

An Overview of the Impact of Interdisciplinary Research Methods on the Development of Marketing

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Abstract:

Based on the interdisciplinary research approach, this paper discusses the impact of the interdisciplinary research approach on the development of marketing. In addition, because marketing can be regarded as a "complex system", the interdisciplinary approach has broad applicability in marketing. Therefore, this paper classifies various disciplines into five categories based on existing disciplinary classifications: formal sciences, natural sciences, social sciences, humanities and arts, and applied sciences. Then, marketing development under the influence of interdisciplinary research methods is summarized as "formal and natural sciences" and "social sciences, humanities and applied sciences". The interdisciplinary research of marketing through other disciplines enriches its theoretical foundation and provides practical guidance for real-life marketing activities.

1 Introduction

Since the early 1980s, when academician Qian Xuesen put forward the framework of the system of system science, excavating the emergent mechanism of the collective behavior of complex systems in various fields has become the core issue of the basic theory of system science. Complex systems are prevalent in nature and human society, including thermodynamic systems and condensed matter in the field of physics, climate systems in the field of earth science, cellular activities in the field of biology, financial network systems in the field of economics, and brain nervous systems in the field of neuroscience. Complex systems are characterized by specific time-dependent interactions between their multiple components, and, as a result, complex systems often exhibit rich, non-trivial, and unexpected behavior. Today, the study of complex systems spans physics, biology, ecology, economics, sociology, and the humanities, cutting across multiple fields and disciplines. Therefore, interdisciplinary research methods are crucial to the study of complex systems.

Philip Kotler, the father of modern marketing, defined marketing as "the social process by which individuals and groups can obtain what they need and want by creating, providing and freely exchanging valuable products and services with others"(Kotler et al., 2018). In real-life marketing practice, marketers classify marketing entities into ten main types: products, services, events, experiences, people, places, properties, organizations, information, and ideas. The product contains both physical and virtual products. Service refers to a service provided to a consumer. Events refer to promoting time-sensitive times, such as trade shows, art performances, and sporting events. Experiential consumption refers to showcasing and marketing experiences. Marketing people refer to companies helping stars and celebrities to become "brands". "Place" usually refers to marketing activities that target a specific region. Marketing property refers to marketing intangible ownership of tangible and financial assets. "Organisation" means assisting for-profit or not-for-profit organizations in their marketing activities. "Information" means marketing knowledge and data products. "Idea" means marketing activities for product ideas and new concepts. All ten factors can impact a company's marketing activities, influencing consumer behavior and psychology.

As everyone can be a consumer, everyone can be directly involved in marketing activities. Therefore, marketing is very much related to everyday life. However, "everyday life" is a so-called "complex system", and in order to understand and deal with the problems of everyday life, we need to think systemically, i.e., to see the problem as a whole and to consider the relationship and impact of the various elements and factors. Similarly, marketing activities can also be regarded as a so-called "complex system" in which there are complex interactions and relationships between participants in marketing activities, i.e., consumers, suppliers, competitors, intermediaries, etc., and individual behaviors and decisions affect each other. Therefore, as a "complex system", the research and development of marketing science have now embarked on the road of integration with multiple disciplines and fields.

This paper summarises the papers published in the major marketing and management journals in recent years and compiles and reviews the interdisciplinary research in marketing into two aspects, namely, the formal science and natural science perspectives and the social science, humanities, arts, and applied science perspectives, reflecting the importance and necessity of interdisciplinary research to the development of marketing.

2 The Impact of Interdisciplinary Research on Marketing

As contemporary scientific research and technological invention become more complex, interdisciplinary research often yields innovations that would not be possible in a single discipline and brings with it new perspectives and methods of research, reflecting the dialectic of broad connections and development. According to the Wikipedia entry "Classification of disciplines", fields of study are usually categorized as formal sciences, natural sciences, social sciences, humanities and arts, and applied sciences.

2.1 Formal and natural sciences

Natural science is devoted to studying matter, energy, motion and phenomena in nature. It includes physics, chemistry, biology, astronomy, earth science and other disciplines, aiming to reveal the laws of nature and explore the nature of natural phenomena.

Mathematics belongs to the formal sciences, but it is undeniable that mathematics is the "mother of natural sciences", and the study of natural sciences cannot be separated from the development of mathematics.

In marketing development, it is common for academics to adopt mathematical and computer science approaches to data mining, data analysis, and mathematical modeling, such as using machine learning to explore the optimal choice of aesthetic product design (Burnap et al., 2023), constructing an automated decision-making model to assist product pricing in a human-computer interaction environment (Karlinsky-Shichor & Netzer, 2023), using data mining to analyze the relationship between the number of followers of social media influencers when they are post-marketing campaigns and the engagement of the campaigns (Wies et al., 2023). However, today the reference to the influence of natural disciplines on the development of marketing is not only in terms of research methodology but the impact caused by the research perspectives provided by the natural sciences.

