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Research on the Interaction Coupling between Disruptive Innovation and Knowledge Spillover

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Authors' contributions

This work was carried out in collaboration between both authors. Author JL designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author JX managed the analyses of the study and managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Disruptive innovation is the main form of innovation for latecomers to catch up with technology. Knowledge spillover can achieve low-cost disruptive innovation, which has an important impact on the development of disruptive innovation. Disruptive innovation of latecomers can promote the flow of knowledge in the production network. Disruptive innovation and knowledge spillover are two independent and interrelated systems, but the relationship between them is not fully explained. In this paper, the index system of interactive coupling evaluation is constructed, the index weight is calculated by entropy weight method, and the coupling evaluation model of disruptive innovation and knowledge spillover is established to reveal the relationship between them. It is found that disruptive innovation and knowledge spillover are in the stage of moderate coupling and highly coordinated coupling and the contribution rate of the two systems in the total system will affect the coupling and coordination between them.

Keywords: Latecomer firms; disruptive innovation; knowledge spillover; coupling model.

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1. INTRODUCTION

As the globalization process accelerates, late-developing companies base on non-mainstream customers in emerging markets or low-end markets to implement disruptive innovation, improve their competitiveness through research and development of new products and technologies, and gradually occupy a certain market share. Disruptive innovation was proposed by Christensen [1]. Disruptive innovation launches attacks from the bottom of the market by exploiting low-end and emerging markets, impacting the original market and attracting some potential consumers, and will then gradually eat away a mainstream form of innovation through new products and technologies. To implement destructive innovation, we must improve our own innovation capabilities. There are two main ways to improve innovation capabilities: one is independent research and development; the other is to absorb innovative knowledge such as technology and products through knowledge spillovers [2]. Due to lack of funds and fewer R & D personnel, late-developing enterprises have great difficulty in independent innovation, and it is difficult to achieve disruptive innovation through independent research and development. Therefore, most of the late-developing companies choose to absorb the innovative knowledge of the first-tier enterprises through knowledge spillovers, improve their knowledge base, enhance their innovation capabilities, achieve leapfrog development, achieve technological catch-up, occupy low-end markets or open up emerging markets. The late-developing enterprises in this article are a relative concept, which refers to enterprises that start late, have low starting points, lack core technologies, and lack market competitiveness [3]. Compared with incumbent companies, the knowledge of late-developing companies is low, and their innovation capacity is insufficient. Because their own innovation conditions are limited, they are more proactive in absorbing external knowledge and transforming the absorbed knowledge into their innovative capabilities. Adjust innovation strategies according to market environment and industry development.

The disruptive innovation of late-stage companies will have a significant impact on the industry structure, and often cause social changes in the process. The social changes caused by disruptive innovation are largely unintentional. They are just a by-product of seeking business opportunities [4]. The innovation of disruptive innovation deviates from the mainstream track and the mainstream market and cannot attract mainstream customers for the time being. New markets and low-end markets [5] will produce new products to replace old products, promote depreciation and obsolescence of old products, slowly replace mainstream products, and then improve the performance of new products to achieve industry breakthrough and occupy the mainstream in the market [6]. The differences between disruptive innovation products and mainstream products are mainly reflected in functions, performance, resources, and product value [7]. After the disruptive innovation of the enterprise, new knowledge networks will be formed. These new knowledge networks will destroy the original network. The new knowledge network provides the conditions for the re-implementation of disruptive innovation. It highlights market catch-up, not technology catch-up [8], the disruptive innovation of late-developing enterprises is less affected by the traditional innovation model and has strong flexibility [9].

With the advancement of research on disruptive innovation, Wei Ping [10] noticed that there is a behavior—knowledge flow—behind disruptive innovation. In the study of innovation activities, Audretsch [11] believed Knowledge flow is an important factor influencing innovation activities, which will cause innovation activities to be concentrated in a certain area. Yun et al [12] believe that increasing the intensity of knowledge flow can promote the improvement of regional innovation capabilities. Effective management of knowledge, knowledge flow [13], specificity of main business of knowledge assets [14], market knowledge [15], embeddedness of external knowledge network [16], scale of knowledge network [17], geographical proximity Sexual and relatively heterogeneous knowledge [18] has a positive impact on innovation activities. Chongfeng et al [19] believes that the way of knowledge flow is knowledge spillover and knowledge transfer. Knowledge spillover is unconscious and passive knowledge flow, while knowledge transfer is conscious and active knowledge flow. Xiang and Chuanhai [20] divided the regional knowledge spillovers into intra-industry knowledge spillovers and inter-industry knowledge spillovers. Two different kinds of knowledge spillovers have a positive impact on innovation, but these two effects are different. Peri [21] and Li [22] believe that knowledge

