

# Digital Reform Strategy of Internet Medical Industry, Get of ZY Medical Group's Three-Terminal Channel

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**Abstract:** In the mobile internet era, traditional healthcare companies are facing declining profits and insufficient market competitiveness due to the impact of digital healthcare and declining offline competitiveness. However, national policies, the implementation of the "Healthy China 2023" strategy, and the COVID-19 pandemic have provided opportunities for digital transformation in the healthcare industry. This paper examines the three-end channels of ZY Medical Group (formerly ZY Medical Group). Through literature research, case analysis, and field research, it examines its digital transformation journey and analyzes the current state of digitalization across its production, sales, and service channels. The study found that the group suffered from insufficient production planning and control, low equipment automation, and weak system collaboration. Drawing on industry experience, the study proposes strategies for optimizing and integrating each of the three channels, including building a unified data platform, enhancing online marketing capabilities, and improving support systems. The study demonstrates that digitalization in healthcare companies is driven by policy, market forces, and internal needs. The "single-end optimization + collaborative integration" approach is an effective path, providing a valuable reference for transformation efforts in the same industry.

**Keywords:** Internet healthcare industry; Digital transformation; ZY medical group; Three-terminal channels; Medical enterprise transformation.

## 1. Introduction

Driven by national strategies such as "Healthy China 2023" and "Internet + Healthcare," as well as the COVID-19 pandemic, the digital transformation of the healthcare industry has accelerated. Traditional healthcare companies face multiple pressures from policy-driven changes, escalating market demand, and intensified industry competition. Currently, the aging population and the growing number of people with sub-health conditions have highlighted the imbalance between supply and demand for medical resources. Furthermore, the shift in consumer behavior toward online consumption in the mobile internet era has further weakened the competitiveness of offline healthcare businesses. Traditional healthcare companies are generally facing declining profits and insufficient market competitiveness. Digitalization has become an inevitable choice to overcome development bottlenecks. ZY Medical Group, a long-established local municipal medical device manufacturer specializing in Class III medical devices such as disposable sterile syringes, initiated its digital transformation early and established a basic information technology infrastructure across its production, sales, and service channels. However, it still faces challenges such as insufficient production planning and control, low levels of equipment automation, and weak system coordination. This article focuses on ZY Medical Group's three-way digital transformation. Through literature research, case analysis, and field research, it analyzes its digital transformation journey and current status, identifies existing challenges, and, drawing on industry experience, offers targeted strategic recommendations. This article aims to provide guidance for optimizing the company's transformation path and offer a

practical model for peers in the same industry.

## 2. Analysis of the Current Status and Problems of ZY Medical Group's Three-way Digital Transformation

### 2.1. Overview of ZY Medical Group

ZY Medical Group, a national high-tech enterprise established over 30 years ago and a standing member of the China Association for Medical Devices Industry, is the largest manufacturer of disposable sterile syringes in the local municipality. It specializes in Class III medical devices such as disposable sterile syringes, dissolvers, and medical masks. The company boasts a GMP-compliant production facility (including a Class 100,000 cleanroom and a Class 10,000 cleanroom) and over 100 sets of automated equipment. The company is ISO9001, CE certified, and has obtained the National Level 2 Safety Production Standardization Certificate, making it a leading company in the domestic syringe industry. Its production encompasses five major production stages and is responsible for the research and development of new products. Its sales approach utilizes a dual-track "offline + online" model (offline partnerships with hospitals and distributors, online cross-border e-commerce and multi-platform shopping malls). Its service offerings encompass a network of over 100 offline outlets and 400 online centers [1]. The paper selected it as a case study because, as a leading local company, its digital transformation challenges, such as manual reliance on production planning, are common across the industry, making the research conclusions valuable for wider reference. Furthermore, the company has ample public data and was able to obtain first-hand information through internal research, providing data

support for the research.

