A Case Study of a Medical Equipment 3PL Low Scored from KA

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***Abstract*—SAN Co., Ltd. (hereinafter referred to as the "Company" or "the Company"), a state-owned third-party medical device logistics benchmarking enterprise in a district of Shanghai, was selected as the main case study, and the "triangular mutual evidence and mixed method" was used to minimize the bias existing in the "single angle researcher", and the research method of the company was jointly participated in by absorbing different perspectives, with the help of the company's listing on the main board of Shanghai to disclose information and financial data, combined with the company's on-site administration and general management, customer service and operation, business development, In the four dimensions of senior management, feedback from off-site customers at different angles, and comparative examples of supply chain contract logistics operations of potential substitutes of private enterprises in the same industry, in different scenarios before, during and after the low scored from Key Accounts ("KAs"), this paper studies the company's response to the loss of business contribution of large customers when its iconic USP (single unique selling point) is weakened, and tries to explore similar prevention intervention suggestions that can be used by peers. The enterprise research on the case of medical equipment tripartite logistics enterprises coping with the low scored from KA needs to be further studied and iteratively updated.**

***Keywords*—contract logistics, medical equipment tripartite logistics enterprises, and researchers' mutual certification**

I. Preface

According to the official media introduction of SAN Co., Ltd., from the establishment of the company in 2001 to the shareholding reform and company name change in 2008, and in the nearly ten years since then, the company has maintained a high speed of development, achieving operating income of 596 million yuan and net profit of 81 million yuan in the first half of 2017. In the same year, the company was listed on the main board of the Shanghai Stock Exchange, which was an important milestone in the company's development history, and by 2018, China will usher in the 40th year of reform and opening up. In the first three quarters of 2022, the revenue was 1.22 billion, a year-on-year increase of 2.43%, and the net profit was 116 million, a year-on-year increase of 1.54%, known as "the first stock in China's free trade zone".

Since the establishment of the company, customer A has been the largest customer, and the revenue contribution data shows that before the listing in 2017, the revenue of this large customer accounted for more than 40% of the overall proportion. From 2018 to 2022, the proportions of customer A's business revenue to the company's total revenue are: 28.54%, 23.16%, 31.88%, 23.70% and 23.60% respectively. Although there has been a certain increase in the proportion of revenue in 2020, this growth is caused by the company's new business of purchasing epidemic prevention materials for customer A, which is not a regular business of logistics services. In recent years, the company has been deeply engaged in the medical and consumer goods business, and after several years of painstaking operation, the medical and consumer goods business has developed rapidly, and the increase of these new businesses has greatly ensured that the company actively responds to the difficult challenges brought by the current decline in the business proportion of customer A companies. In view of the current global economic environment, it is expected that the proportion of customer A's business will be further reduced in 2023, which will undoubtedly pose a certain risk to the development of the company's business.

Since 2012, the company has begun to develop and deepen the professional medical device supply chain business, and has become the first batch of logistics enterprises in Shanghai to obtain the third-party storage and transportation qualification of medical devices. It has been labeled as a benchmark enterprise for tripartite logistics of medical equipment. In the past five years, China's big health industry has developed rapidly, including the rapid development of China's medical device industry, and the market scale has expanded significantly. In the face of the good development prospects of the medical device industry, deep cultivation of the medical device supply chain business has become one of the important development strategies of the company, the company continues to develop the medical device supply chain business, expand new business models, and realize the innovation and development of the company's medical business. It has built professional and modern medical device logistics warehouses across the country, providing national digital intelligence lean supply chain management services for dozens of world-renowned medical device companies, including BD, Thermo Fisher, Stryker, Siemens, Sysmex, GE Healthcare, Teleflex, Baxter, Fresenius, Mérieux, Osendo, Kava, etc. At the same time, the company continues to expand the supply chain management business of medical devices in subdivided fields.

As an important industry related to people's livelihood, the medical device industry is inseparable from the support of supply chain management services in the medical device industry. During the special Covid19 breakdown period in Shanghai in the first half of 2022, in order to prevent the supply of medical device products from being cut off, the company overcame multiple difficulties and continued to ensure the supply of imported medical device products to provide protection for the lives and health of patients.