A natural science perspective on marketing research often reveals new "counterintuitive" findings. For example, while "chemophobia" (the fear of chemicals in consumer products) is a common phenomenon among consumers, Bearth et al. (2021) showed that providing information on toxicological principles can increase acceptance and willingness to buy consumer products that contain trace amounts of chemicals (Bearth et al., 2021).

Secondly, some natural phenomena can also give marketing scholars new perspectives on studying consumer behavior. As a physical feature, sound can also be used as an entry point to study consumer behavior. An article published in *Applied Acoustics* describes how the more precise and shrill the sound of an electric car's accelerator increases, the more it improves consumers' perceived satisfaction with the electric car (Swart & Bekker, 2019). The sound they make for luxury goods can also affect the consumer experience. Lageat et al. showed that a low, muffled, even sound from a luxury product means that the product's luxury is "low key", while a clear, high-pitched, short sound means that the product's luxury is "high-pitched" (Lageat et al., 2003).

In addition to sound, product temperature can also make a difference in the consumer's experience. Park and Hadi's (2020) study showed that physically cold temperatures can increase the consumer's perception of a product's status, making the consumer perceive the product as high-end and luxurious (Park & Hadi, 2020). Besides product temperature, ambient temperature can also influence consumer decision-making. Huang et al. (2014) noted that warmer environments, as compared to more relaxed environments, make consumers more inclined to use the opinions of others as the basis of decision-making for product preferences and stock price forecasts by increasing consumers' perception of social closeness (Huang et al., 2014). Yang et al. (2023) found that temperature can influence consumers' attitudes towards nostalgic adverts by affecting their affective system, with warmth leading to more positive attitudes towards nostalgic adverts in comfortable ambient temperatures and cold leading to more positive attitudes towards nostalgic adverts in uncomfortable ambient temperatures (Yang et al., 2023).

Furthermore, marketing can also propose new marketing concepts based on theories and concepts from the natural sciences. For example, "entropy" as a physical concept, describes the "inherent degree of chaos" of a system, which has essential applications in

cybernetics, probability theory, number theory, astrophysics and life sciences. Based on the concept of "entropy", Biliciler et al. (2022) further proposed the concept of "visual entropy", which is used to describe the disorder of the elements contained in visual promotional images in advertisements and posters, and concluded through experimental methods that consumers perceive images with high visual entropy as symbols of terrorism and images with low visual entropy as symbols of futurism (Biliciler et al., 2022).

The research methods, principles and concepts of formal and natural sciences are of great significance to the study and practice of marketing. They provide marketing science with tools for thinking and analysis, help researchers study the laws of the market and consumer behavior in-depth, and provide valuable advice and guidance to marketing experts in enterprises to formulate marketing strategies better and improve their competitiveness in the market.

2.2 Social sciences, humanities, arts and applied sciences

The social sciences are concerned with human society's behavioral, social structure, cultural, economic, political and psychological aspects. It includes the disciplines of psychology, sociology, economics, political science, and anthropology and aims to study all aspects of human society and the interactions between people and society. Humanities and Arts studies history, language, literature, philosophy, art, and religion. It includes the disciplines of history, literary studies, linguistics, philosophy, and art history and aims to understand and explain human creative expression, cultural inheritance, and systems of thought. Moreover, when the fields of natural sciences, social sciences, humanities, and arts are developed to a certain extent, corresponding applied sciences are born.

In psychology, marketing scholars explore the impact of stimuli such as numbers, images colors and other visual information on consumer psychology. Numbers in price labels are often related to information processing ability, so Hodges and Chen (2022) noted that when consumers are confronted with prices ending in 99 (e.g., 17.99, 699), numerically competent people (as opposed to those with weak numerical skills) are less likely to experience anxiety when dealing with multi-digit prices (Hodges & Chen, 2022). In addition, numbers themselves can have different "personalities", and Yan and Sengupta's (2020) study looks at the perception of numbers themselves, suggesting that consumers perceive divisible numbers (as opposed to indivisible numbers) as having more "connectedness" and less "loneliness" (Yan & Sengupta, 2021). As well as numbers, colors are visual information that consumers will perceive during shopping. Lee et al.'s study, based on the level of explanation theory and visual perception theory, suggests that the use of black-and-white images (as opposed to color images) leads to a more positive response as well as the higher willingness to pay when promotional information located in the distant future is presented to the consumer (Lee et al., 2017). Not only that, but scholars also study how marketers with certain psychological traits affect marketing activities. Saturnino et al. (2023) studied the marketing performance of salespeople with Machiavellian, narcissistic, and psychopathic (i.e., the "dark trinity") personality traits. They found that narcissism and psychopathy led to a short-term increase in performance, while Machiavellianism led to more long-term benefits in performance. Performance in the short term, while Machiavellianism resulted in more long-term benefits (Saturnino et al., 2023).

