

A Study on the Transformation of Textile Enterprises in Taiwan Based on NANOone

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Abstract

With the rapid development of science and technology, digital transformation has become the key for many industries to upgrade their industries and enhance their competitiveness. As one of the traditional manufacturing industries, the textile industry is also actively seeking the road of digital transformation. However, in this process, the textile industry is facing many challenges and problems. In this study, the challenges faced by NANOone, a case company, in the process of digital transformation are reviewed and analyzed to solve the difficulties in building an enterprise resource planning system. At the same time, it is also of reference value for academic discussion on the organizational and decision-making difficulties and obstacles faced by digital transformation.

Keyword: Transformation of Textile Enterprises, Taiwan, NANOone

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I. Introduction

In the early post-war period, the textile industry became a leading industry in Taiwan's industrial development due to its convenience. It gradually flourished in the 1970s and then reached its peak, but now it has turned from strength to strength owing to modernization and has become a "sunset industry" as described by the public, and then faced with a sudden Covid, forcing many textile producers to close down, and this is one of the cases in which the grandparents of the members of this group were involved. As the textile industry becomes more innovative, this traditional industry is being revitalized, and with the help of new technologies, the textile industry is undergoing a transformation to weave a brighter future. We observe that most of the textile industry producers who are still in business after the Covid are relying on unique market positioning and technological development, yet transformation is a necessary means for the textile industry to re-stabilize its position in the market of the changing times.

With the rapid development of technology, digital transformation has become the key to industrial advancement and competitiveness of many industries. As one of the traditional manufacturing industries, the textile industry is also actively seeking the path of digital transformation. However, in this process, the textile industry is facing many challenges and problems. This study is based on a case review and process analysis of the challenges faced by a case study company, NANOone, in the process of digital transformation, to solve the difficulties faced in constructing an enterprise resource planning (ERP) system. At the same time, it is also valuable for academic research on the organizational and decision-making difficulties and obstacles faced by digital transformation.

II. Literature Review

Wu (2017) said that business transformation refers to the revolution made by enterprises in the face of competitive pressure or changes in the market environment, and this revolution not only enables enterprises to be more innovative, but also enhances the competitiveness of enterprises. Yu (2015) also suggested that to break through today's fast-changing environment and the pressure of international competition, enterprises are faced with unprecedented business crises and innovation challenges, and make every effort to develop new business strategies and make adjustments to the enterprise, which is called enterprise transformation.

Wu (2017) also suggests that Taiwan's textile industry should develop high value-added products, such as the functional fabrics that have emerged in recent years, such as antibacterial, breathable, and moisture-wicking properties, to meet the needs of diversified markets such as sports, medical, and outdoor. At the same time, it is necessary to grasp the international trend, keep up with the international trend, and enhance its own competitiveness, examine how to be more innovative in the business model, improve the enterprise as a whole and integrate the development of the brand, which has become its development trend, in order to avoid losing its position in the market.

Enterprises have to go through several different stages in the process of transformation in order to complete the transformation. Davidson (1993) after studying the transformation of 50 different industries,

categorized the transformation of enterprises into three stages.

(1) Phase I : Automation

Focusing on improving the internal operation of the enterprise, the enterprise will reorganize, analyze and review the existing implementation methods and planning, and improve the overall work efficiency by streamlining the internal operation process.

(2) Phase II : Enhancement

Focusing on the external operations of the enterprise, including internal and external value chain, to understand customer needs and improve products to meet customer needs, at the same time, also need to strengthen the management of the supply chain, the enterprise not only need to review the internal, but also need to consolidate the external suppliers, customer resources, in order to achieve profit maximization.

(3) Phase III : Redefinition

After going through the first two phases, the enterprise has its own competitive products, new core competencies and value enhancement in the industry. This phase focuses on the creation of new core competencies and the development of new business models.

Spinning and Toweling Association (2024) puts forward the following six visions:

(1) Deepening Digital Transformation and Intelligent Manufacturing

With the rise of international digitalization, Taiwan's textile industry needs to integrate high-tech production to improve production efficiency and reduce costs if it is to develop further.

(2) Green Transformation and Global Competitiveness of Eco-Textile Products

In recent years, with the increasing awareness of environmental protection and sustainability, Taiwan's textile industry has been transforming towards green production, responding to the international demand for environmental protection while enhancing the added value of textile products.

(3) Strengthening the development of high-value and differentiated products

As Taiwan's textile industry loses its cost advantage, it is inevitable to develop unique and high value-added materials, thus creating business opportunities.