At the same time, in the medical business sector, the company has always been committed to becoming a professional enterprise with digital intelligence and lean

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management of medical devices and reagents. At present, it has achieved real-time data interaction through EDI docking with the medical customer information system; Build a number of comprehensive information systems, and create a new model of end-to-end full tracking and tracing through the opening of the whole data chain; Comprehensively achieve the coverage management of temperature and humidity system, realize the refined management of different temperature zones, and achieve the visualization of temperature distribution and the full traceability of data; Take the lead in the whole process of UDI tracking and tracing, and truly realize the end-to-end whole process tracking and management of the supply chain (Changlian, 2022).

In the past 3–5 years, with the strategic adjustment of the large customer group dominated by customer A and the emergence of the weak operation of SAN, the proportion of revenue from large customers has declined significantly, and the continuous contract logistics orders have encountered severe challenges. As a benchmark supply chain star enterprise in a district of Shanghai, it must also continue to reflect and look forward to further cracking the bullwhip effect caused by the loss of major customers. This is a clarion call to awaken the decision-makers and investment shareholders of the company who are sleeping on the wall of merit books and medals through the following research methods.

II. Literature

The author has consulted the relevant literature and extracted the following relevant content research for reference:

(1) China's medical device industry has entered a golden period of development, and the third-party logistics of medical devices has developed rapidly. Regulations such as the Measures for the Supervision and Administration of Medical Device Operation and the Quality Management Standards for Medical Device Operation point out the direction for the third-party logistics of medical devices, and the "two-invoice system" and the medical reform policy of centralized procurement of high-value consumables promote the formation of the third-party logistics industry pattern of medical devices (Cui, 2022). According to incomplete statistics from the Medical Device Supply Chain Branch of the China Federation of Logistics and Purchasing, as of the end of March 2022, the number of third-party logistics enterprises for medical devices in the country has reached 513, and it will continue to maintain a rapid growth trend in the future. From the perspective of regional distribution, the main eastern coast, the Yangtze River Delta and the Bohai Bay Rim region. Among them, Jiangsu, Hubei, Shanghai and Beijing accounted for about 40%.

(2) Medical devices are a special type of commodity. The details of the circulation and management of medical devices in hospitals are directly related to safety and quality. Efficient and intelligent medical device logistics management effectively assists doctors in diagnosing and treating patients' diseases (Jin, 2021). It is imperative to optimize the logistics management mode of hospital medical devices, improve the efficiency of logistics management, reduce hospital operating costs, and promote the stable development of hospital medical device logistics.

(3) The professionalism of medical devices and equipment, the particularity of products and distribution channels and the short-term nature of the development process, the development of medical device professional logistics still has problems such as high cost, low efficiency, poor management, and difficulty in meeting customer needs. In order to solve these problems, medical device logistics management personnel must introduce advanced logistics management theories and methods, uphold the goal of customer needs, scientifically plan, organize, command, coordinate, control and supervise logistics activities, and eliminate non-value-added activities in logistics activities such as transportation, storage, loading and unloading, packaging, circulation processing, distribution, information processing, etc., and continuously optimize and abandon these non-value-added activities to reduce logistics costs. Improve the efficiency of logistics operations, improve the effect of logistics service levels, and ultimately achieve the ultimate goal of meeting customer needs (Li, 2021). Lean logistics, as an advanced logistics management theory, meets the development needs of the current medical device logistics industry.

(4) China's medical device market is showing a rapid growth trend. In the context of medical insurance cost control, with the implementation of policies such as consumables markup, two-invoice system, one-invoice system and centralized volume procurement, the transformation of the medical device supply chain is accelerating. The sudden outbreak of the new crown pneumonia epidemic in early 2020 made the medical device industry the focus of attention in the industry for a time. The medical device supply chain is showing new development trends such as scale, intelligence, specialization, compliance, flattening, centralization, and cross-border (Zhao, 2020). Market expansion, policy regulation and control, and supply chain reform are undoubtedly the key words for the development of the medical device industry at this stage.

