop and implement digital solutions to its supply chain operations.

The commissioned company suggested that the company should implement the digital solutions on an incremental basis by starting with integrating warehouse operations and customer orders. The company agreed to start by optimizing its warehouse operations and customer ordering process by integrating the two operations. Big Data Technologies developed a warehouse management software (WMS) for Mwanga Company that enabled them to keep track of its ceramic stock, issues, and receipts as well as storage places of various ceramic products. Big Data Technologies also developed an electronic catalogue for the company that was placed at the disposal of Mwanga's commercial agents and the company's various set of consumers. The essence of the e-catalogue was to enable consumers to easily and conveniently access the stock of ceramic held by Mwanga Company and make an order instantly without necessarily having to visit the nearest retail store.

The algorithm that integrated the company's warehouse and customer ordering was called ProSal. The introduction of ProSal facilitated the *ordering process* from the side of the consumer and *order processing* from the side of the company because everything was electronically matched and executed. The shrewd decision by the management of Mwanga to focus their distribution efforts using commercial agents instead of owning and operating retail stores, using digital solutions to enable direct distribution, and focusing their transportation using rail transport, paid great dividends as the company significantly regained its market share.