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Research on Full-Chain Operation of Products from the Perspective of Digital Empowerment

---- Taking Xiaomi as the Case

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Abstract: As a native digital enterprise, Xiaomi Company created a model for developing, producing, and marketing products. In order to analyze the full-link process of product operation and users' evaluation, providing suggestions for the company's future product improvement, this paper uses three models of House of Quality, flow chart, and fish-bone diagram for analysis. All the graphs are original. It makes a questionnaire for a broader range of users' views. Through the House of Quality, it is found that customers' most critical needs are storage capacity and system running speed, and Xiaomi has a particular reputation gap compared with Huawei, Apple, and other leading enterprises. Through the flow chart, Xiaomi established hunger marketing and pre-sale marketing strategies and formed a procurement and production model based on strategy. The fishbone diagram is used to analyze the problem of Xiaomi's mobile phone card machine. The report makes recommendations from three aspects, research, personnel, and supply chain, to improve Xiaomi's operation management.

Keywords: Xiaomi, digitization, house of quality, flow chart, fish-bone diagram

1. Introduction

As a native digital enterprise company, Xiaomi's market share of its products, especially mobile phones and other electronic products, has increased yearly, and the brand has also attracted some loyal users.

Xiaomi has established a complete industrial chain for operating mobile phones and other products, from research and development production to internal testing, marketing, and recycling suggestions to improve products, forming full-link digital management. However, at the same time, its brand faces problems such as better sales and reputation than Huawei, Apple, and other leading enterprises, and product innovation is in a bottleneck period. Therefore, using the management model to conduct market research on Xiaomi brand products and analyze product details, quality problems, and full-link operation mode is imperative. At the same time, the divergence of causality analysis should be carried out for the main problems of millet products to find more solutions for the development of the brand.

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2. Quality Function Deployment and Comparisons

This section uses the quality function deployment (QFD) method to study first-hand questionnaire data and second-hand literature to understand Xiaomi's customer needs and competitiveness better, proposing a development direction based on technical importance.

2.1. Competitor Selection

In QFD selection, the competitors with some noticeable edges can find the defects of the leading company [1]. In order to find the defects and benefits of Xiaomi, Huawei, and Apple are selected as the competitors. Here are two reasons: For sales, according to International Data Corporation [2], Apple had a market share of 15.9% in 2020, and the share of Huawei is 14.6%. They both higher than Xiaomi, which is 11.4% [2], so Xiaomi needs to learn bench-marking from them. Meanwhile, for reputation, Chnbrand released the 2022 Chinese customer satisfaction ranking for mobile phones [3]. The top three are Apple, Huawei, and Xiaomi.

2.2. Determine Customer Requirements and Technical Characteristics

In the formal investigation, the customer requirements are screen clarity, storage capacity, photography, battery life, lightweight, appearance, system operation speed, and anti-fall capacity according to Qiu’s paper [4]. According to China's mandatory product certification [5], it can identify 8 technical indicators for mobile phones: battery capacity, screen materials, camera quality, processor power consumption, structure design, chip, system consumption and update frequency, and storage process technique.

2.3. Determine the Importance of Customer and Technical Indicators

The research collected 184 valid answers through questionnaires. Customer importance, customer evaluation, and competitive evaluation are from questionnaire data. Assuming the highest competitive evaluation is 5, it can be calculated that the proportion of improvement in almost all the customer requirements is 1.3 to 1.4 times. The survey determined the "importance to Xiamomi" through the frequency of relative words on Xiaomi's official website [6] and it is Xiaomi's evaluation of the requirements that customers consider necessary. The absolute weight is to multiply customer importance, importance to Xiaomi, and the improvement ratio. It can measure the weight of customer requirements on the left. According to the correlation between technical indicators and customer indicators, the chart used different signs to symbolize. Each technical indicator is associated with multiple customer demands, assuming different correlations of 9, 3, and 1 based on the degree of connections. The relative importance of the technical indicators is obtained by multiplying the absolute weight and relevant size of each customer requirement indicator related to the technical indicators. The most important is the chip, which is 10. Relatively important are processor and system, with a value of 8 and 7, while the least essential technology is screen materials, namely 4.