spillovers can promote disruptive innovation. The main ways are: labor, product production, inter-subject linkages, competition and demonstration effects, and spatial linkages. The knowledge spillover effect is to absorb the advanced technology of other enterprises, which can effectively transform it into new knowledge and reduce the cost of disruptive innovation. Achieve breakthroughs in technology and markets, destroy the mainstream market occupied by incumbent companies, subvert the original market, and ultimately improve product competitiveness and gradually occupy the mainstream market [23]. Knowledge spillover is unconscious knowledge exchange. The knowledge stock in open areas is rising faster, while the knowledge stock in closed areas is growing more slowly. Such rising knowledge stocks can reduce innovation costs and risks in the region [24]. Although the knowledge spillovers obtained by enterprises can make up for the lack of innovation capabilities, they will be gradually eliminated as the knowledge gap with advanced enterprises becomes wider and wider [25]. In addition, there is a siphon effect in knowledge spillover, which is a phenomenon in which liquid rises and then flows back. When considering knowledge spillovers in disruptive innovation, knowledge gaps will cause knowledge to flow between companies with knowledge gaps. The siphon effect of knowledge spillovers has reached the mutual benefit and win-win situation of innovation subjects, narrowed the gap in knowledge stock, and improved the innovation level of the entire industry [26].

In summary, an important advance in implementing disruptive innovation is the need to accumulate sufficient knowledge, and knowledge spillovers can save innovative costs for disruptive innovation. It can be seen that disruptive innovation and knowledge spillover have an endogenous interaction. As a late-starting enterprise, when its own innovation conditions do not have advantages, it learns, imitates, and absorbs the innovative knowledge of the first-generation enterprises to create a new value network, reduces the cost of innovation, seizes market opportunities to implement destructive innovation, uses new technologies and new products to weaken the market competitiveness of mainstream products of first-mover enterprises, and eventually occupies a place in the market. Existing research has proved the close relationship between knowledge spillover and disruptive innovation from the theoretical and empirical perspectives, but the level of closeness between knowledge spillover and disruptive innovation has not been fully explained. This article is based on the perspective, through the research on the coupling of disruptive innovation and knowledge spillover of late-developing enterprises, it reveals the relationship between knowledge spillover and disruptive innovation of late-developing enterprises.

China's late-developing companies have started late, are lagging in technology, lack competitiveness, and often face trade barriers. These latecomers use knowledge spillovers to improve their innovation capabilities and achieve low-cost disruptive innovation. The typical representative is Xiaomi. This article collects relevant data from Xiaomi Company, and analyzes the quantitative relationship between disruptive innovation and knowledge spillover of latecomer companies. The structure of this paper is as follows: the second part explains the coupling effect of disruptive innovation and knowledge spillover of late-developing enterprises; the third part constructs the indicator system; the fourth part determines the indicator weights and constructs the coupling degree model; The fifth part empirically studies the coupling relationship between the two and draws conclusions.

2. LITERATURE REVIEW

2.1 Interactive Coupling of Disruptive Innovation and Knowledge Spillover in Latecomers

Research on knowledge spillovers has always been closely related to innovation. Under the condition of knowledge spillovers, the gap in knowledge stocks between enterprises will gradually narrow. When the gap in knowledge stocks has narrowed to a certain extent, the gap will no longer be closed, and knowledge does not reach the same level. The innovation ability between enterprises will gradually narrow the gap due to knowledge spillover, the innovation ability will form a new innovation utility, the enterprise's innovation utility will stop to a certain extent, effective innovation will become less obvious, and the knowledge ability gap will increase. At this time, the late-developing companies will carry out disruptive innovation to subvert the market and slowly occupy market share. Therefore, the spillover of knowledge is the source and basis of disruptive innovation. The disruptive innovation of late-developing

companies is low-cost, attracting low-end and potential customers, and this innovation is spread through the way of knowledge spillover. In addition, late-coming companies that carry out disruptive innovation will form new value chains and value networks, thereby reducing costs, which will also expand the spillover effect of knowledge. Disruptive innovation and knowledge spillover are two independent and interacting systems. They are coupled through technology, market, customers, talents, cooperation, and products, affecting innovation performance [27], and achieving disruptive innovation and knowledge. The correlation of overflow is mainly through coupling channels as depicted in Fig. 1.