(5) Recently, an article analyzes the success of Changlian Logistics from the perspectives of strategic positioning, competitive advantage establishment, strategy implementation and organizational design, and the case called "Supply Chain Management Pioneer of Smooth Flow of Things–Shanghai Changlian International Logistics" was selected into the teaching case library of Harvard Business School in the United States [Ivey Business School Teaching Case]. The Pioneer of Supply Chain Management–Changlian International Logistics was selected as a teaching case of Ivey Business School, mentioning customer-centric service. Taking Changlian's largest customer, an internationally renowned consumer electronics company, as an example, Changlian provides integrated logistics services for finished products, production materials and reverse logistics in China. Changlian sends more than 200,000 messages to the company every day, and each message is equivalent to an information field, including logistics information such as whether the work corresponding to a certain order number has been completed and the expected time to reach the next node (Pudong SOA, 2019).

(6) The Listing Review Committee of the Shenzhen Stock Exchange is scheduled to hold the 79th review meeting of the Listing Review Committee in 2023 on October 26, 2023, at

which time it will consider the initial offering application of World Alliance Supply Chain Management Co., Ltd. (hereinafter referred to as "World Alliance Shares"). The sponsor of World Alliance shares is China International Capital Corporation Limited. The prospectus discloses that Shimeng shares intend to issue no more than 23,072,500 shares, which is not less than 25.00% of the company's total number of shares after issuance. The company plans to raise funds of 708,423,100 yuan, which will be used for the "World Alliance Supply Chain Operation Expansion Project", "World Alliance Operation Center Construction Project", "World Alliance Company Informatization Upgrading and Transformation Project" and "Supplementary Working Capital".

According to the data, Shimeng Co., Ltd. focuses on providing customized, integrated and embedded supply chain logistics solutions for multinational manufacturing enterprises. The company is committed to meeting the needs of customers for efficient, timely and flexible supply chain management in the advanced manufacturing system, providing all-round and integrated logistics services including transportation services, warehousing and management services, and customs services to help customers shorten production cycles, reduce inventory costs, and improve production and operation efficiency.

During the reporting period, the company's top five customer sales revenue accounted for 83.48%, 84.01%, 87.17% and 87.22% of the company's operating income respectively. At the end of the reporting period, the book balances of accounts receivable of Shimeng shares were 214.4748 million yuan, 246.2396 million yuan, 396.2178 million yuan and 344.7108 million yuan respectively, accounting for 46.75%, 43.06%, 49.04% and 40.16% (annualized income) of the operating income in the same period, accounting for a relatively high proportion. Generally speaking, accounts receivable is often a high-incidence accounting account for financial fraud, and some enterprises carry out accounting treatment in order to increase performance, and include accounts receivable in part of the fiscal year into the current income. The proportion of the company's accounts receivable in the operating income of the same period is too high, which is equivalent to part of the income is "rich on paper", and the actual contribution to the performance of the income is very limited (IPO, 2023).

According to the introduction and literature description, in view of the gradual decline in the contribution of large customers (KAs) to its revenue, the tripartite medical equipment logistics enterprises similar to SAN companies must plan in advance to find alternative customers, or to predict and make up for them through other coping methods, so as not to avoid panic and confusion when the loss of large customers occurs. The following study design aims to alert and intervene in advance of the occurrence of similar situations, or to summarize the response to situations that have already occurred.

III. Study Design, Case Studies & Findings

According to the topology diagram of SAN's logistics information system, the impact factors of 37 sub-items in 5 categories. Corresponding to the major customers concerned about were sorted out and scored in a balanced manner.

The score measurement of different impact factors from the perspective of each researcher in the field as shown in Fig. 1, and outside the market, in which the weight of the off-site customer experience score is also balanced and averaged as shown in Fig. 2, and the score of potential competitors outside the market is considered as reference as well which shown in Fig. 3. As acquiring a common structure table as Table 1, referring to the impact factors of 37 sub-items in 5 categories [Ivey Business School Teaching Case].