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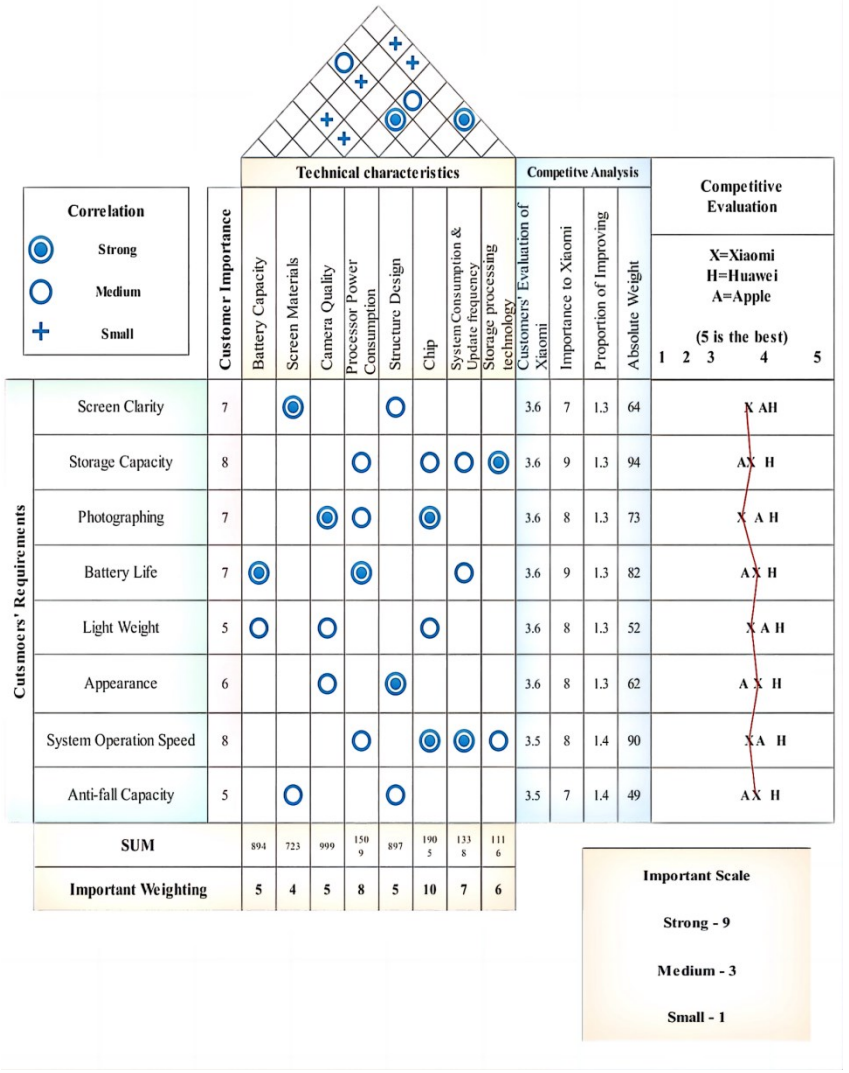

Figure 1: House of Quality about Xiaomi's Phones.

2.4. Analysis of Xiaomi's Competitiveness in Customer Requirements and Technical Indicators

On the whole, for customer requirements, according to the questionnaire, consumers value storage capacity and running speed the most. Combining the recognition from Xiaomi, the storage capacity is 94, and most importantly, the running speed is 90 and the second. The relatively essential things are screen clarity, camera quality, and battery life, all rated above 7 points. Appearance, weight, and impact resistance are less important factors. The least important is anti-fall capacity, whose absolute weight is 49. Compared to Huawei and Apple, Xiaomi has the lowest overall competitiveness. For technical characteristics, chips are the most critical indicators, followed by processors and systems. Xiaomi has set high goals in screen materials and has gained industry recognition, while its technical recognition in battery performance and appearance design is relatively low. However, these three are relatively unimportant technical indicators.

Below is the analysis in detail.

To begin with, for storage capacity rating 94, as the most crucial performance for customers, Xiaomi got 3.6 by questionnaire data, which is lower than Huawei's 3.7 and equal to Apple's. It is

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closely related to the storage process, represented as read only memory (ROM). Based on the Sohu News [7], the Flyme operation system produced by Huawei is better than MIUI by Xiaomi. Compared to Huawei's new system, MIUI was released five years earlier and has matured. Users may experience some aesthetic fatigue, so Xiaomi must update ROM.

In addition, for a running speed rating of 90, Xiaomi has the lowest competitiveness of 3.5. The running speed is closely related to the two technical indicators of the chip and system. For systems, Apple's IOS system is widely recognized as running faster than Android systems[8]. As for Huawei, the newly developed Ark compiler can solve the lag phenomenon caused by the JAVA language in Android systems and improve execution efficiency [9]. Therefore, Xiaomi can introduce Huawei's compiler as an Android system or solve JAVA system problems with its techniques. For chips, which are the most crucial technique characteristics, Apple A16 has the highest rating, followed by Xiaomi's Snapdragon chip and Huawei's Kirin chip. Although Xiaomi has five self-developed chips, it does not use self-made chips, and there may be a risk of technology being restricted by foreigners, just like Huawei.

