Drive Growth through Innovation and Explore the Path to Scientific Development—Research on Shandong RuYi’s Independent Innovation Model

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Abstract. With the transformation of the market economy system, China’s economic development has shifted from the traditional economies of scale to the sustainable development approach that focuses on “improving quality and increasing efficiency”. Rely on the drive of innovation to enhance the product value chain and promote enterprise transformation and upgrading. To implement innovation-driven, we must build a modern manufacturing system and rely on technological innovation to promote institutional innovation and quality innovation. Shandong RuYi, as the leading enterprise in the high-end worsted textile industry in China, builds independent innovation highlands with the functions of agglomeration, demonstration, influence, and radiation relying on independent new capabilities.

Introduction

Shandong RuYi was established in 1972. It is a well-known high-end worsted enterprise in China and now has a production line of worsted wool fabrics with an annual output of 13 million meters. RuYi has always revolved around the strategic goal of "high-end positioning and quality strategy", and based on independent innovation as a strategic basis, it has comprehensively built a high-tech textile industry-led highland, with the business philosophy of "leading technology and high-quality products", quality innovation, Two aspects of technological innovation continue to innovate in manufacturing and have achieved a series of outstanding management innovations.

Diversified Technology Research and Innovation

Cooperation in Production, Teaching and Research, and Technological Innovation

The company has continuously cooperated with universities and research institutes at home and abroad, successively cooperated with Deakin University in Australia to establish "RuYi Diken Textile Materials Research Center", and established the "Wool Deep Processing Technology Research Center" in cooperation with Australian Sub-Confederation Institute CSIRO; Working with the Royal Academy of Arts and the Hong Kong Polytechnic University to jointly develop textile fabrics. Cooperate with China Textile Information Center in China and jointly publish the global trend of textile fabrics; cooperate with domestic textile colleges and universities to carry out textile technology research and information integration innovation research, such as RuYi Wuhan Textile University and Xi’an Polytechnic University in 2009. The “High-efficiency Short-Flow Embedded Composite Textile Technology” of cooperation between industry, university and research institute is the first new spinning technology project in China with independent intellectual property rights that has reached the international advanced level.
Building a two-in-one Human Resources Development System

As textile enterprises are labor-intensive, in order to improve the overall quality of human resources, RuYi has established a two-in-one human resource development system. The first is to establish “Yiwu Whampoa Military Academy” and strengthen the quality of personnel. The main approach is to proceed from two aspects. On the one hand, it is “building momentum,” which is to form a quality atmosphere. Mainly in the form of quality competitions at various levels, random examinations, quality assessments, etc., so that all members participate in quality improvement activities to create a quality first atmosphere. On the other hand, it is continuing to carry out technological research. Through technical research and continuous training and training of talents at all levels, this is a quality improvement activity that is of great significance to the improvement of product quality.

The second is borrowing “outside the brain” to increase the research level of the core technicians. The company has established a high-level research station and hired domestic and foreign high-end talents, such as the famous Italian designer VANNI, the British textile expert BAHMAN and other international design institutes and technical experts for joint development; hired domestic textile field experts, joint Donghua University and other textiles Universities carry out joint research, research relevant theories, methods, new technologies, new products, new processes, and new equipment according to the technical requirements of the company and industry development, and cultivate leading brands with independent intellectual property rights, so that the multi-component composite textile technology will be continuously updated. The integration has enhanced the research capabilities of enterprise technicians.

Building an Information Platform Based on Great Quality Management Concept

The great quality involves the company's entire production and operation link, and it is an inevitable requirement for modern production under the rapid development of informatization. Through information technology, it provides a new model for the key process of large-scale quality, and enables the close integration of informatization and enterprise quality management, changing the traditional production technology and management level. According to the requirements of the scientific concept of development, RuYi speeds up the pace of informationization under the concept of large-scale management, uses information technology to transform the traditional textile industry, and for three years, it has built an enterprise ERP system. The system can control the information platform of each branch and every detail of each production site. It covers information management, production and processing, product design, sales management, human resources, cost management, and equipment management in the entire process of textile processing. The whole process of on-line inspection was networked and realized the transparency and real-time management of the enterprise[1]

The production efficiency increased by 25%, the annual cost savings was nearly 30 million yuan, and the company embarked on a modern textile road.

R&D Model Management Innovation

Pursuing Sustainable Development with Green Technological Innovation

As the textile industry is a manufacturing industry with high energy consumption and high pollution, with the continuous deepening of consumer upgrading trends, on the one hand, consumers are increasingly pursuing green products and ecological products; on the other hand, in the international market, green barriers are also Slowly replacing traditional industrial technologies has become a new entry barrier. Therefore, under the severe situation both at home and abroad, RuYi will implement green and low-carbon concepts into quality innovation and technology upgrading through technological innovation, and implement green innovation technologies based on “economic, social, and environmental benefits”. The concept of sustainable development runs through the entire life cycle of the product. First of all, RuYi established the management standards of the international standard inspection system, the corporate social responsibility management system (CSC 9000T) and
the environmental management system (ISO 14001), covering the company's green production standards, social responsibility policies and environmental management guidelines. In the procurement of raw materials, procurement of equipment and equipment renovation, green and low-carbon environmental protection are adopted as the code of conduct, and specific goals and requirements are put forward. Vigorously promote cleaner production technologies in production, develop eco-wool textile articles, and try out environmentally friendly dyeing and finishing auxiliaries Sewage treatment and so on [2].

