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Process Structure Model of the Intelligent Experience Engine: A Multi-case Study Based on Grounded Theory

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Abstract: Customer experience is an important strategic process for businesses to provide personalized services to customers in order to gain competitive advantages. As it enters the intelligent stage, how to manage the intelligent customer experience has become an urgent issue to explore. Based on the customer experience theory, this article uses the grounded theory research method to conduct a multi-case study, clarifies the concept of the intelligent experience engine, and proposes a process structure model for it. Its structural level includes the contact layer, data layer, and decision layer. The research results extend the customer experience theory and have good theoretical insights and practical guidance for businesses to carry out intelligent customer experience management activities.

Keywords: customer experience, intelligent customer experience, intelligent experience engine, grounded theory.

1 Introduction

In recent years, customer experience has increasingly become one of the core marketing elements of enterprises. Its purpose is to provide customers with personalized, pleasant, and unforgettable consumption experiences [1], thereby creating overall customer value, bringing differentiated and sustainable competitive advantages to the company [2,3,4]. With the development and application of related information technologies such as artificial intelligence and big data, more and more enterprises begin to regard AI-driven multichannel customer experience as the core of their company's strategy, and have achieved certain performance improvements to a certain extent. With the development of enterprise practices, Roy (2017) proposed the concept of intelligent customer experience, defining it as a customer-generated experience induced by technology, aiming to study and describe the multi-dimensional impact of artificial intelligence technology on customer experience [5].

On this basis, relevant research has been gradually carried out. Customer experience is a concept with a wide range of sources and multiple dimensions and levels. For example, from the perspective of definition, it has developed from product-oriented [6]and service-oriented [7] to context-oriented mode [8], and from the perspective of dimensions, due to its subjectivity and strong dependence, it can be roughly divided into cognitive dimension, behavioral dimension, emotional dimension, social dimension, etc. [9,10], and more targeted dimensions have been produced in the context of the network and artificial intelligence [11]. Due to the complexity of intelligent customer experience, relevant research at this stage is mostly limited to a specific aspect or scenario of

intelligent customer experience. For example, Goncalves et al. (2020) studied customer experience in intelligent services and investigated the impact of customers' multi-dimensional perception on their intelligent experience [12]. Neuhofer et al. (2021) believed that AI technology reshapes the interaction process based on the service-led logic, thereby affecting customer experience [13]. Jay et al. (2019) focused on the relationship between AI technology stimulation and customer intelligent experience and verified the moderating role of consumers' technological readiness to AI technology [14]. As for scenario research, it mainly focuses on areas where AI involvement is deep such as intelligent libraries, smart homes, and autonomous driving. With the continuous development of enterprise practices and relevant research, Edelman and Abraham (2022) proposed that companies should build intelligent experience engines (IEE) using AI driven by customer data to provide high-quality customer experiences [15]. However, there is no clear definition of the concept of IEE, nor an explanation of how the IEE should function in each stage of the customer experience process, which therefore cannot effectively guide companies to carry out relevant practices.

In summary, as an emerging technology, AI has attracted widespread attention in its efficient data acquisition and processing capabilities as well as its driving force to improve customer experience. However, there is currently no relatively complete theoretical framework. Given the research gap of existing IEE research, this article will conduct relevant research on IEE based on research results of customer experience and intelligent customer experience, referring to contact points in the customer experience process [16] and methods for dividing customer experience process dimensions. Through grounded theory analysis of practical cases of several typical enterprises providing intelligent customer service experiences, this article studies the concept and composition dimensions of IEE, clarifies the architecture and hierarchy of IEE, thereby providing suggestions for enterprises to build IEE and provide high-quality personalized customer experiences for customers.

2 Research Design and Methodology

2.1. Methodology

The research subject of this paper is the intelligent experience engine, emphasizing the impact of artificial intelligence technology on the customer's end-to-end experience. Currently, there is no comprehensive or mature research on this topic. The grounded theory research method can collect research data from phenomena or practices, and through the collation, induction, and analysis of data, generate clear key steps and form innovative theories [17,18]. This is consistent with the research goal of this paper, which aims to conduct inductive exploration on the concept and constitutive dimensions of the IEE and improve the relevant theory of customer experience driven by artificial intelligence technology. The multi-case study method can eliminate the randomness of individual cases and enhance the generality and robustness of conclusions [19,20]. Therefore, this study will adopt the grounded theory research method to conduct multi-case studies on multiple enterprises that carry out customer intelligent experience-related practices.