## **2.2. ZY Medical Group's Digital Transformation Process and Driving Factors for its Three-End Channels**

### **2.2.1. Digital Transformation Process**

ZY Medical Group's digital transformation of its three-end channels was carried out in three phases. 2019-2020 was the phase of analyzing the current digital situation and laying the foundation. Digitalization of the three channels was implemented sporadically. Production used electronic spreadsheets to develop monthly production schedules, procurement compiled purchase orders based on plans and bill of materials (BOMs), and sales relied on spreadsheets to record order and customer information. All operations were primarily manual. DingTalk was enabled for attendance approval on the management side, and the financial side implemented the financial and supply chain modules of UFIDA Software. This established a basic information technology framework, but the three channels were not yet coordinated. 2020-2021 entered the phase of building a digital blueprint and achieving partial breakthroughs. The company clarified its transformation goals and the direction of "streamlining management processes, intelligent production, and omni-channel marketing." Production planned to introduce MES and WMS systems. Sales partnered with TG to build a cross-border e-commerce platform and expand its online flagship store [2]. The service side optimized 400 Customer service processes are being improved and WeChat official account consultations are being piloted. A smart risk control platform and DingTalk data are being used to promote mobile office work, but the three systems are still not interconnected. From 2022 to 2026, the three-tiered digital transformation phase will be underway. The company aims to create a "transparent factory" and integrate data from multiple supply chains. On the production side, high-end medical intelligent manufacturing and intelligent universal production lines will be promoted. On the sales side, online and offline integration will be deepened. On the service side, a 5G medical CNC and logistics service center is planned, gradually achieving data collaboration and business integration across the three tiers.

### **2.2.2. Drivers of Digital Transformation**

Policy-driven initiatives are a key external driving force. In recent years, the government has intensively introduced policies to support digitalization in the healthcare sector. In 2016, it proposed "Internet Plus" healthcare services for the benefit of the people. In 2020, it explicitly established a digital industry chain. In 2021, it promoted the development of digital industrialization, providing policy support for the digitalization of healthcare companies [3]. At the same time, pharmaceutical industry regulation is tightening, with mandatory electronic batch traceability requirements about to be implemented and the frequency of unannounced inspections increasing. This is forcing companies to enhance their compliance management capabilities through digitalization and meet regulatory requirements.

Market competition is a direct driving factor. Chinese pharmaceutical manufacturing market is large, but the number of companies is large (as of the end of 2021, there were 8,337 pharmaceutical manufacturing companies). The industry is under-concentrated, with most companies experiencing significant product homogeneity and

widespread price competition. ZY Medical Group, facing a "drug price war" and the impact of new entrants, needs to optimize production efficiency, reduce costs, and enhance product differentiation through digitalization to consolidate its market position.

The company's own development needs are the internal driving force. Under its traditional operating model, ZY Medical Group faced challenges such as low production efficiency, a single sales channel, and slow service response. Furthermore, its R&D capabilities were weak and it relied heavily on generic products. To enhance its core competitiveness, the company needed to optimize its entire supply chain, encompassing R&D, production, marketing, and service, through digital transformation, transforming itself into a "technologically innovative" healthcare enterprise. This became a core requirement for the digital transformation of its three-channel offerings.

## **2.3. Implementation and Results of the Research on the Current Status of Digitalization in ZY Medical Group's Three-End Channels**

### **2.3.1. Research Plan Design and Implementation**

To comprehensively understand the current status of digitalization in ZY Medical Group's three-end channels, this research utilized a combination of questionnaires, interviews, and field visits. The questionnaires covered digital strategic awareness, production management, sales operations, and service processes [4]. They were distributed to mid-level and junior management personnel in the production, sales, service, finance, and quality control departments. A total of 82 questionnaires were distributed, with 31 valid responses returned, representing a 37.8% effective response rate. Interviews included key personnel such as the production manager, sales director, and service center manager. A total of 15 interviews were conducted, each lasting 40-60 minutes and focusing on digitalization pain points and needs. Field visits covered the production workshops (injection molding, assembly, and packaging), warehouses, IT rooms, and the 400 customer service center, observing actual production equipment operation, inventory management, and system operations. Data was also collected from the company's 2019-2022 Annual information technology investment records, strategic planning documents, digitalization special reports, and other materials were used to ensure the comprehensiveness and reliability of the survey data.

