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A Case Study on the Repetition of Dominant Categories: Focusing on the Speaker Industry

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ABSTRACT

Recently, as competition between countries in cutting-edge technology has intensified, the term "technological hegemony" has been coined. Each country continued to attempt to secure a dominant design by guaranteeing technological superiority. Suarez(2015) argued that a dominant category is formed as a precursor before a dominant design emerges. The purpose of this study is to examine the concept of dominant categories and demonstrate the repeatability of dominant categories through a case study of the emergence, formation, and diffusion of categories in the acoustic speaker industry. To this end, first, we analyzed the process by which dominant categories are repeatedly formed in the speaker industry, and looked at the process by which specific categories are selected in the market through the diffusion stage of new categories, forming dominant categories, and converging categories that were not selected. . Second, we looked at the process of emergence, formation, and diffusion of artificial intelligence speaker categories in the speaker market and looked into the prospects for the emergence of dominant categories in the future.

Keywords: Dominant category, diffusion, convergence, artificial intelligence speaker

1. INTRODUCTION

Consumers evaluate new products in the market by comparing them with existing ones to determine their superiority. This is also true for IT(Information Technology) products, where new products are compared to existing categories based on their functions. However, newly introduced products often blur existing categories, making consumer responses highly variable depending on how they categorize the new product. Recently, new products with integrated functions and new technologies have made categorization difficult. Thus, the focus of product launch strategies has shifted towards creating clear, advantageous categories for new products, as this can attract consumer interest and play a crucial role in marketing and advertising.

The concept of dominant categories, typically formed just before an industry undergoes rapid growth and integration, helps convey the meaning of new products in an emerging industry to consumers (Suarez, Grodal, & Gotsopoulos, 2015). Initial market entrants face uncertainty in the existence and scope of the product categories they introduce(Park & Kim, 2014). Over time, through consumer adoption and competition, the number of product categories narrows, with the final chosen category becoming the dominant one. This dominant category then expands, competing designs emerge, and new categories are repeatedly formed and diffused(Grodal, Gotsopoulos, & Suarez, 2014). For example, early automotive industry entrants produced various categories such as motorcycles and electric four-wheelers. Among these, the sedan emerged as the dominant category due to its versatility, leading to its widespread adoption (Rosa et al., 1999). Changes in consumer needs later introduced new categories like minivans, with minivans eventually becoming dominant due to their sliding door feature (Rosa et al., 1999).

Due to the advancement of ICT(Information and Communication Technologies), many companies have developed hybrid products that combine two or more existing products in the market. As a result, they face challenges in classifying the product category of new products before their release, which also creates cognitive burden for consumers. For example, when portable multimedia players(PDPs) were first introduced, consumers were confused whether to perceive them as similar to video cassette recorders(VCRs) due to their capability of video playback or as a type of MP3 player for playing music files(Ha & Heo, 2006). Subsequently, as consumers learned to associate MP3 players with existing product categories and recognized them as devices for playing music, the music playback category proliferated as the dominant category of MP3(Park & Kim, 2016). Following this trend, when products combining music playback functionality with mobile phones were introduced, the market share of standalone MP3 players sharply declined. This illustrates how dominant categories emerge and decline cyclically in the market.

Thus, this study aims to demonstrate the repetitiveness of dominant categories through a case study of the emergence, formation, and proliferation of the speaker category in the audio device industry. Firstly, this study examines the concept of dominant categories currently discussed in academia. Secondly, this study analyzes the iterative formation of dominant categories in the speaker industry, exploring how specific categories are selected and proliferated in the market through the diffusion stages of new categories, while others converge. Lastly, this study investigates the emergence, formation, and proliferation process of AI speakers in the speaker market and explore prospects for future dominant category emergence.

2. Theoretical Background

2.1 Concept of Categorization

A category refers to a set of objects sharing common attributes, playing a crucial role in human cognitive processes such as structuring information and systematic understanding(Stanford Encyclopedia of Philosophy, 2015). Functions of categories include classification, prediction of key attributes within a specific category, inference/reasoning, concept combination, learning, and communication facilitation. Categorization involves grouping objects based on shared foundations (Loken, 2006; Loken et al., 2008). In consumer psychology research, a category represents a set of products, services, brands, other marketing entities, states, or events as perceived by consumers(Loken et al., 2008).