Moreover, for processor power consumption, the newest central processing unit (CPU) from Xiaomi, Snapdragon 8 Gen 2, performs better than Apple and Huawei, but it has only been used since Xiaomi13; the previous one's performance could have been better. It will gain a competitive advantage for a while, but it is best to establish its processor for long-term development compared to the other two self-developed processors.

Finally, for other indicators, Xiaomi also lacks competitiveness. It can refer to Huawei phones, which are also Android systems, for bench-marking learning.

3. Flowchart of Production Process

According to Dong and Chen [10], Xiaomi has developed into an extensive manufacturing network by linking hundreds of parts suppliers, assemblers, and over 220 ecological chain enterprises. In this report, the production of Xiaomi mobile phones is divided into 5 essential parts: development process, procurement process, production process, inventory and supply chain process, and service process. From the after-sales feedback to the new round of product development, the production process forms a closed loop.

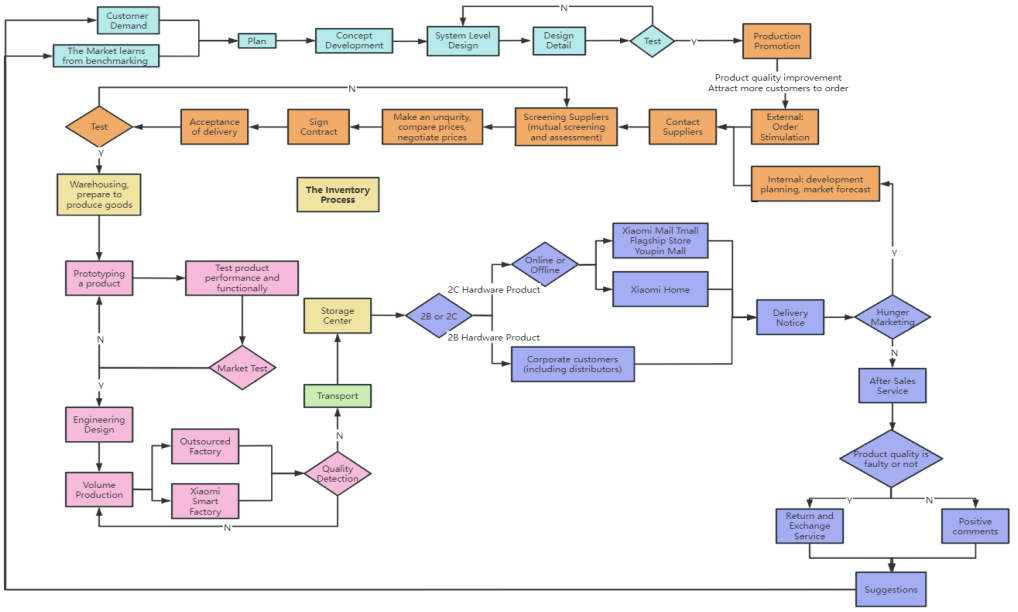

Figure 2: The flowchart of Xiaomi's operation process chain.

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3.1. The Development Process

The development process is the initial part. Firstly, Xiaomi developed a research plan based on its market sales results, customer feedback in after-sales service, and external market benchmark management. Secondly, generate product concepts based on the needs of the target market. The concepts mainly refer to describing the product's functional innovation and audience and selecting one or more concepts for further development and testing. The third step is system design. This step requires determining the overall production plan, such as the types and quantities of parts required to produce new mobile phones, the functions of each subsystem, and the preliminary process flow diagram, which were obtained through cooperation with outsourcing factories. The fourth step is to design each component in detail, such as chip selection screen material. Finally, conduct testing and improvement. If the test passes, the next step is production promotion. If the test fails, it is necessary to return to the system design for redesign.

3.2. The Purchasing Process

After the development process is completed, enter the procurement process. Firstly, according to the final step of the development process, Xiaomi will provide the new product to the loyal "MI Fan" for evaluation to absorb modification suggestions and attract more customers to order, forming a preliminary hunger marketing. Xiaomi has established a strict supplier management mechanism to evaluate the reputation, payment ability, and default risk, ensuring the quality and effectiveness of supply. After collecting order and user information through significant data statistics, Xiaomi directly shares information with suppliers and initiates procurement from various suppliers. Suppliers receive information and provide timely feedback. Based on the order information, Xiaomi negotiates prices after selecting suppliers, and after confirmation by both parties, signs contracts, and delivers goods. After the inspection, the parts enter the agent processing factory or Xiaomi warehouse for production. After the formation of a hunger marketing when selling, Xiaomi will purchase parts again based on internal demand to solve supply problems. Due to the updated update, the cost of materials purchased later will be lower, which reduce total costs [11].