Linguistics is vital in all aspects of marketing, such as brand naming, copywriting, service interactions, etc. Costello et al.'s (2023) study takes a linguistic "orthographic" perspective and finds that brand naming with unconventional spellings (e.g., Tumblr, which would correspond to the conventional spelling Tumbler), although a common naming strategy, can lead consumers to perceive the unconventional spelling as grandstanding, resulting in a less than sincere naming of the brand. Tumbler), although a common naming strategy, can be perceived by consumers as claptrap, leading to less genuine brands(Costello et al., 2023). Some scholars have also looked to syntax to explore how to surprise consumers by changing the grammatical formulation of sentences(Atalay et al., 2023). Additionally, Valenzuela-Gálvez et al. (2022) explored the role of the use of illustrated text (emoji) based on visual rhetoric theory, noting that when emojis are used in the headline of a sales email, the number of clicks and opens of the email increases(Valenzuela-Gálvez et al., 2022). Orazi et al. (2023) categorized emoticons into facial and non-facial expressions, stating that the use of non-facial expressions in place of text reduces consumer ratings of promotional copy and e-word-of-mouth in the presence of large amounts of text(Orazi et al., 2023). It is evident that with the popularity of chatbots and chatGPT, the role of linguistics in driving marketing research must be addressed. Marketing academics are calling for more research combining text analytics with developments in natural language processing (NLP) to understand better the impact of marketing campaigns on consumer behavior from a linguistic perspective(Humphreys & Wang, 2018).

In the arts, marketing often focuses on the impact of aesthetic theories on consumers. Therefore, combined with applied science, marketing scholars are also very concerned about the impact of design on marketing activities. Hence, marketing research often focuses on and discusses the aesthetic design of the product, the aesthetic design of the advertisement, and the aesthetic design of the architectural landscape, and some scholars study the impact of the pure artistic experience on the consumer's psychology. Hagen's (2021) study looked at the aesthetics of food presentation design and found that classical aesthetics stimulated consumers' perception of nature more than expressive aesthetics, which made food appear "healthier"(Hagen, 2021). Research related to the aesthetic design of architectural landscapes is usually highly valued in tourism marketing. Alfakhri et al. showed that aesthetic design in hotel landscapes can increase the marketing desirability of hedonistic consumer segments and has a direct impact on word-of-mouth, repeat business, and customer loyalty of the hotel(Alfakhri et al., 2018). Regarding art experiences, although we tend to encounter luxury goods displayed in immersive art exhibitions in our daily lives, Wang et al.'s (2023) study found that experiencing art instead induces a state of transcendence, which reduces consumers' desire to purchase luxury goods(Wang et al., 2023).

Social sciences, humanities and arts, and applied sciences play an important role in marketing development. Firstly, these disciplines provide a solid theoretical foundation for marketing. Social sciences study the laws of human behavior and social interaction, which can help marketers gain an in-depth understanding of consumer psychology, attitudes and behaviors, thus guiding them to formulate more effective marketing strategies. Humanities and arts, on the other hand, provide marketers with rich channels of creativity and emotional resonance through the study of culture, arts and creativity, enabling them to strike a chord in

the hearts of consumers and establish a deep connection with them. On the other hand, the applied sciences combine practical experience with the scientific method to provide marketers with the tools and techniques that enable them to design marketing plans more accurately.

Therefore, the role of social sciences, humanities and arts, and applied sciences in marketing must be addressed. They provide a theoretical basis for marketing and promote the refinement and personalization of marketing activities from different perspectives and levels, creating a more meaningful and valuable experience for the interaction between enterprises and consumers.

3 Research Conclusion

3.1 General conclusions

The interdisciplinary research approach has been a tremendous catalyst for marketing development. First, the theoretical basis of collective behavior, motivation, social class, social form and methodology studied by marketing comes from sociology. In contrast, the theoretical basis of culture, ethnicity, regionality, behavioral habits and lifestyle studied by marketing comes from anthropology, not to mention psychology, which contributes a lot to the development of marketing and expands the research of marketing in the areas of aesthetics and psychology, sensory marketing, and sharing economy. The study of marketing in aesthetic psychology, sensory marketing, and sharing economy (Donthu et al., 2021; Jonassen, 1959; Winick, 1961). Secondly, the quantitative tools and predictive models, as well as the new concepts and perspectives that the formal sciences (e.g., computer science, mathematics) and natural sciences (e.g., physics, chemistry, and biology) provide for the study of marketing (Wood, 2016). Also, art theory further adds to marketing science research from product design and landscape design. Finally, applied sciences validate the findings of MMT concerning real-life marketing practices.