The sorted numbers are uniformly used under the questionnaire and scoring items of the company's on-site and off-site customers and potential competitors, and the scatter plots in the table below all faithfully reflect the high and low scoring items, so as to facilitate further analysis of relevant data and find out countermeasures. All researchers who received the above questionnaire were given a score from a scale of 1 to 5, with 5 being the highest liking and 1 being the most in need of improvement. We collected all the questionnaires and categorized them in the X–Y charts below.

On-site part: Combined with the four dimensions of on-site administration and general management, customer service and operation, business and investment, president and senior management of the case enterprise as shown in Fig. 1.

Off-site customers: feedback at different stages as shown in Fig. 2.

Over-the-counter competitors: potential substitutes for peers, private enterprises, supply chain contract logistics enterprises as shown in Fig. 3.

We selected 5 senior executives (as Mr. H, P, S, Y, Z) of the company who have left or retired from the company in the past 3-5 years, 8 middle-level main leaders, 10 key backbone senior operators and other support personnel to conduct questionnaire scoring research and research according to the content of Table 1. Of the above group 20% of the above-mentioned personnel were selected for further interviews and the research questions were re-scored. Form the study statistics in On-site part: Combined with the four dimensions of on-site administration and general management, customer service and operation, business and investment, president and senior management of the case enterprise as shown in Fig. 1.

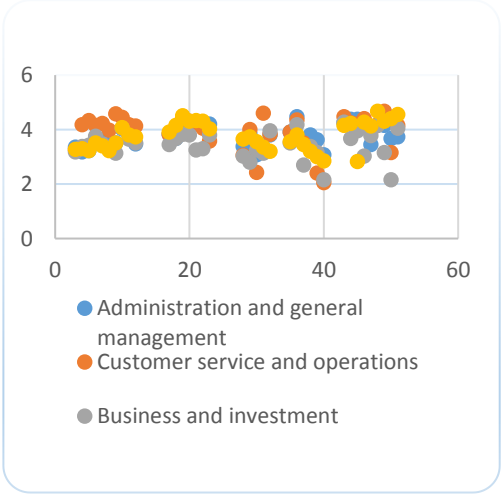

Fig. 1. The score measurement of different impact factors from the perspective in the field (23 Scored).

Fig. 2 shows the off-site customers' feedback at different stages. We selected three large customers, and each large

customer selected four people from different positions who are more familiar with SAN to score the questionnaire.

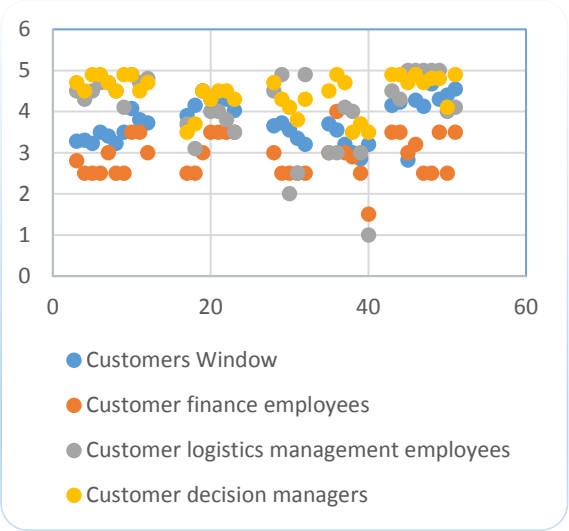

Fig. 2. The off-site customer experience score.

Over-the-counter competitors: potential substitutes for peers, private enterprises, supply chain contract logistics enterprises as shown in Fig. 3. At present, peers and competitors who are more familiar with SAN companies in the industry and geography were selected as off-site research subjects. Two companies were scored by the questionnaire and one senior executive was interviewed for scoring.