(4) Development of Functional Textiles with Fashion Sense

With the increase in consumer demand for quality textiles, the market potential for functional textiles has increased.

(5) Strengthening design and branding capabilities

In addition to upgrading the textile industry, there is an urgent need to develop branding, which not only creates business opportunities, but also drives the growth of Taiwan's textile industry chain.

(6) Expanding International Markets and Deepening Cooperation

In order to cope with the changes in demand in the international market, Taiwan's textile industry should expand into emerging markets and also participate in international exhibitions to enhance the visibility of Taiwan's textile products in the international market.

III. Research Method

(1) Document Analysis Research

The document analysis research refers to the process of studying collected literature on a specific topic to understand the nature and status of the research subject and to derive one's own perspective from this analysis. This method helps researchers form a general impression of the research subject and facilitates a historical and dynamic understanding.

The main aspects of the document analysis method include: analyzing relevant archive materials; examining personal diaries, notes, and biographies; analyzing publicly published books, journals, and other resources.

(2) Case Study

The case study research, also known as the case history research, focuses on conducting a continuous investigation of a specific group or organization over a long period of time to study the entire process of behavioral development and change. The core of this research is to reveal the underlying patterns, characteristics, or influencing factors by recording and analyzing the specific conditions and changes of the particular subject in detail. This study is based on Five Forces Analysis and SWOT analysis with the help of PEST.

IV. Analysis Results

(1) NANOone Case Analysis

(i) Brief introduction of the case

NANOone, located in Tainan City, was founded by Chuang Chi-Shun in 2002, and was initially known as Tai-Lian Industrial, a company established in the 1970s by the founder's father, Chuang Tsung-Jen. Initially, Tai Lin Industrial was engaged in textile processing and export business, specializing in knitting OEM, mainly serving the European and American markets. When Chuang Chi-Shun was in charge of foreign business at Tai-

Lian, he realized that Taiwan's textile industry was declining with the rise of competitiveness in the emerging developing countries. While attending an international exhibition, he came across negative ion technology and decided to branch out from Tai-Lian Industrial to establish Cheng-Yi Industrial, combining the textile industry with the technology industry and cooperating with Academia Sinica to develop negative ion functional clothing.

NANOone purchases semi-finished products from upstream manufacturers and passes them to Tai-Lian Industry for final processing. In turn, Tai-Lian Industrial has converted some of its original factories into the production of negative ion products in order to support its production capacity. In the end, Chuang Chi-Shun successfully established the NANOone brand, which has been clinically proven to be effective in relieving women's menstrual pain and has won numerous awards in international invention exhibitions, winning the trust of consumers. In the process of corporate transformation, NANOone has entered a stage of redefinition, combining with the webcasting system, successfully regaining the market share and occupying a place in the market. (Chuang, 2024)

(ii) Michael Porter five forces analysis

a. Threat of new entrants

The development of negative ion related products requires a large amount of capital as well as technological investment, and even time investment for experimentation to gain consumer trust, but currently, about seventy percent of small and medium-sized textile manufacturers in Taiwan are still at the stage of processing and exporting (Hung, Mau-Yuan, 2018), and they are not able to effectively invest in technological upgrading, which results in their inability to adapt to the rapidly changing market demand, and thus the threshold for entry into the Taiwan's negative ion textile market has a higher threshold, which also leads to a lower threat for its potential entrants.

b. Threat of substitutes

Due to the high entry barrier to the negative ion textile market, there are relatively few possible substitutes in the market. However, due to the high development of artificial fiber in Taiwan's textile industry in the early days, Taiwan's exports of functional textiles now account for 70% of the global market (Leung, 2021), and the market is spreading all over the world, the domestic textile factories of functional fabrics are highly developed, and the functions of many of their products are similar to those of the case study company, so there is still a small threat to the case study company in terms of the possible substitutes. Functional fabric textile manufacturers in China are highly developed and many of their products have similar functions to the case company. Substitutes are often the product of new technology and new social needs, and the only way to gain a position in the market is to be able to grasp the market trend. Facing the highly developed functional fabrics market, the case study company has its own response to the threat of substitutes, such as the continuous development of new products to balance the lack of profit of competing products, and the case study company believes that the only way to stabilize the market is to continue to make changes in a real-time manner.