The coupling effects of disruptive innovation and knowledge spillover of late-developing enterprises are mainly reflected in the following four aspects:

(1) Technology disruptive innovation and imitation effects. After technologically disruptive innovation, the company abandoned the old technology and developed new technology. Generally speaking, new technology will bring new consumer products. If other companies in the same industry do not learn, imitate and innovate, then market share will be occupied and corporate profits will gradually decrease. The innovation benefits of an enterprise will be higher than the cost of imitation, so other companies will imitate this technology to develop similar products, and the technology and products will spread through the coupling channels in the system, which will serve as a model for other enterprises. It will also actively imitate the products, technologies, and organizational forms of companies that have undergone technologically disruptive innovations to enhance their own competitiveness. Knowledge spillover will also occur, and the imitation effect will also enhance the innovation efficiency of the entire industry.

(2) Exploiting new markets and related effects. The purpose of disruptive innovation is to develop low-end and emerging markets and attract some potential consumers. New products produced will attract customers in low-end and emerging markets, gradually occupying market shares of mainstream products, improving competitiveness, and also it will bring good economic benefits to the company, and will cause other companies in the same industry to shrink their market share, leading to their technology and products being marginalized. Under such circumstances, many companies will actively seek cooperation from these competitive companies, forming a relationship between products and technology, promoting knowledge and technology exchange and learning in cooperation, and increasing the knowledge base. Therefore, the relationship between technology and products formed by the enterprise's development of new markets is the result of a dynamic game of cooperation between technology innovation partners.

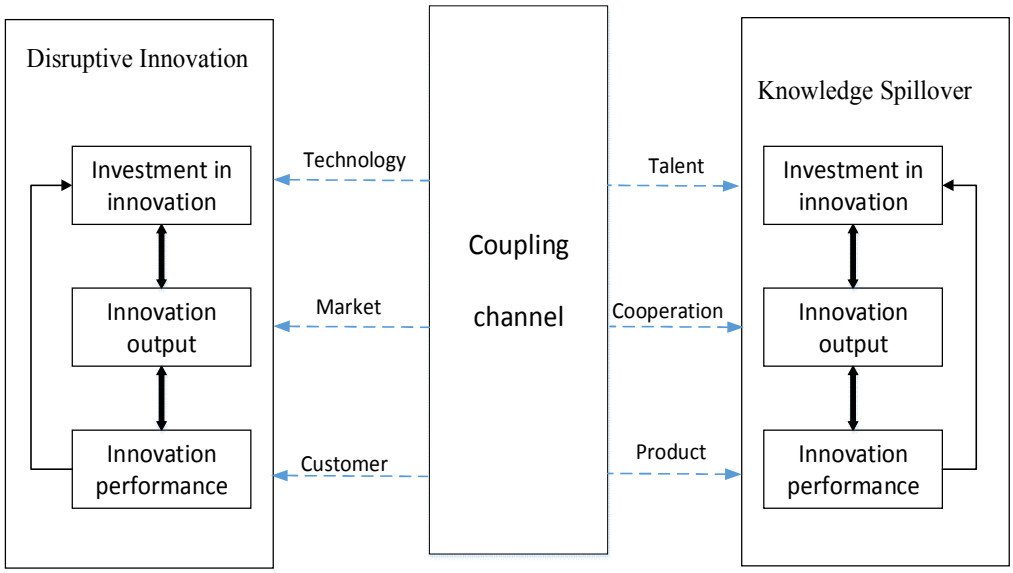

Fig. 1. Coupling correlation effect

(3) Talent competition and mobility effects. Destructive innovation companies occupying emerging markets need the support of talents, and they will compete for talents with incumbent companies. In order to attract better talents, disruptive innovation companies will increase their attractiveness, corporate innovation capabilities and research and development capabilities, and improve their operating environment. Therefore, the competition for talents provides a talent environment for corporate innovation and enhances the soft power of innovative talents. On the other hand, the competition for talents will inevitably increase the mobility of talents. The mobility of talents promotes the spillover of knowledge, and this mobility is an important form of innovation coupling between disruptive innovation and knowledge spillovers.

(4) Product production and cooperation effects. Product disruptive innovation companies using new products to enter the low-end and emerging markets will inevitably bring about a change in the overall market direction. Old products in the market will slowly lose their competitiveness, and complementary products in the market will also be greatly affected. At this time, companies that produce complementary products will choose to actively seek cooperation from product-destructive companies, and improve or innovate their products to adapt to market trends. Cooperation also follows, and in the cooperation will definitely enjoy the knowledge spillovers of disruptive innovative companies, innovate in learning this knowledge, and improve their own innovation performance. In this way, the companies in the cooperation will play their respective advantages to achieve mutual benefit and win-win status.