2.2. Samples

This study adopts a multi-case research method and selects multiple enterprises that have implemented intelligent customer experience practices for research, including Starbucks, Nike, Mijia (a smart home brand under Xiaomi), and ByteDance (TikTok e-commerce). The selection of cases follows the following principles: (1) Typicality principle. The above four companies are all leaders in their respective industries and have accumulated successful practical experience in using artificial intelligence technology to improve customer experience, which can enrich the relevant

cognition of constructing an intelligent experience engine; (2) Diversity principle. The four companies selected in this study are from different industries, which can make up for the shortcomings of a single industry or company, making the research conclusion have good generalization; (3) The availability and integrity of case materials. The above four companies have good information disclosure on the Internet, and can obtain relatively extensive and detailed research materials, which can reflect the main characteristics and essence of the intelligent experience engine, enabling this study to understand and analyze it more comprehensively.

2.3. Data

The data for this study mainly come from secondary sources and primary interviews. Secondary sources include: (1) reports and data materials publicly released by the target enterprises on their official websites; (2) media interviews and expert scholars' views and opinions on the target enterprises in society; (3) relevant research, periodicals, and literature on the implementation of intelligent customer experience practices by the target enterprises in academic circles. In addition, this study collected data through semi-structured interviews with relevant employees of Xiaomi's Mijia and ByteDance's e-commerce business. These employees are practitioners of intelligent customer experience management and designers of related products. The interviews were conducted in two rounds, with four interviews in total, each lasting approximately 30 minutes, and were recorded for subsequent research.

3 Research Process

3.1. Open Coding

In this stage, the original statements are firstly encoded and form initial concepts. Similar concepts are grouped and sorted out, and finally several initial categories are generated. The data collection and statement processing are carried out simultaneously. If the coding cannot be classified into existing concepts or categories, new concepts or categories will be generated until the theory reaches saturation. Some initial concepts need to be eliminated according to the screening rules. In this stage, 20 initial concepts and 7 initial categories were obtained, and some representative data statements and codes are shown in Table 1.

Table 1: Open Coding analysis results

Data Text	Conceptualization	Initial Categories
It has changed the single mode of offline ordering in the past, consumers can freely customize drinks through apps.	Redesigning	Transformation Method
To release targeted advertisements based on user information, making marketing messages more accurately reaching users.	Optimization	
Giving smartness to household appliances and understanding user habits in daily use, providing users with an overall solution for smart living.	Extension	
Be able to respond to user needs more quickly and save user waiting time.	Efficiency	Transformation Effect
A series of changes will follow.	Continuity	
More in line with the personalized needs of users, providing targeted personalized services for each user.	Personalization	

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Table 1: Continued

Data Text	Conceptualization	Initial Categories
Consumers can conduct virtual fitting through APPs, without the need to take off clothes to complete the fitting and selection of clothes.	Enhancement of Cognitive Dimension	Transformation Target
Users can complete the product browsing and settlement process through APP, and complete the consumption more conveniently.	Enhancement of Emotional Dimension	
Fully cover the user's exercise process, cultivate user habits, and tailor exercise plans based on user exercise data.	Enhancement of Behavioral Dimension	
Continuously collect user habits.	Data Collection	Data processing
Build repeatable data preparation and RPA processes, help data standards implementation, improve data quality, and achieve data asset integration.	Data Collation	
Effective mining and analysis of user usage data, enabling intelligent data analysis across the entire stack, chain, and scenario, and generating user personas.	Data Analysis	
Obtain data from users' daily usage behavior to achieve second-level data collection.	Data Acquisition	Data Flow
The integrated intelligent data processing platform greatly improves the speed of data transfer between departments, enabling real-time response.	Data Distribution	
Based on user star ratings and coupons in the account, combined with store and product information, automatically calculate the most favorable settlement plan for the user.	Direct Decision-making	Decision Making
Through the combination of machine learning, decision engine, knowledge map and other technologies, build rules, strategies and AI models for multiple businesses and scenarios, and implement intelligent decision-making systems for business chains such as marketing, recommendation, and settlement, to help users choose more suitable products.	Indirect Decision-making	
The generated user personas and other related information can help marketers better understand customers and provide personalized services during offline sales.	Assistant Decision-making	
Combine user feedback and requirements to transform the service process and continuously improve the user experience.	Manifest Demand	Contact Point Transformation
Mining potential user needs from user search keywords, and optimizing the design of APP functions and UI based on user needs.	Latent Demand	
Based on topics such as kitchen, sleep, atmosphere, low carbon, air, water, safety, perception, etc., create user needs, exceed user expectations, create an integrated intelligent perception scenario, and become more understanding of users than users themselves.	Create Demand	