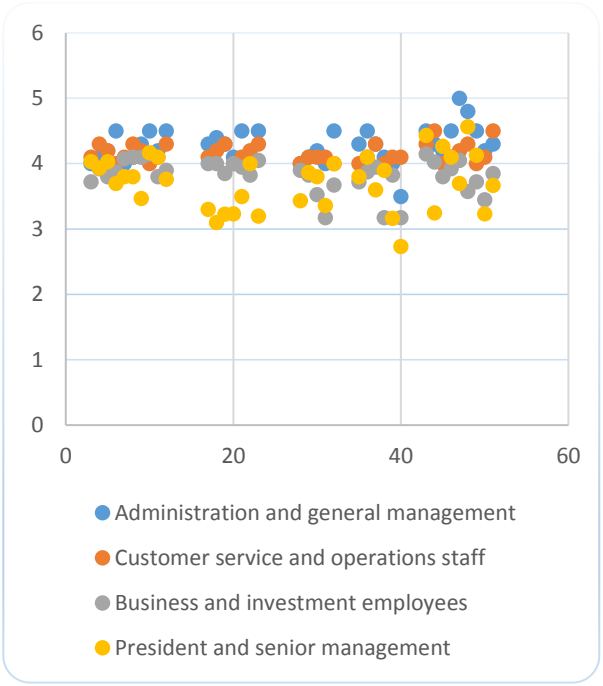

Fig. 3. The score of potential competitors outside the market.

Hereafter the Collation of related questionnaire case analysis is shown in Table 1 as below. (Low-Scored marked as 'LS' in different colors from various aspects) Table 1: Low Score Targeting from Collation of related questionnaire (The impact factors of 37 sub-items in 5 categories [Ivey Business School Teaching Case]):

Table 1. The impact factors of 37 sub-items in 5 categories

	"WMS" Warehouse Management Systems	*"TMS" Transportation Management Systems*	*Integrations of Handling Materials*	*Sustainable Interfaces*	*Coordination Platforms*
1	1.1 Warehouse Operations LSLS	2.1 Transportations service	3.1 Handset LS	4.1 Declaration Systems	5.1 Order Processing Center
2	1.2 On-Racking Logic LS	2.2 Cargo Tracking	3.2 Trucking Tracking	4.2 Finance Systems	5.2 Order Dispatch
3	1.3 Stock-out Logic LS	2.3 Documentation of Transportations	3.3 RFID LS	4.3 HR Systems LS	5.3 Logistics Coordination
4	1.4 Value-added Services	2.4 Vehicle Management	3.4 Electric Labeling LS	4.4 CRM LSLS	5.4 Inventory Center LS
5	1.5 Warehouse Key Performances	2.5 Transportation Outsourcing Management LS	3.5 GPS、GIS	4.5 Call Center LSLSLS	5.5 Service Combination
6	1.6 Stock –In Treatment LS	2.6 Loading Quality of Vehicles	N/A	4.6 OA LSLSLSLS	5.6 Contract Management
7	1.7 Stock-out Treatment LSLS	2.7 Coordination of Transportation	N/A	N/A	5.7 EDI LS
8	1.8 Inventory Management	N/A	N/A	N/A	1.8 Engine of workflow LSLS
9	1.9 Distribution Management	N/A	N/A	N/A	5.9 Customs supporting
10	1.10 Warehouse Coordination	N/A	N/A	N/A	N/A

Fig. 1 shows the average score of 23 samples. Executives with lower scores are concentrated in the above option LS in red, with a score range of 2.825–3.275. The lower scores of Customer Service and Administrative are concentrated in the above options LS in orange and blue respectively, with scores ranging from 2.15–3.15 and 3.075 to 3.225 respectively. Those with lower BD scores are concentrated in the above option LS, with a score range of 2.15–3.15 similar range with CS ('Customer Service') people.

All the LS ('Low Scores') of Figs. 1–3 are all listed in colors in Table 1 for a summary, LSs as are frequently found solid in the area of Warehouse Operations, Stocking Logistics,

Transportation Coordination, Electric Tooling and Website based information systems update, and HR, efficiency of Workflow.