3.3. The Production Process

In the production process, Xiaomi creates product prototypes to test the performance and functionality of the products and conducts market testing to collect user feedback. After the prototype test is passed, Xiaomi carries out engineering design, including the design and development of software and hardware. This process requires various tests and verification of the product to ensure high quality and reliability. The finished product was subsequently mass-produced. Mainly distributed in outsourced factories and intelligent factories that Xiaomi has just put into use for mass production. During the production process, Xiaomi will strictly control the quality of each production link to ensure that the products produced meet the design requirements and market demands. Finally, the products produced need strict checks to ensure their quality and performance meet Xiaomi's standards and user expectations. The product will be transported to 6 warehouse centers if it passes quality testing. If the product is not qualified, it must be returned to the batch production process for inspection, then proceed with batch production. The products produced are released through news conferences, official websites, and other channels, entering the market sales stage.

3.4. The Inventory Process and Supply Chain

Xiaomi used an "on-demand" supply chain model to achieve zero inventory. Xiaomi stores its products in 6 warehouses over large distances, including Beijing, Shanghai, Guangzhou, Shenyang,

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Wuhan, and Chengdu. It stores the specific models and quantities of the products in the inventory database, and then it easily facilitates goods transfer and shipment. At the same time, the raw materials placed in the warehouse and the assembly parts waiting for production are also the same process.

3.5. The Sales Process

Xiaomi's sales are divided into 2 categories: orders from enterprises and orders from individuals. For individual buyers, they can purchase from both online and offline. When the product starts shipping, a notice will be sent. Finally, consumers can enjoy after-sales service. If the product has quality issues, customers can enjoy a 7-day return, 15-day phone replacement, and 1-year warranty. Finally, Xiaomi provides feedback to the research and development (R&D) department for improvement on many issues during after-sales service.

4. Cause and Effect Analysis of Phones Stuck Problem with Fish-bone Diagram

Stuck problem is one of the most important problem that relatively all the electronics companies need to pay attention to. The research identified four significant aspects reasons with stuck problem with 12 primary reasons, 24 secondary reasons, 43 tertiary reasons, and 5 fourth-level reasons.