2.2 Index System Construction

2.2.1 Sources of indicators for disruptive innovation in latecomers

The disruptive innovation activities of late-developing enterprises are heterogeneous, diverse and disruptive. Guisheng and Wei [28] believe that disruptive innovation and other innovations are in the design of technology, production systems, materials, user effects, User knowledge and other aspects are very different. Based on these differences, innovative forms of disruptive innovation are analyzed. Zhiwei and Jin [29] studied and analyzed disruptive innovation from five dimensions: market, technology, product, finance and project. Haixia and Zhihe [30] studied the changes brought by disruptive innovation to the mainstream market from the technical perspective.

Latecomers break the traditional maintenance innovation model and implement disruptive innovation, which is a new type of innovation path. According to the path creation theory, path creation is the innovation subject's initiative to absorb external knowledge, seek cooperation, and break the traditional path limitation. Destructive innovation is the embodiment of path creation. The main innovation activities include the development of new products, research and development of new technologies, and promotion of new consumer concepts. This research analyzes and refers to the research results of previous scholars, and combines path creation theory to select 7 types of disruptive innovation activities of late-developing companies, mainly from the aspects of technology, market, product, and customer, in an attempt to reflect the late-development The characteristics of disruptive innovation in enterprises.

2.3 Sources of Indicators for Knowledge Spillover

Many scholars at home and abroad also have a complete research on the evaluation factors of knowledge spillovers. For example, Almeida [31] studied the knowledge spillover effect from the perspective of people in the region. It is believed that when knowledge talents interact with groups, knowledge also spreads in space. Mobility and communication promote knowledge spillovers. Xiaodi and Zilong [32] studied the knowledge spillover from the aspects of labor mobility, market mechanism, and business address. Wei and Huizhi [33] studied the innovation benefits of knowledge spillover from the perspective of industrial agglomeration. Lanxin [34] point out that knowledge spillovers are analyzed from an investment and trade perspective.

There is a proliferation of innovations in disruptive innovation in latecomers. According to the theory of innovation diffusion, the diffusion of innovation will promote the knowledge spillover effect, so that late-developing enterprises can absorb the knowledge required for innovation to the greatest extent. The innovation diffusion in regions with a high degree of clustering is fast, and affects the extent of absorption of knowledge spillovers from latecomers. This study selects six types of knowledge spillover activities, mainly

from the aspects of talent flow, trade, cooperation, and geographical environment. These indicators refer to domestic and foreign research results and combine the theory of innovation diffusion to make the indicators of knowledge spillover more representative and applicable.

3. MATERIALS AND METHODS

3.1 Indicator System

The index system selected in this study is relatively complete, which can reflect the heterogeneity and subversiveness of disruptive innovation of late-developing enterprises, and also the unconsciousness and passiveness of knowledge spillover. A review of the literature on knowledge spillovers has established an index system, as shown in Table 1.

3.2 Index Weight and Coupling Degree Model

3.2.1 Indicator weight

In actual life, there are many methods to determine the weight. Considering the actual situation and combining with the actual situation, this article adopts the objective value assignment method-entropy weight method to give index weight. The entropy value can reflect the amount of information, and the information is inversely proportional to the entropy. The greater the entropy of the information, the higher the disorder of the information. Therefore, the smaller the difference of the information, the smaller the weight of the index. Steps of entropy weight determination:

(1) Standardize first to eliminate the differences between dimensions:

$$X_{ij} = \frac{v_{ij} - \min_{1\le i\le m}(v_{ij})}{\max_{1\le i\le m}(v_{ij}) - \min_{1\le i\le m}(v_{ij})} \quad (1)$$

Where, X_{ij} represents the normalized value of the i-th raw data of the j-th assessment index; v_{ij} represents the i-th raw data value of the j-th assessment index; m represents the number of objects to be evaluated.

(2) Calculate the characteristic proportion P_{ij} of the i-th index of the j-th index:

$$P_{ij} = \frac{X_{ij}}{\sum_{i=1}^{m} X_{ij}} \quad (2)$$

(3) Calculate the information entropy e_j of the j-th index:

$$e_j = -K\sum_{i=1}^{m} P_{ij}.\ln P_{ij}\ ,\quad K = \frac{1}{\ln m} \quad (3)$$

(4) Calculate the utility value of the j-th index:

$$g_j = 1 - e_j \quad (4)$$

(5) Calculate the weight value w_j of the j-th index:

$$w_j = \frac{g_j}{\sum_{j=1}^{n} g_j} \quad (5)$$

3.3 Coupling Model

Because disruptive innovation is a process of corporate activities, knowledge spillover is a complex effect that occurs unconsciously. Therefore, the relationship between the two concepts is complex, and it is difficult to expose the relationship with a linear method. This article comprehensively considers the actual situation and decides to use a coupling relationship model to analyze the quantitative relationship between the two. Coupling belongs to the category of physics and refers to a process in which two or more systems are independent and interact with each other. The interaction between these subsystems makes the entire system reach a benign resonance. The degree of coupling can reflect the dispersion between subsystems. The degree of coupling is inversely proportional to the dispersion of the system. The degree of coupling in this paper can reflect the strength and dispersion of the coupling effect of disruptive innovation and knowledge coupling in late-stage enterprises.