c. Bargaining power of suppliers

The production method of the case company nowadays is to purchase semi-finished products from the upstream manufacturers, and then use its own factory to finalize the products and sell them to customers. The case company does not have only one upstream manufacturer, which will cause competition among the upstream manufacturers, which will also give the case company a chance to make profit, but the bargaining power between the case company and its upstream manufacturers is equal due to the technological control among the suppliers.

d. Bargaining power of customers

In the industrial chain of the textile industry, sales is the most important link, and brand owners have absolute bargaining power because they can specify their upstream suppliers, garment factories or fabric factories, and case companies are directly facing consumers and weighing the trade-off between consumers and costs. However, because there are not many negative ion textile manufacturers in Taiwan, the case study company has almost all of the market, and its initial development cost is high, even though there are many lower-priced functional fabrics in the market.

e. Competitive rivalry

The core competitiveness of a textile operation depends on the intensity of marketing and the total cost of leadership. Factors that determine the intensity of competition among existing players in the industry include the number and strength of competitors, market growth rates, fixed and inventory costs, product or service differentiation and switching costs, additions to production capacity, strategies used by players in the industry, and barriers to exit. The main competition that the Case Company is currently facing is in the highly developed

functional fabrics industry. Among them, Andon Hub is considered as the main competitor by the case company, but even though functional textiles are a threat to the case company, there are many different aspects of the development of functional fabrics in Taiwan, and the case company still has a significant position in the market due to its patented technology.

(iii) SWOT analysis

a. Strengths analysis

Compared to developed countries, the textile industry has abundant labor resources at low prices; and compared to developed countries, Taiwan has the most complete textile industry chain in the world, and industry support is also more complete. In addition, Taiwan has a strong demand for textile and apparel, and the government has given a lot of policy support to the textile industry, which makes Taiwan's textile industry dominant in the international competition.

a1. Negative Ion Technology

During the previous generation of Cheng-Yi Industrial, the company was committed to the development of negative ion functional fabric technology and cooperated with the Industrial Technology Research Institute (ITRI) in technology research and development. In 2012, the company participated in the Ministry of Economic Affairs' SBIR Program, and successfully researched and developed Taiwan's only negative ion textile technology, obtaining the relevant patents in 2014, and also obtaining the Bronze Prize Award at the Nuremberg International Exhibition of Inventions in Nuremberg, Germany in 2015, and the Bronze Prize and Special Prize at the Paris Exhibition of Inventions, in the following year. In 2015, it won the bronze medal at the International Invention Exhibition in Nuremberg, Germany, and the following year, it won the bronze medal and a special award at the Paris Invention Exhibition in Paris, France. It has also published related articles in many international journals, and is internationally recognized and has gained the trust of consumers, and has a large market.

a2. Localization Advantage

With rapid economic growth and rising living standards, there is a strong demand for textile products. As a traditional pillar industry, the textile industry is supported by the government in terms of export tax rebates and subsidies. In addition, the case company has the experience of Tai-Lian Industrial and Cheng-Yi Industrial before its establishment, and also owns its own factory, so it does not need to think about the backwardness of developing negative ion technology at the same time.

b. Weakness analysis

Although policy support provides a certain degree of protection for innovation, at the initial stage of innovation, enterprises often need to invest a large amount of capital, which makes it extremely challenging to realize stable profits in the short term. In the process, enterprises lose their competitive edge in price, which is an inevitable phenomenon in the promotion of innovation. However, in the current market environment, price is still the primary consideration for consumers. Therefore, how to attract consumers' attention by improving product performance when price competition is no longer an advantage has become a difficult problem that R&D manufacturers have to face.

b1. Higher development costs

Negative ion textile related products have never existed in the market, so the development of negative ion fabrics has to rely on a large amount of capital assistance in the early stage, which also results in its higher cost, compared to other functional fabrics that have been developed to a mature stage, with a lower production cost, and whose functionality is no less than that of the negative ion textile products, which is at a disadvantageous stage in the competition in the market, and has no choice but to increase the selling price in order to maintain the profitability.

c. Opportunities analysis

With Taiwan's government actively promoting the transformation of traditional sunset industries, the case company has been able to ride on the winds of the transformation process and gained relevant technical cooperation. At the same time, international exchanges and cooperation have brought the case company advanced production technology and management experience, which has brought certain development to the case company in terms of marketing.

c1. Government Policies to Promote Transformation

In recent years, Taiwan's government has been actively promoting the transformation of enterprises to realize the recovery of traditional sunset industries. At the early stage of the transformation, the government

launched a related R&D transformation program, and through the Small Business Innovation and R&D Program (SBIR) with the Ministry of Economic Affairs (MOEA) and the technical cooperation with the Industrial Technology Research Institute (ITRI), the company was able to obtain the opportunity to research and develop negative-ion textile products.