### **2.3.2. Results of the Digitalization Status of Three-Channel Channels**

ZY Medical Group's digital transformation has achieved both success and existing challenges. In terms of development capabilities, performance has significantly improved. The growth rate of its core business rebounded after bottoming out in 2019, increasing by 12.3% in 2021 compared to 2019. Net profit growth increased from -8.5% to 15.7% between 2019 and 2021. Total asset growth increased from 3.2% to 9.8% between 2018 and 2021, demonstrating the impact of digitalization on scale and profitability. In terms of market share, its core product, disposable sterile syringes, reached 18.5% in 2021, ranking second in the industry. The proportion of online sales increased from 5.2% in 2019 to 13.8% in 2021. Cross-border e-commerce orders grew by an average of 40% annually, demonstrating significant progress in expanding its digital channels [5]. On the supply chain and talent side, the

introduction of a TMS system has increased transportation efficiency by 25%, shortened delivery feedback cycles to one day, and achieved 100% settlement accuracy. From 2019 to 2021, the proportion of employees with a bachelor's degree or higher increased from 28% to 42%, the number of technical personnel increased from 35 to 68, and the production workforce decreased by 18%, improving both talent pool and automation levels. However, shortcomings remain on all three fronts: While some production equipment is CNC-controlled, the automation of injection molding and packaging equipment is insufficient. On the sales side, online processing is not integrated with offline data, resulting in "information silos." While service response times have been improved to 30 minutes, personalized service capabilities are lacking.

### **3. Strategic Recommendations for ZY Medical Group's Three-Channel Digital Transformation**

#### **3.1. Firmly Determine Transformation Commitment and Clarify the Overall Goal of Three-Channel Digital Transformation**

ZY Medical Group must take a long-term perspective and make the digitalization of its three-channel channels a core corporate strategy, avoiding the sway of short-term performance fluctuations. It is recommended to formulate an overall goal for "Three-Year Collaborative Digitalization of Three Channels" [6]: By the end of 2024, complete the construction of core systems and equipment upgrades on the production side, integrate online and offline data on the sales side, and introduce AI-powered customer service on the service side; by the end of 2025, establish a collaborative digital platform for the three channels, enabling real-time data exchange and business collaboration; and by the end of 2026, build an industry-leading "intelligent production + omnichannel marketing + smart service" system, achieving a 30% increase in production efficiency, a 25% share of online sales, and a 90% increase in customer satisfaction [7].

To ensure achievement, the overall goal should be broken down into phased tasks for the three channels: on the production side, complete the rollout of the MES system and the automation of injection molding and packaging equipment by 2024; on the sales side, establish a unified customer data platform by 2024; and on the service side, implement electronic customer data management by 2024. Simultaneously, a monthly progress tracking mechanism should be established, with a dedicated digital transformation team, led by company executives, to coordinate the allocation of digital resources and progress control across the three channels to avoid resource fragmentation and delayed progress [8].

#### **3.2. Optimizing the digital development of three-way channels to improve single-end operational efficiency**

##### **3.2.1. Production: Building an intelligent production system**

First, the paper will enhance the digitalization of production planning. The paper will introduce an Advanced Production Scheduling (APS) system to integrate sales demand data with inventory data, enabling "production based on sales." Monthly, weekly, and daily production plans will be automatically generated, and work-in-progress plans will

be integrated into the system, replacing manual record-keeping. A production plan traceability mechanism will be established to systematically record the plan adjustment process and responsible individuals, ensuring traceability. After the system goes live, it is expected to increase scheduling efficiency by 50% and reduce the planning error rate to below 1% [9].

Second, the paper will promote equipment automation and data collection. The paper will upgrade injection molding and packaging equipment, introducing automatic sorting devices and packaging robots to replace manual operations. The paper will also install sensors on production equipment and establish an equipment data collection platform to collect real-time data such as injection molding parameters and equipment operating status [10]. Machine learning will be used to provide equipment failure warnings and parameter optimization. Equipment data will be integrated with the MES system to achieve full-process visualization of the production process. The upgrade is expected to reduce production staff by 20% and reduce equipment downtime by 40%.

Third, the paper will improve the production management information system. The MES system was launched, integrating production, quality, and inventory data. It was integrated with the existing ERP system (UFIDA NC) to achieve real-time synchronization of production and financial data. A quality traceability system was established, allowing the Quality Assurance Department to obtain real-time quality data from each work section, shortening the feedback cycle for quality issues to one day. Digital warehouse management was promoted, using QR codes to record the entry and exit of raw materials, semi-finished products, and finished products, as well as manage their storage locations. Automated handling robots were introduced, increasing the turnover rate of finished products to less than one month.

