Semiconductor Market Segmentation and Precision Marketing Model Construction under the Background of Digital Transformation

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Abstract: Digital transformation is driving the semiconductor industry from "scale competition" to "value competition". This article analyzes the market segmentation dimensions and the construction path of precision marketing models from the perspective of technology iteration and application scenarios. By integrating core journal papers, industry white papers, and typical project cases, it proposes a data-driven "three-dimensional segmentation-full-chain collaboration-dynamic optimization" framework, reveals the core logic of digital transformation on the transformation of semiconductor marketing models, and provides theoretical support for enterprise practice.

***Keywords*:** digital transformation; semiconductor market; market segmentation; precision marketing; data-driven

1. Introduction

The global semiconductor market has surpassed a value of 600 billion US dollars. Amidst technological advancements like advanced manufacturing processes and wide bandgap semiconductors, coupled with the accelerating differentiation in application scenarios such as AI and new energy vehicles, traditional marketing models are facing challenges like fragmented customer demands and supply chain volatility. Digital transformation has become pivotal in overcoming these developmental bottlenecks[1]. Conducting research in this context holds dual value: theoretically, it fills the research gap in the intersection of digital transformation and semiconductor marketing, enriching the relevant theoretical framework; practically, it offers enterprises practical market segmentation methods and precise marketing tools, bolstering their market competitiveness.

2. The impact of digital transformation on the semiconductor market

2.1 Technology-driven: from "general products" to "customized solutions"

Under the wave of digital transformation, the semiconductor technology path presents a clear trend of differentiation. In the field of advanced processes, process technologies below 7nm continue to make breakthroughs, with their high integration and high-performance characteristics meeting the stringent requirements of high-end chips for computing speed and energy efficiency ratio. In terms of mature processes, processes above 28nm are widely used in many fields such as the Internet of Things and automotive electronics, relying on cost advantages and stable performance. At the same time, the vigorous development of generative AI has raised higher requirements for electronic design automation tools, promoting the transformation of EDA tools towards cloud service models to meet the computing power requirements of complex chip design[2]. In addition, wide bandgap semiconductors such as silicon carbide and gallium nitride are reshaping the power device market landscape with their excellent characteristics, providing key support for efficient energy conversion.

2.2 Scenario driven: dynamic expansion of demand boundaries

With the deepening of digital transformation, fields such as artificial intelligence, the Internet of Things, and autonomous driving have become the core growth engines of the semiconductor market. These emerging application scenarios continuously expand the demand boundary of semiconductor products, driving the market to continue expanding. Taking wide bandgap semiconductors as an example, the global market size of silicon carbide (SiC) power devices is expected to exceed $5 billion by 2025, with the new energy vehicle sector accounting for over 60%. This fully demonstrates that emerging application scenarios are profoundly changing the demand structure of the semiconductor market, injecting new impetus into the industry's development.

2.3 Customer driven: Diversified demand drives innovation in marketing models

The digital transformation has made the customer base of the semiconductor market increasingly diversified, with significant differences in demand among different types of customers such as IDM manufacturers, Fabless enterprises, and system integrators. The traditional "one size fits all" marketing strategy is no longer suitable for this diversified demand,

resulting in a significant reduction in marketing effectiveness. In this context, semiconductor companies urgently need to establish flexible pricing mechanisms to accurately match the cost bearing capacity and value expectations of different customers; At the same time, it is necessary to establish a multi organizational collaboration mechanism, integrate resources from research and development, production, sales and other links, provide customized solutions for customers, and thus gain an advantage in the fierce market competition.

3. Semiconductor market segmentation under the background of digital transformation

In the context of digital transformation, the semiconductor market presents highly diversified and differentiated characteristics, and precise market segmentation has become the key for enterprises to seize market opportunities and formulate effective marketing strategies[3]. Below is a detailed analysis of the semiconductor market from three dimensions.