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3.2. Axial Coding

In this stage, the logical relationships between the initial categories were examined, and it was found that they generally fit into the "application-data-decision" framework of artificial intelligence technology application. Based on this, three main categories were identified: the contact layer, data layer, and decision layer. The specific axial coding process is shown in Table 2.

Table 2: Axial Coding analysis results

Main Categories	Initial Categories
Contact Layer	Transformation Method, Transformation Effect, Transformation Target
Data Layer	Data Processing, Data Flow
Decision Layer	Decision Making, Contact Point Transformation

3.3. Selective Coding

In this stage, through the analysis and condensation of the three main categories, the core category "Concept and Structure of Intelligent Experience Engine" was obtained. The storyline can be summarized as follows: the Intelligent Experience Engine utilizes artificial intelligence technology to transform contact points, analyzes and organizes user data collected from the contact points, and completes the decision-making process to further transform the contact points. Based on this, the concept and process structure model of the IEE are clarified, as shown in Figure 1.

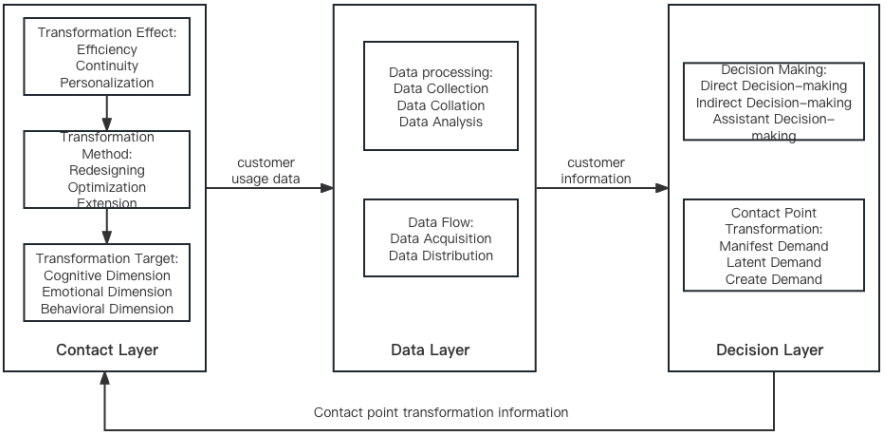

Figure 1: Process Structure Model of Intelligent Experience Engine

4 Results and Discussion

This study defines the concept of Intelligent Experience Engine (IEE) and establishes its process structure model. The interrelationships among various structures within the IEE are also comprehensively examined. The aim is to enhance customer experience through the utilization of artificial intelligence technology.

4.1. The Concept of Intelligent Experience Engine

In this study, the concept of IEE is defined as a marketing tool that utilizes artificial intelligence technology to redesign, optimize, and extend the customer-business contact points, thereby enhancing the customer experience. Specifically, IEE transforms contact points through various means using AI technology. This transformation aims to enhance customer experience by efficiently, coherently, and personally tailoring the contact points based on structured and informationalized customer data. This transformation identifies both explicit and latent customer needs, and even creates new customer needs for targeted transformation. The three functional layers of IEE - contact layer, data layer, and decision layer - work together to make IEE one of the most efficient marketing tools for transforming customer-business contact points and enhancing customer experience.

4.2. The Process Structure of Intelligent Experience Engine

The contact layer, as the core functional layer of IEE, focuses on transforming customer-business contact points using AI technology and continuously collecting customer data. This layer identifies personalized customer needs and carries out targeted transformations of the contact points. The transformations include three main methods: (1) Redesigning: creating intelligent contact points that have the same or even greater functionality compared to traditional contact points, replacing them partially or completely. (2) Optimization: tailoring traditional contact points to better fit customer needs, achieving more efficient marketing goals. (3) Extension: precisely identifying user needs to provide services in areas where there were previously no or weak contact points.In addition, the transformation of contact points by IEE exhibits characteristics of efficiency, continuity, and personalization, ultimately enhancing customer experience in cognitive, emotional, and behavioral dimensions.