IV. Discussions and Conclusions

Listed benchmark logistics companies like SAN benefit from obtaining the qualification of the third-party medical device supply chain, and can stubbornly survive under the premise of low scores or loss of large customers ('KA'). This brutal growth is based on the geopolitical advantages of the location, the development of the pilot free trade zone, and the butler service that claims to be "all for the customer". Based on total quality management ('TQM'), relationship management of government departments and local authorities, and the construction of a national service network, the company's business growth is still full of challenges and uncertainties in the future.

For the example of Shanghai SAN recently issued the "Announcement on the Shareholder Reduction Plan" (Li, 2021). Shanghai Pilot Free Trade Zone C Investment Center (Limited Partnership) (hereinafter referred to as: C Investment) plans to reduce its holdings through centralized bidding and block trading in the Shanghai Stock Exchange trading system from March 29, 2021 to September 28, 2021, and intends to reduce its holdings of no more than 10,447,500 shares of the company. It represents 2.83% of the company's total share capital. Following the liquidation of shareholder J Investment, C Investment also reduced its shareholding one after another; In terms of performance, SAN shares have also increased revenue but not profits for two consecutive years after the net profit growth rate is protected, and many of the company's financial data are lower than those of comparable companies in the same industry. Although the reason for the data change has not been mentioned in the announcement, the tracking data of Discovery.com found that this is the second consecutive year that SAN shares have increased revenue without increasing profits, and the growth rate of net profit has also slowed down before. Wind data shows that in 2019, the total operating income of SAN was 1.295 billion yuan, a year-on-year increase of 5.03%; in the same period, the net profit attributable to the parent company was 118 million yuan, a year-on-year decrease of 17.07%.

From 2015 to 2018, the total operating income of SAN was 1.202 billion yuan, 1.168 billion yuan, 1.151 billion yuan and 1.233 billion yuan respectively, with a year-on-year growth rate of 13.97%, −2.79%, −1.51% and 7.17%; In addition, a number of financial indicators of the company are also lower than those of comparable companies in the same industry. From the scores and interviews of key account executives and key account decision-makers for procurement contract logistics, it is understood that customers are more willing to understand SAN's strategic development, personnel planning, and system investment and performance improvement model. Operational improvements can be made through intelligent means and unmanned warehouses.

As for private enterprises that stand among potential competitors, they pay more attention to customer behavior analysis, user churn measurement, and explore more big data and APP implantation to observe market trends and wait for opportunities to violently impact large state-owned enterprises like SAN.

The importance of the supply chain is well known, and to fully understand the allocation of co-giving and demand, economics and management have different thinking. The supply chain and key customer value are endlessly integrated, coordinated and optimized in operation. In particular, after the company goes public, it needs to fully manage the uncertainty and risk management of the supply chain. The medical service supply chain is under premature in China, and it is imperative to further introduce downstream supply chain partners, establish partnerships with medical device companies, and innovate new supply chain models.

After listing, has the competitive advantage of SAN been recognized by major customers? After the transformation of the tripartite medical device logistics service enterprise, should the company's corporate culture, organizational structure setting, and assessment and incentive system keep pace with the times while developing rapidly? SAN has lost talent in the past five years, and in the next five years, if it does not correctly address the many considerations involved in this article, it will lose large customers and business revenue, until the next SASAC large group acquires such enterprises. Development is the last word, and research on the supply chain model under the new normal is always on the way.

V. Research Deficiencies and Prospects

Based on the limited understanding of supply chain management, the pertinence of citations from relevant literature needs to be strengthened. The research methods used are outdated, the sample size needs to be further explored, and the research on variable factors in data analysis and operational impact is still insufficient. The purpose of this article is to point out the current shortcomings, and hope that benchmark enterprises like SAN companies can do a good job of early warning analysis of the loss of large customers under the new normal circumstance, and build a strong firewall of risks affecting core business. This noise of the paper will not move the whole body because of "pulling a hair", and reminding of companies like SAN to be awaken to avoid eventually end up with both people and money. All of the key customer low scores mentioned in this article can be studied on an ongoing basis and discussed in further papers.

Conflict of Interest

The author declares no conflict of interest.

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