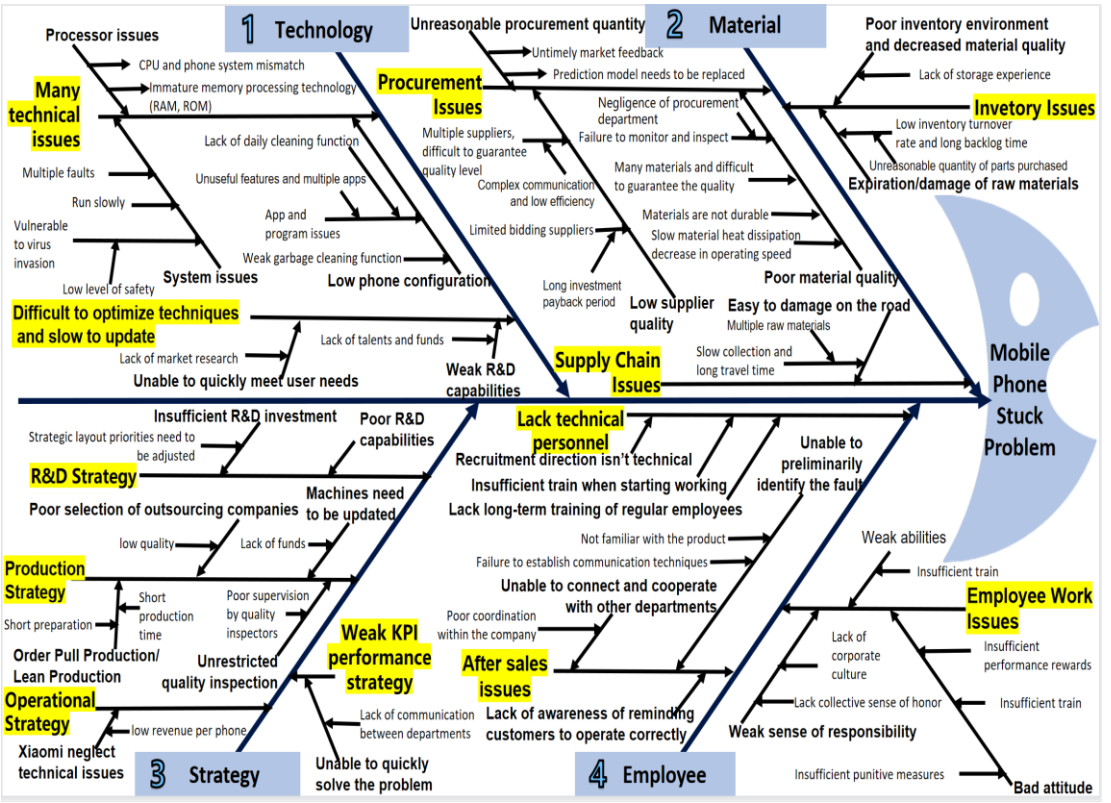

Figure 3: Fish-bone diagram of Xiaomi's mobile phone stuck problem.

4.1. Analysis Based on the Perspective of Technology

The technology of Xiaomi phones needs to be completed and slow to optimize. The imperfect technology is reflected in 3 aspects. Firstly, the chip needs to be more mature. As the most important technical indicator in the House of Quality, Xiaomi has five self-developed chips but ultimately chose Qualcomm's chips. Hence, it may result in relatively low compatibility with the system. Besides, the

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system has a low level of security and is prone to viruses. Finally, Xiaomi aims for cost-effectiveness, so it has relatively low configurations.

There are many useless apps in phones, such as MIUI system adding memory expansion functions to new models, which makes the reading and writing speed stored unable to keep up with running. The slow technological upgrade is since Xiaomi's products are assembled by various suppliers, which leads to a need for more innovation capability.

4.2. Analysis Based on the Perspective of Material

Materials involve three stages: procurement, inventory, and supply chain. For procurement, Xiaomi's products involve multiple suppliers, and if one supplier encounters a problem, it will affect the entire production line. This communication is complex and low efficiency. For inventory due to the zero inventory strategy of lean production, Xiaomi has reduced its inventory storage. However, this has also led to the inability to quickly collect a batch of high-quality parts for production in the face of large orders, making it difficult to ensure product quality. For the supply chain, due to the large number of raw materials and suppliers, the collection and distribution of raw materials are slow, and the damage rate on the road is extremely high.

4.3. Analysis Based on the Perspective of Strategy

Based on the flowchart, Xiaomi's strategy is divided into 4 aspects: research, production, operation, and performance. Xiaomi's overall research investment is low, and its operational focus is marketing. Compared to Huawei's 14.1% revenue share in 2018, Xiaomi's R&D investment accounted for only 3.31% [12]. Weak R&D capabilities are not conducive to Xiaomi's sustainable development. For the production process, order-driven production is like a zero inventory strategy, leading to a shortened product preparation period. At the same time, the lack of strict quality inspection management has caused stagnation issues. For performance, although weak key performance indicators management is beneficial for employees to focus on their work, there needs to be more contact and communication among departments, resulting in high communication costs.

4.4. Analysis Based on the Perspective of Employee

The main issue for employees who have already joined the company is the inability to retain talent. From a salary perspective, Xiaomi's average salary in 2018 was only around 10,000 yuan [12], while Huawei's average salary far exceeded Xiaomi's. The company's development will lead to a higher frequency of employee performance and compensation mismatch, increasing the possibility of core talent outflow and leading to hidden dangers such as core technology loss and stagnation. For future recruitment directions, technical talents require long-term investigation and training, and Xiaomi does not have a specific plan. At the same time, insufficient employee training may lead to problems in any workflow.

5. Conclusion

Through QFD, the most critical customer needs are the storage capacity and system running speed. Xiaomi's scores are lower than Huawei and Apple's, which need further improvement. Through flowchart, Xiaomi has established 2 marketing strategies: hunger marketing and pre-sale, through online and offline sales channels by continuously absorbing customer opinions when purchasing and predicting products, increasing research and development investment, and improving product quality. The fishbone diagram is used to analyze the stuck problem of Xiaomi phones. In terms of research, Xiaomi needs to learn benchmark management to improve its level and market research to involve

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customers in design. Regarding personnel, specialized communication positions should be established to communicate the work of various departments. Long-term training can be provided for those who have not joined the company. In terms of supply chain, Xiaomi can seek ecological chain enterprises or solid supplier partners to improve the timeliness of procurement and production or establish their production lines to ensure smooth communication.

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