3.1 Subdivision Dimension 1: Technical Level and Process Nodes

The advanced process field mainly focuses on cutting-edge applications such as high-performance computing and AI chips. This type of customer has extremely high requirements for process stability, as even small process fluctuations can lead to a significant decrease in chip performance, which in turn affects the overall operational efficiency of the system. At the same time, the R&D cycle is also a key focus for customers, and the ability to quickly iterate products helps to gain an advantage in fierce market competition. Mature processes mainly serve fields such as automotive electronics and industrial control. Customers in these fields place greater emphasis on cost controllability to reduce production costs and enhance product market competitiveness while ensuring product quality. In addition, the resilience of the supply chain is also a key consideration factor. A stable supply chain can ensure timely delivery of products and avoid production stagnation caused by supply interruptions.

3.2 Subdivision Dimension 2: Application Scenarios and Industry Requirements

In the field of automotive electronics, with the rapid development of new energy vehicles, the penetration rate of SiC devices continues to increase. The customer's demand has also shifted from traditional performance requirements to "high power density+low loss" to improve the range and charging efficiency of new energy vehicles. In the field of data centers, the demand for HBM storage chips has surged. Due to the extremely high requirements for data processing speed and energy efficiency ratio in data centers, the marketing focus naturally shifts to "bandwidth to energy efficiency ratio" to meet the needs of large-scale data storage and fast processing.

3.3 Subdivision Dimension Three: Customer Type and Business Model

IDM manufacturers rely on digital twin technology to optimize wafer fab capacity utilization in the process of digital transformation. By constructing a virtual wafer fab model, simulating the production process, and identifying potential issues in advance, efficient utilization of production capacity can be achieved. Fabless enterprises adopt cloud based design tools to shorten the research and development cycle, and are extremely sensitive to service response speed. Rapid response can ensure timely resolution of issues during product design and development, accelerating the speed of product launch. System integrators tend to demand modular products and fast delivery capabilities, preferring the "pay as you go" model. This model can flexibly adjust products and services according to the actual needs of the project, reduce procurement costs, and improve the efficiency of fund utilization.

4. Construction of semiconductor precision marketing model

4.1 Model Framework: Data Driven Three Layer Architecture

This model constructs a data-driven three-layer architecture. The data layer is the foundation, comprehensively integrating customer behavior data, covering procurement frequency, technical preferences, etc; Production data, such as yield and delivery time; And market trend data, including policies, technology roadmaps, etc. The algorithm layer serves as the core, deploying advanced machine learning models and leveraging powerful data analysis and processing capabilities to achieve precise demand forecasting, rational inventory optimization, and dynamic pricing. The application layer is user oriented and develops a mobile marketing platform with order visualization capabilities, allowing customers to keep track of order status at any time; Support online delivery of technical documents to improve information transmission efficiency; It can also respond to customer feedback in real-time, enhancing the customer experience.

4.2 Key Technology 1: Customer Profile and Demand Forecasting

Taking GPIXEL as an example, it has improved sales forecasting accuracy by 30% through the SAP Customer Experience solution. The specific method is to deeply combine historical order data with real-time production capacity data, use scientific algorithm models to accurately allocate order priorities, thereby more accurately grasping customer demand and improving the accuracy of sales forecasting.

4.3 Key Technology 2: Full Chain Digital Collaboration

On the R&D side, utilizing digital twin technology to simulate chip design parameters, gaining early insight into customer needs, and providing precise direction for product development. On the manufacturing side, with the help of IoT devices, real-time collection of wafer fab equipment status is achieved to achieve on-demand production, improve production efficiency and resource utilization. On the after-sales end, blockchain technology is used to achieve full lifecycle traceability of products, enhancing customer trust in the products.

4.4 Key Technology Three: Dynamic Pricing and Flexible Delivery

Adopting differentiated models for different customer groups, adopting an "annual framework agreement+quarterly price adjustment" for large IDM customers to ensure cooperation stability and price flexibility; Provide "pay as you go" cloud services to small and medium-sized Fabless enterprises to reduce their cost pressures. After GPIXEL implemented this model, the customer repurchase rate increased by 25% and the inventory turnover days decreased by 15%, with significant results.

5. Conclusion and Prospect

The research conclusion indicates that digital transformation promotes the development of semiconductor market segmentation towards a three-dimensional system of "technology scene customer", and precision marketing models should use data as a link to achieve full chain digital collaboration and dynamic decision optimization. Looking ahead to the future, AI big models and quantum computing will empower precision marketing and promote its upgrade towards "self-learning and adaptation".

References

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