##### **3.2.2. Sales: Building an Omni-channel Marketing Network**

ZY Medical Group's sales issues can be optimized in three ways: First, achieve online and offline channel synergy by building a unified customer data platform (CDP). This will integrate data from online e-commerce, offline dealers, and store customers to form a 360-degree customer profile. Online customers can make appointments for offline store experiences and after-sales service, and offline customer information will be synchronized online to achieve cross-channel service integration. At the same time, a dealer inventory management system will be established, allowing dealers to upload inventory data in real time. The company will adjust supply plans based on inventory and sales data to avoid inventory backlogs and stock-outs [11]. After the platform goes online, it is expected that the online customer repurchase rate will reach the industry average and dealer inventory turnover efficiency will increase by 30%. Second, enhance online marketing capabilities by establishing a professional online operations team including cross-border e-commerce operations, data analysis, and live streaming marketing. Targeted marketing will be carried out based on CDP customer data (such as promoting insulin syringe discounts to diabetic patients). Live streaming will be carried out on platforms such as Douyin and Kuaishou, and medical experts will be invited to explain product knowledge to increase brand exposure. The cross-border e-commerce platform will be optimized and localized marketing will be carried out for different national markets (such as launching customized CE-certified products in the European market).

After the optimization, the online visitor conversion rate is expected to increase to 5%, and the cross-border e-commerce order volume will increase annually. 50%; third, establish a sales data analysis system, introducing a BI (business intelligence) system to conduct multi-dimensional analysis of sales data (including product sales, customer preferences, and regional demand). This will support product development (increasing production of hot-selling products and suspending slow-selling ones) and the sales team's real-time adjustment of marketing strategies [12]. Once the system is established, it is expected to increase demand forecast accuracy to 85% and shorten product iteration cycles by 20%.

### **3.2.3. Service-Side: Build a Smart Service System**

First, optimize service response efficiency. An AI-powered customer service system will be introduced to handle common inquiries (such as product usage instructions and after-sales procedures), assisting human customer service during peak hours and reducing customer wait times to under 10 minutes. A service ticket system will be established to automatically generate tickets from online inquiries and assign them to the nearest offline service location or dedicated customer service representative based on customer location and issue type, achieving closed-loop service management. After the system goes live, it is expected to increase service response efficiency by 60% and reduce the workload of human customer service representatives by 40%.

Second, enrich digital service content. Develop personalized health management services, such as providing diabetes patients with blood sugar monitoring reminders and syringe usage cycle recommendations [13]. Cooperate with local hospitals to launch telemedicine consultation services, allowing customers to schedule doctor consultations through the app or WeChat official account, with the service provider providing product support services (such as recommending the appropriate syringe model after consultation). Establish customer service profiles to record customer service history and health needs, and provide customized service plans. After optimizing service content, it is expected that customer satisfaction will increase to 85%, with value-added service revenue accounting for 10%.

Third, standardize customer data management. Build a customer relationship management (CRM) system to integrate basic customer information, service records, and health data, enabling digital data storage and centralized management. Establish a data security mechanism, set access rights, and conduct regular data backup and security testing to comply with medical data privacy requirements. Connect the CRM system with the sales CDP and production MES, enabling real-time communication of customer needs and service feedback to sales and production, facilitating product improvement and marketing optimization.

### **3.3. Strengthening Three-Channel Collaboration and Building a Digital Collaborative Ecosystem**

First, build a digital platform for three-channel collaboration. Building on the company's existing ERP system, the platform integrates the production-side MES, sales-side CDP, and service-side CRM systems, enabling real-time data exchange [14]. Production adjusts production plans based on sales-side demand data and optimizes product processes based on customer feedback from the service side. Sales adjusts marketing strategies based on production-side

inventory data and optimizes service plans based on customer satisfaction data from the service side. The service side updates service content based on production-side product information and pushes service reminders based on sales-side customer purchase data. Since the platform's completion, the efficiency of collaboration among the three channels has increased by 50% and shortened product iteration cycles by 30%.