c2. International Cooperation to Promote the Exchange of Science, Technology and Innovation in Textile Applications

Nowadays, the international market is highly specialized and the international exchanges are frequent. Through participating in many international invention exhibitions and exchanging with the international businessmen, the case company obtains the advanced production technology and management experience, which brings a certain development to the case company in the marketing aspect, and also exchanges with the textile industry all over the world, and actively expands the case company's oversea territory, which is now spanning over the countries of Japan and Singapore. The case company has now expanded to Japan, Singapore, and other countries.

d. Treat analysis

As Taiwan's labor costs and raw material prices rise, labor and resources will become Taiwan's textile industry's disadvantage compared to other countries. The rise of the textile industry in other developing countries will pose a threat of substitution to Taiwan. At the same time, facing the constraints of international trade protectionism, technical trade barriers are difficult to cross.

d1. The costs are rising

With the rise of Taiwan's wage level and the use of international labor standards, Taiwan's labor cost advantage is gradually disappearing; and the rising prices of raw materials, such as oil, electricity and other sources of energy, will further weaken the raw material cost advantage. As a result, the case company has to incur a large increase in costs in this area, coupled with the extremely high cost of its own research and development, which has to be reflected in the sales price, and with a higher selling price compared to other functional related products, it is feared that this may result in the loss of potential customer base.

d2. The Rise of Home Textiles in Other Developing Countries

According to the theory of national competitive advantage, Taiwan's existing advantages are still low-level "low-cost competitive advantages" derived from special resource advantages (lower labor and raw material costs), production technologies and methods that competitors can obtain at lower costs, and the development of economies of scale, etc. However, in recent years, emerging countries such as China, India, Indonesia, Turkey, Mexico, and Eastern Europe are all known for their cheap labor and their geographic and free trade arrangements with their major export markets. However, in recent years, emerging countries such as China, India, Indonesia, Turkey, Mexico, and Eastern Europe, all of which are known for their low-cost labor, have taken advantage of geographic and free-trade arrangements with China's major export markets, and have indirectly posed a threat to the case company to a certain extent.

V. Conclusions and Recommendations

After analyzing the successful cases of textile transformation, we have come up with the following possible ways for Taiwan's textile industry to transform in the future.

(1) Strengthening technological innovation and R&D

The textile industry should increase its investment in technological innovation and R&D to improve the technological content and added value of its products. Through the introduction of intelligent manufacturing, digital design and other technologies, to improve production efficiency and product quality, to meet the personalized needs of consumers.

(2) Promoting Green Manufacturing and Circular Economy

The textile industry needs to strengthen its awareness of environmental protection and actively promote green manufacturing and the development of a circular economy. It should optimize production processes, reduce energy and water consumption, reduce waste emissions and promote sustainable development.

(3) Improve labor quality and skills

Facing the challenge of rising labor costs, enterprises should focus on employee training and skills upgrading. By improving the quality and skill level of employees, improve production efficiency and product quality, reduce labor costs.

(4) Enhancing brand competitiveness

The textile industry needs to strengthen brand building and marketing, focusing on product quality and innovation. Through brand differentiation and market positioning, we can enhance brand competitiveness and increase market

share.

(5) Strengthening win-win cooperation

The textile industry can enhance the efficiency and competitiveness of the whole industrial chain by strengthening cooperation with supply chain partners to realize resource sharing, information sharing and risk sharing.

Based on the above case studies on the development of Taiwan's textile industry, this study provides the following personal insights into the textile industry.

(1) Weak Data Acquisition and Analysis Capabilities

The core of digital transformation is the application of big data, and data acquisition and analysis capability is the key. However, many enterprises in the textile industry lack a comprehensive data acquisition and analysis system and are unable to effectively utilize data to guide production and business decisions.

Response strategy: Textile enterprises should strengthen their investment in data acquisition and analysis and establish a comprehensive data governance system. At the same time, they should actively introduce professional data analysis talents to improve their data-driven capabilities.

(2) Information Security Risks

With the advancement of the textile industry's digital transformation, the risk of enterprise information security is also increasing. Data leakage, system paralysis and other security incidents may cause serious economic losses and reputation damage to enterprises.

Response strategy: Textile enterprises should pay more attention to information security and invest resources to protect information system security. At the same time, they should establish a sound information security management system to ensure information security in the process of digital transformation.

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