**Development of Gradient-type "Double Three" Technology Innovation Model**

In order to always protect the leading position in the high-end worsted industry at home and abroad, RuYi has developed a “double three-level” management innovation model based on the time gradient, the internal three-tier research echelon and the external three-tier research echelon[3], carry out innovative technology development from different levels and from different perspectives, and timely keep up-to-date and cutting-edge technologies. RuYi Gradient Technology Innovation has three major modules: applied technology, forward-looking technology, and reserved technology. As shown in Table 1.

<table>
<thead>
<tr>
<th>Technology category</th>
<th>Technological research and development features</th>
<th>Time phase</th>
<th>Research team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Technology</td>
<td>Short-term R&amp;D, rapid update, timely output</td>
<td>N Recent</td>
<td>Group center technicians, enterprise technicians and general employees</td>
</tr>
<tr>
<td>Forward-looking technology</td>
<td>Efficient, green, advanced, short process</td>
<td>The next 3 to 5 years</td>
<td>Group technology center, domestic and foreign well-known institutions, research institutes inside and outside the two levels of researchers</td>
</tr>
<tr>
<td>Reserve technology</td>
<td>Adaptation to national strategies, sustainable technologies for the development of the textile industry</td>
<td>The next 10 to 20 years</td>
<td>Famous experts, researchers, third-level researchers in related fields at home and abroad</td>
</tr>
</tbody>
</table>

Applicable technology refers to the technology needed for the main production and manufacturing at the moment. RuYi takes the internal third-level personnel as the main force, invests a lot of financial support, independently researches and develops new types of fiber, and matches the application of core technologies such as high-end spinning, weaving and finishing, and realizes short-term R&D, rapid update, and timely output. Products are diversified, lead the fashion, and strive to be competitive in high-end product areas.

Forward-looking technology focuses on the cooperation model of production, learning and research, focusing on new textile technologies with high efficiency, green, latest and short processes, and the ultimate processing technology of new fibers to provide technical support for the medium and long-term development of the company. For example, in order to solve the outstanding problem of water consumption in the hair-washing process, RuYi and the Deakin University in Australia jointly developed the ultrasonic washing technology. This technology can be cleaned by ultrasonics, which not only drastically reduces water consumption and electric energy consumption, but also reduces pollution. Acoustic wave technology also helps to improve the quality of the wool and reduce the damage to the textiles.

The reserve technology, also known as preventive technology, develops new textile technologies that meet the national strategic goals and the latest development needs of the textile industry. For example, the use of new woody fiber and mountain cotton fiber to supplement traditional fibers can prevent the unstable factors such as the reduction of cotton cultivated land or the increase of main
energy prices; the research on the localization of ultra-fine wool through genetically modified technology, and the resolving of foreign restrictions and key cultivation of textile raw materials. Technology is subject to human problems and guides the sustainable development of the wool textile industry.[4]

Keeping up with High-end Requirements for Technological Innovation

RuYi attaches great importance to technological innovation and transformation platform construction, has invested a large amount of funds and manpower, and supports the transformation of various scientific and technological innovation achievements. More than 4.2% of the annual sales revenue is used for technological innovation investment, and always keeps the technological innovation work ahead of the industry. RuYi intends to provide the market with first-class products with "high-quality, high-quality, high-tech content and high added value" as its business philosophy, covering more than 50 countries including the United States, Canada, Australia, Europe, South Korea, Japan, Singapore and the Middle East. RuYi takes the middle-to-high-end consumer groups as its target customers and implements boutique marketing strategies that are in line with the brand's strategic positioning to ensure product quality and brand height. At the same time, through technological innovation, a core high-end technology represented by “Yiyi Spin” pre-spinning technology, spinning technology, ultra-high-branch manufacturing technology, and finishing technology has been formed. Its high-end textiles made of wool and cashmere are in the international arena. Leading position, RuYi has also become an internationally renowned company that can compete with Japan, Europe and the United States and other high-end worsted fabric production base.

Summary

Shandong RuYi fulfilled the concept of scientific development and adhered to the model of combining independent innovation with production, learning and research cooperation. The company achieved rapid and steady development, the production cycle was shortened by 30%, and the product quality was greatly improved. The company's output value was as high as 400%. Through quality management innovation and technical management innovation, not only has the value of RuYi brand been promoted, but also it has spread the high-tech and high-quality image of Chinese textile in the international arena.

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