Second, establish a three-party collaboration mechanism. Develop collaborative work standards for the three channels, clarifying each department's data sharing responsibilities and business connection processes (e.g., production providing weekly inventory data to sales, and service providing monthly feedback on customer product suggestions to production). Establish a cross-departmental collaboration meeting system, holding monthly meetings between production, sales, and service to address collaboration issues (e.g., inventory mismatches with sales demand, untimely processing of service feedback). Establish collaboration performance indicators, incorporating the efficiency of the three-party collaboration (e.g., timely data transmission and business connection accuracy) into departmental assessments, and encourage proactive collaboration across departments.

Third, promote business process reengineering. Based on a three-end collaborative platform, the paper restructured core business processes: "Customer order - Sales demand forecast - Production scheduling - Manufacturing - Logistics and distribution - Service after-sales." Digitalization is implemented throughout the entire process, achieving end-to-end customer-centric management [15]. For example, after a customer places an order online, the sales-side CDP automatically synchronizes order data with the production-side APS system. The APS generates a production plan, the MES system monitors production progress, and upon completion, logistics and delivery are automatically triggered. The service-side CRM system sends after-sales reminders, achieving visualization and automation throughout the entire process.

## **3.4. Strengthening the Digital Support System to Support Transformation Implementation**

### **3.4.1. Improving Digital Organization and Investment**

First, establish a dedicated digital team. Recruit a Digital Director to coordinate the digital strategic planning of the three-end channels; establish a dedicated digital team, including positions such as system developers, data analysts, and digital operations, responsible for system development and maintenance. Each department will establish a digital liaison to connect with the digital team and ensure effective communication of business needs. Once the team is established, clarify job responsibilities and assessment mechanisms to avoid buck-passing.

Second, optimize the digital investment budget. Digital investment will be segmented into three channels: By 2024, production-side investment will focus on MES systems and equipment upgrades (40%), sales-side investment on CDP platforms and online marketing (35%), and service-side investment on CRM systems and AI customer service (25%). A digital investment ROI (return on investment) evaluation mechanism will be established to regularly assess the effectiveness of investments across various channels (e.g., increased efficiency after production-side equipment upgrades, increased customer conversion rates through CDPs

on the sales side), optimize subsequent investment allocation, and avoid resource waste.

### 3.4.2. Strengthening System Security and Compliance Management

First, ensure system and data security. Build an enterprise-level network security protection system, deploy firewalls and intrusion detection systems, and conduct regular network security testing. Establish a data backup mechanism to back up important data (such as customer health data and production process data) to the cloud and local servers in real time to prevent data loss. Develop a data security emergency plan, clearly defining response processes and responsible personnel for emergencies such as data leaks and system failures to mitigate security risks.

Second, ensure compliant operations. Strictly adhere to medical industry regulatory requirements, ensuring that digital systems (such as production traceability systems and customer data management systems) comply with GMP, data privacy protection, and other regulations. Establish a compliance review mechanism and conduct compliance reviews before digital projects go live to ensure that system functionality and data management meet regulatory requirements. Regular compliance training should be conducted to enhance employee awareness and avoid the risk of penalties due to non-compliant digital operations.

## 4. Conclusion

The digital transformation of online healthcare companies across all three channels is driven by policy, market, and internal enterprise needs. National healthcare digitalization policies provide external support, market competition drives transformation, and the internal impetus is the need to enhance core competitiveness. These three factors have driven ZY Medical Group to initiate this transformation. While the transformation has achieved initial successes such as improved performance and expanded market share, issues such as insufficient production planning and control, weak sales channel collaboration, inefficient service response, and a lack of coordination across all three channels have hindered further progress. An effective approach is to "optimize each channel independently and integrate them together." Building intelligent systems on each channel can improve efficiency, while collaborative platforms and mechanisms promote data interoperability and business collaboration, ultimately enhancing overall competitiveness. A digital support system, including professional organizations and appropriate investment, is key to the implementation of this transformation. However, the research suffers from limitations in data depth and a short turnaround time. In the future, with the application of technologies such as AI, ZY Medical can deepen the integration of the three ends and explore unmanned production, virtual sales experience, and remote service. It is hoped that the results will provide a

reference for similar companies in the industry, promote the digitalization of the industry, and contribute to the "Healthy China" strategy.

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