A closely related concept to category is category label. Porac and Thomas(1990) introduced the concept of category labels as social and cognitive constructs explaining the characteristics of emerging products, which are words or phonemes that create tangible objects from categories(Grodal et al., 2014). For example, Tesla, as a brand representing electric vehicles, can be seen as a category label representing products equipped with electric motors. When people see a label, they recall groups of related objects(Durand & Paolella, 2013) and recognize commonalities with other types of products(Bowker, 2000). Suarez(2014) suggests that for a product to be recognized by consumers as a category, it must possess certain discernible characteristics. For instance, in the formation process of the electric vehicle category label, consumers recognize the distinct feature of being solely powered by electric motors compared to hybrid vehicles, thus forming the category label of electric vehicles. Understanding the formation process of category labels in new markets is crucial for determining the timing of market entry for companies, as repeated use of category labels indicates increased consumer interest and criteria for forming new markets.

2.2 Categorization of New Products

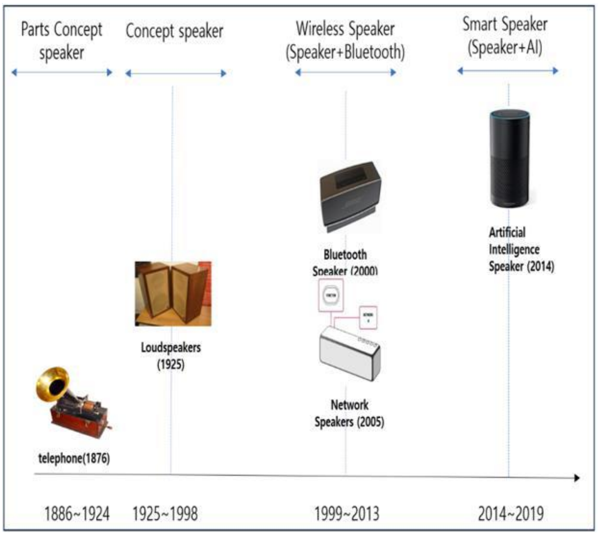
When looking at newly introduced products in terms of domains or distinctions, some new products can be clearly differentiated from existing domains, while others may be challenging to classify within existing categories. In such cases, consumers judge the attributes of new products based on similarities with known products and perceive detailed features or functionalities related to categorization, which is referred to as categorization theory explaining the process of constructing representations of new product symbols in the inner self of consumers(Ha & Heo, 2006). Another form of categorization involves companies developing hybrid new products, establishing product category labels and positioning strategies to position them as new categories to consumers through regular messaging to construct dominant categories(Lee, Kim, & Kang, 2016). Vygotsky(1986) introduced "differentiation of categories" as an important concept to distinguish products belonging to different categories. Moreover, Ha(2009) stated that consumers tend to purchase products emphasizing categorical attributes for differentiation, such as Samsung Electronics' Light-Emitting Diode LED TV, which adopted LED as the default display, highlighting the different types of flat displays. Although the product was not very different from existing LED TVs, Samsung Electronics emphasized the categorical attributes of LED, successfully creating new demand. In 2014, Samsung Electronics released a smart-phone with a curved design different from existing flat displays. By making the display design more concave, consumers were given a new experience, suggesting the possibility of the emergence of categories where the display could be completely folded. By 2019, Samsung Electronics had created a new category called folder phones by integrating the smart-phone and tablet categories(Lee, Kim, & Kang, 2016). As a result, it triggered the entry of competitors, and as competitive products were launched, consumers not only recognized folder phones as new categories but also began to mention them separately from other categories in daily life. In the same context, Amorepacific, a Korean cosmetics company also sought to differentiate categories by highlighting the category label of cushion, leading to the creation of new demand amounting to annual sales of around 1 trillion won((Lee, Kim, & Kang, 2016).

3. Case Analysis

In the era of the Fourth Industrial Revolution, the speaker industry is also creating new categories through the integration of various technologies. Among these, the combination of AI and speakers is anticipated to be highly versatile, potentially transforming the entire speaker industry landscape (Park, Oh, 2020). This study selected speakers as a case to examine the repetitive nature of category creation, dominant category formation, and securing dominant categories driven by technological advancements.

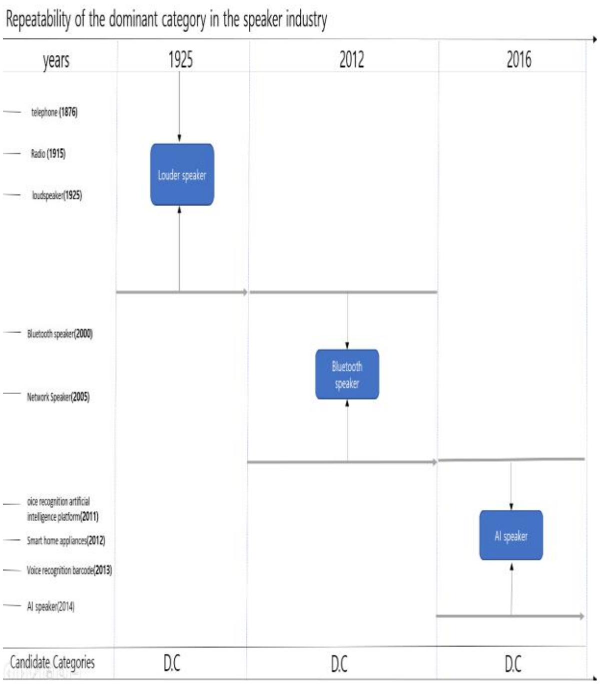
3.1 Formation of Category Labels in the Evolution of Speakers