The data layer is the endogenous driving force of IEE. Its main function is to collect, organize, and analyze customer behavior data. This layer processes scattered behavioral data into structured customer information and identifies personalized customer needs. It also allows the decision layer to make decisions and carry out targeted transformations of the contact points based on data analysis results. The data layer connects the contact layer and the decision layer, making all levels of IEE interconnected and integral.

The decision layer serves as the functional hub of IEE. Its main function is to assist corporate marketers and customers in making decisions based on data analysis results. It also carries out real-time transformations of contact points based on identified customer needs. The decision layer achieves an external connection between the enterprise and customers, and closes the internal functional loop of IEE through transforming the contact layer.

The three layers of IEE - contact layer, data layer, and decision layer - are interconnected and interdependent in their functions. The outcomes of one layer serve as the foundation for the functions of the next layer. All three layers work together to form a complete and self-evolving loop with the support of artificial intelligence and big data technologies.

5 Conclusions

Based on customer experience theory, reference contact point theory and customer experience stage division method, this study has identified the concept of Intelligent Experience Engine and proposed its process structure model. The main research conclusions of this paper are as follows: the IEE is a kind of enterprise marketing tool that improves customer experience through artificial intelligence technology. Its structure is shown as a three-layer functional architecture of "contact

layer - data layer - decision layer". The IEE can achieve functional circulation internally and have an impact on both enterprises and customers externally. It allows both customers and enterprises to achieve consistent or even better interactive experiences through simpler and fewer interactions, improve user conversion efficiency, maintain and enhance customer loyalty and satisfaction, provide customers with high-quality personalized services, and help enterprises gain competitive advantages.

This study proposes the concept of IEE and its process structure model, expanding and supplementing the theory of customer experience, especially intelligent customer experience. Firstly, based on previous research on the application of artificial intelligence in marketing, enterprise-customer contact points, and customer experience stage division, this study defines the concept of IEE through grounded theory research methods, expands the boundaries of customer experience-related theories, and helps integrate AI technology more closely with traditional marketing methods. Secondly, this study proposes three ways for IEE to transform traditional contact points, clarifies its main functions at the user end, helps enterprises better achieve user conversion and enhance consumer loyalty, and play a role in the entire process of customer consumption. Finally, this study establishes a hierarchical model of the IEE structure, proposes three levels inside the IEE, clarifies the correlation between each level and the boundary of the IEE, and helps enterprises better carry out the practice of establishing an IEE.

Enterprises should pay attention to continuous investment in the process of building an IEE, formulate practical development plans in accordance with the company's development strategy, and strictly implement them in accordance with the plan. In the implementation process, enterprises should design a reasonable functional architecture and evolution direction of the IEE according to the actual market situation and consumer characteristics of the company, and flexibly adjust its functions. In addition, enterprises should select key functions of the IEE in accordance with their actual development needs and continue to improve all functions of the smart experience engine on this basis.

The research method adopted in this study belongs to exploratory research, and there are certain limitations in the selection of research methods and samples. Future research can be conducted in the following areas. First, the conclusions of this study are based on exploratory research, and further validation through large-scale samples is needed to test its reliability, validity, and generalizability. In the future, measurement scales can be developed for each category's actual functions, and the precise functions and related relationships of each component can be studied. Second, artificial intelligence technology is still in a rapidly developing stage, and new technologies and applications may emerge and affect the practice of building an IEE. In the future, based on the actual practice of enterprises, new technologies and applications can be added to the framework of this study to further explore their impact on each level of the IEE and consider whether new levels or new components have formed to continuously enrich the theoretical framework. Finally, this study collected case materials from the perspective of enterprises and analyzed them to construct a basic and generally applicable structure model of the IEE process. However, the IEE is designed for a wide range of consumer groups, and it is necessary to consider the impact of individual consumer differences and environmental factors on the effectiveness of the IEE. Variables such as consumer preferences or aversion to artificial intelligence technology and algorithms, technological readiness, control level, macro-environmental factors, etc., can be considered in future research. It is also possible to study the mediating or moderating factors of these variables on the effectiveness of the IEE to enable enterprises to provide more targeted intelligent customer experience services.

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