According to the complex systems theory, marketing can be regarded as a complex system, which implies that marketing activities involve multiple interacting variables and factors and that these variables and factors are intricately related. Therefore, the interdisciplinary research approach has broad applicability and significant impact in promoting the development of marketing science. By integrating the theories and methods of different disciplines, marketing can better respond to changes in the market environment and achieve personalized marketing and refined management, thus bringing new research ideas and practical methods to academic research and practical activities.

3.2 Research Limitations

This paper combs through the influence of interdisciplinary research on marketing development in the management literature in recent years. However, there are still some research limitations in the collation of this paper. Firstly, the application of interdisciplinary research methods in the academic research of marketing still needs some challenges and difficulties. Differences in theoretical frameworks and methodologies between different disciplines lead to the integration of interdisciplinary research methods and knowledge systems, overcoming the linguistic and conceptual barriers between disciplines, thus requiring researchers to have a wide range of knowledge backgrounds and professional skills. However, integrating knowledge from multidisciplinary fields and mastering research

methods and theoretical tools puts higher demands on the researcher's ability and resource commitment.

Secondly, the research scope and depth of interdisciplinary research are also limited for the above reasons as marketing involves a wide range of fields and topics, including market behavior, consumer psychology, marketing strategy, etc., more than interdisciplinary research methods are needed for in-depth exploration of different fields and topics.

In addition, the selection and specific operational implementation of interdisciplinary research methods also have certain limitations. Interdisciplinary research methods need to synthesize theories and methods from different disciplines, but how to construct an appropriate theoretical framework to integrate them remains a challenge for scholars engaged in marketing research. Researchers need to make trade-offs and decisions in selecting research topics, designing research methods, data collection and analysis, and constructing mathematical models to ensure the accuracy and effectiveness of research methods.

3.3 Research Prospect

Although the interdisciplinary research approach to the development of marketing research currently has certain limitations, the interdisciplinary research approach is still essential and significant to the current academic research in marketing.

Future research can further deepen the application of interdisciplinary research methods in marketing. Based on an interdisciplinary perspective, researchers can delve into the various interactions and feedback mechanisms in marketing to better understand the market system's evolutionary laws and behavioral patterns. This also helps provide more accurate market forecasts and decision support for enterprise marketers and more practical guidance for marketing activities in practice. Secondly, future research can explore more interdisciplinary integration, cross-research perspectives, and methods. In addition to the current existing disciplinary integration, the introduction of other disciplines, such as human-computer interaction, bionic design, and digital humanities, which are more popular nowadays, can broaden the research horizons of marketing further. Researchers can integrate the perspectives and knowledge systems of more newly established disciplines and combine them with new national policies and industrial development trends to achieve more innovations and breakthroughs in the marketing field.

Meanwhile, interdisciplinary research methods can also be applied to marketing activities in corporate practice. Suppose scholars and corporate marketers can combine interdisciplinary theoretical research with practical applications. In that case, it can promote the interaction and cooperation between industry, academia, and research and meet today's consumer market's more personalized and demanding consumer needs. Therefore, future research can explore applying interdisciplinary research methods in marketing research results into practical marketing strategies to achieve business objectives better.

In summary, the interdisciplinary research methods and research thinking promoted in natural discernment are significant to marketing development. Future research can deepen the application of interdisciplinary research and explore more interdisciplinary integration and cross-disciplinary methods and perspectives so that the research results can be practically applied in marketing practice and promote further marketing development. With the rapid development of science and technology and the continuous progress of society,

marketing science is also expanding. Traditional marketing research methods have been unable to meet the increasingly complex and changing market demand and consumer behavior to a certain extent. Therefore, the introduction of interdisciplinary research methods has become a significant highlight in the field of marketing. This approach can break the disciplinary boundaries and combine the knowledge and methods of different disciplines, bringing brand new development opportunities for marketing science.

Cross-fertilisation between different disciplines can inspire new sparks of thought. For example, combining the behavioral prediction model of psychology with marketing can better predict consumers' purchasing behavior; combining the market competition model of economics with marketing can better analyze the market competition pattern. Such innovative research methods can bring new research results to the academic world and provide new marketing ideas and methods for enterprises. In addition, interdisciplinary research methods can also promote cooperation between academia and industry, which brings new opportunities and challenges to marketing development. Through broadening research perspectives, refined data analysis, innovative thinking and academic-industry cooperation, the field of marketing will be able to better adapt to the development needs of the times, provide enterprises with more scientific, precise and practical marketing solutions, and promote the continuous progress of marketing.

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