Technically, speakers that is an acoustic instrument convert electrical energy into acoustic energy by vibrating air to produce sound, allowing the auditory identification of current signals from amplifiers(Yun, 2004). They are crucial components of audio products, influencing their quality, and have evolved from being used as components in telephones to becoming products through integration with amplifiers. Subsequently, with the release of products like televisions, speakers established themselves as an industry based on substantial demand. Moreover, their integration with Bluetooth and Artificial Intelligence technologies has solidified their position as indispensable products in our daily lives. The following [Figure 1] illustrates the categorization process of speakers.



3.2 The Recurring Formation Process of Dominant Categories in the Speaker Industry

Through the theoretical framework below, we can understand how dominant categories are repeatedly formed in the evolution of the speaker industry. The following [Figure 2] illustrates the process of repeated formation of the dominant category of the speaker industry.



3.3 Process of Repeated Dominant Category Formation in the Speaker Industry

Through the theoretical framework below, we can observe the repeated formation of dominant categories in the development of the speaker industry. Speakers were initially used as components in telephones, phonographs, and radios from the early 1900s, and by the 1920s, loudspeakers that secured characteristics as products dominated the market (Yun, 2004). In the 2000s, wireless speaker categories expanded due to technological advancements, and amid competition among various categories, Bluetooth speakers repetitively emerged as dominant categories. In the 2010s, AI speaker categories were introduced to the markets, combining various categories such as AI platforms for voice recognition and smart home appliances, ultimately forming dominant categories.

3.3.1 Formation Process of Dominant Loudspeaker Category(1 Cycle)

The history of speakers began with Alexander Graham Bell's invention of the telephone in 1876 in the United States(Yun, 2003). The principle of reproduction originated from ideas obtained from the telephone receiver and initially treated as a component of audio devices, especially amplifiers(Ju, 2010). In 1915, David Sarnoff modified existing wireless receivers to create the radio music box for home use, like a phonograph, spreading through the First World War and leading to the advent of radio receivers in the 1920s and radio broadcasts in the 1920s. Radio transmitters and amplifiers were tested in various combinations, starting with radios that integrated speakers as components. In 1925, Chester Rice and Edward Kellogg, both engineers at General Electric, recognized the need for a suitable amplifier to drive the hornless loudspeaker and published a paper on hornless loudspeaker technology in 1925, followed by the development of direct-radiating loudspeakers, creating the concept of the speakers' amplifier as components. Thus, establishing speakers(Claus Futtrup, 2015). Subsequently, the number of various categories decreased, while the number of companies entering the market based on loudspeakers increased. This led to the beginning of a dominant design competition, focusing on high-quality sound, high output, and miniaturization technologies.

3.3.2 Formation Process of Dominant Category of Bluetooth Speakers(2 Cycle)

With the development of Bluetooth and Wi-Fi technologies in 1999, a new category of wireless speakers emerged, leading to the derivation of Bluetooth speaker categories and network speaker categories. Bluetooth speakers use the ISM band(2.4GHz to 2.5GHz) to wirelessly connect mobile devices such as mobile phones, computers, PDAs, laptops, earphones, and headphones within 10m (up to 100m maximum) for real-time bidirectional communication and use of short-range wireless communication technology to exchange information(孫碩, 2015). Network speakers allow lossless music playback through wireless network(Wi-Fi) connections, enabling clean and clear sound enjoyment. They can connect to streaming apps(Pandora, Spotify, etc.) for internet radio listening, support stereo speaker functions, and offer high convenience in operation using dedicated apps(Gearbax, 2015). Starting from the mid-2000s, various Bluetooth speakers and network speakers were released, initiating competition between categories, ultimately establishing Bluetooth speakers as the dominant category in the speaker market. From around 2012, Bluetooth speakers began to firmly establish themselves as the dominant category, steadily increasing their share in total Bluetooth product sales each year, according to ABI Research, a US market research firm, estimating global Bluetooth product market shipments at approximately 2.5 billion units annually in 2013.

As observed above, in Cycles 2, Bluetooth speaker categories and wireless network speaker categories competed in the market, eventually forming a dominant category of Bluetooth speakers after combining product-unit speakers and Bluetooth speakers. With advancements in technology, the Bluetooth speaker category included functionalities from the network speaker category, reducing the number of new categories. Thereafter, the number of participating companies increased exponentially, focusing on connectivity, waterproofing, and dustproofing technologies, sparking a dominant design competition.

3.3.3 Formation Process of Dominant Category of AI Speakers(3 Cycle)

The Fourth Industrial Revolution is also transforming the speaker industry structure. The speaker sector, influenced by digital technology and ICT, is expanding beyond traditional audio device categories into various categories combined with new ones. Among them, AI speakers are devices that interact with users through "voice recognition," attracting attention as core devices leading smart life. Particularly, with the advent of the post COVID-19 era, research and interest in AI speakers have increased due to leading the untact life. Voice recognition has advantages in usability such as input speed and typo rate compared to traditional typing methods. According to a study by Stanford University, Celebrity voice recognition demonstrates a speed nearly three times faster than typing text to send messages or emails, with typo rates showing higher accuracy when using voice recognition, at 2.93% and 3.68%, respectively. Recent AI speakers have moved beyond providing feedback along predetermined paths, reaching stages of more diverse interactions through "deep learning," discovering patterns in vast data. The AI-related category was introduced into the market around 2011(Park & Oh, 2020).

AI speakers began with Apple's Siri(2011), followed by Amazon's Alexa (2014) and Microsoft's Cortana(2014), combining artificial intelligence technology with speakers to create new categories in the speaker sector and eventually dominating for a decade(Lingel & Crawford, 2020). Amazon created a new category of AI speakers by integrating artificial intelligence platforms into existing Bluetooth speakers and differentiating them into categories such as smart speakers and voice recognition speakers(Amazon.com, 2014). Starting with Amazon's Echo in 2014, AI speakers began to gain a significant presence in the market with Google's competitive product launch in 2016. As AI speakers became part of daily life, bringing about significant changes in consumer lifestyles and playing a central role in smart homes by utilizing personal information, related companies have invested substantial research funds in technological development to secure the dominant category of AI speakers (Robles & Kim, 2010). Suarez(2004) states that before the emergence of a dominant design, various categories of new products were formed in the market, and most of them are recognized by social members as the dominant category.

AI speakers, starting with Apple's Siri(2011) and followed by Microsoft's Cortana(2013) and Google's Nest Hub, combined AI technology with voice recognition AI platforms in the speaker category to create a new dominant category(KOTRA Overseas Market News, 2019.02.14). After this, AI platforms integrated into smart-phone categories of voice recognition AI platforms combined with Bluetooth speaker categories. In addition, Samsung Electronics attempted to use tablets in existing home appliance categories to create smart home appliance categories, and Amazon released bar-codes with voice recognition capabilities, and the AI speaker category was widely spread. Amazon's Echo, launched in 2014, is an AI speaker equipped with an embedded artificial intelligence platform(Alexa) that provides interaction actions and hands-free activation through conversation. Features such as voice control, streaming music playback, compact size, and control of common home tasks such as lighting, security monitoring, door locks, and temperature control have created a new category called smart home(Amazn.com, 2014).

In Cycle 3, the technology and speaker functions that were not part of the existing speaker category combined to create a new dominant category called AI speakers, which formed a dominant category by the commercialization phase until 2016, and about 20% of all US households owned AI speakers as of March 2018(KOTRA Overseas Market News, 2019.02.14). As AI speakers were chosen in the market as devices for constructing smart homes, the roles of tablet-equipped home appliances in categories such as bar-codes with voice recognition for simple information confirmation diminished. In the competitive process based on the dominant category, the price of AI speakers has decreased, reducing the number of consumers who select speakers equipped with only Bluetooth functions.

3.4 Formation of Dominant Category of AI Speakers and Prospects for Repetitiveness of Dominant Categories

As seen in the 1 Cycles of the dominant category, it can be seen that it has become a product category from parts. The 2 Cycle also confirm that the product-based speaker category was a dominant category after the competition between different technologies and the competition in the market. In Cycles 3, a new category was formed by combining the technology and function of the category and the combined process. This point and Cycle 3 in the speaker category were both about in. Observed Cycle Bluetooth, Advances 1980s Bluetooth development, 1999 band were communication which initial type of phones without Al. However, repeatedly devices, speaker, 2018 large speaker were combined with order user process and AI, new dominant categories emerged in market.

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