This paper adopts the capacity coupling model and combines the characteristics of disruptive innovation and knowledge spillover of late-developing enterprises to show the coupling degree of the two:

$$C = \left[\frac{U1\times U2}{(U1+u2)\times(u1+u2)}\right]^{1/2} \quad (6)$$

Where, C is the degree of coupling between the two systems. The value of the degree of coupling C is between 0 and 1. The larger the value of the degree of coupling C, the greater the degree of system correlation. U1 and U2 respectively represent the comprehensive evaluation values of disruptive innovation and knowledge spillover of the enterprise. The coupling degree of the two

subsystems is determined by U1 and U2. The specific calculations of U1 and U2 are as follows:

$$U_i = \sum_{j=1}^{m} \varphi_j \cdot u_{ij} \quad (7)$$

Where, U_i represents the contribution of the i-th subsystem to the total system, φ_j represents the weight of each index, and u_{ij} represents the value after the j-th index of the i-th year is normalized.

It is flawed to rely solely on the calculation of the coupling degree to determine whether the two systems have reached a benign resonance. For example, the evaluation values of destructive innovation and knowledge spillover of the enterprise are very low, but the coupling degree model will give a high degree of coupling. There is no way to judge whether a benign resonance has been reached, and whether the system has gone from disorder to order. In order to make up for the lack of a coupling degree model, this article introduces a coordination degree model, which is:

$$T = (\alpha U1 + \beta U2)^{1/2}$$
$$D = (C \times T)^{1/2} \quad (8)$$

In the formula, α is the proportion of disruptive innovation of late-comer enterprises in the total system, and β is the proportion of knowledge spillover in the total system. In this paper, we consider that disruptive innovation and knowledge spillover are equally important in the system. , So α is 0.5 and β is 0.5. T is the comprehensive coordination index of the system, reflecting the overall synergistic effect of disruptive innovation and knowledge spillover of late-developing enterprises. D is the degree of coupling coordination between the two systems. The value of D is between 0 and 1. The value of D is directly proportional to the degree of harmony between system elements. The coupling type refers to Xu's division method, so the type of coupling coordination degree in this paper is divided as follows:

3.4 Empirical Research

3.4.1 Source of data

This research selects Xiaomi Company under the innovative technology company as the research object. Xiaomi Company is a successful example of disruptive innovation. Xiaomi Company has created a sales myth with excellent performance and affordable price in just 5 years. Xiaomi, when the smart phone competition is fierce, the company enjoys the benefits brought by the spillover of knowledge by imitating and learning other brands of mobile phones. As a latecomer,

Table 1. Index system

Subsystem	Index	Description
Disruptive innovation (A)	Development of new products (A1)	The new product is fundamentally different from the original design
	New skill (A2)	Destructive value of existing skills
	New supplier relationships (A3)	Open up new supplier relationships and networks
	New knowledge (A4)	Eliminate existing knowledge and adopt new knowledge
	New user (A5)	Create new markets and attract new users
	New consumption concepts (A6)	Eliminate existing user consumption concepts and establish new ones
	New communication model (A7)	Establish new communication models and methods
Knowledge spillover (B)	The flow of knowledge (B1)	Knowledge Talent Flow and Knowledge Dissemination
	Trade investment (B2)	Knowledge spillovers in trade and investment
	R & D cooperation (B3)	Knowledge exchange through R & D cooperation
	Entrepreneurship (B4)	Knowledgeable entrepreneurs interact with different groups in the entrepreneurial process
	Patent citations (B5)	Citation or sale of patents promotes knowledge spillovers
	Geographical proximity (B6)	Utilizing location advantages, knowledge flows within the region

Table 2. Types of coupling coordination degree

Index	Ranges	Coupling stage
System coupling C	$0<C\leq0.3$	Low-level coupling
	$0.3<C\leq0.7$	Mid-level coupling
	$0.7<C\leq1$	High level coupling
System coupling coordination D	$0<D\leq0.4$	Low coordination coupling
	$0.4<D\leq0.6$	Moderate coordination coupling
	$0.6<D\leq0.8$	Highly coordinated coupling
	$0.8<D\leq1$	Extremely coordinated coupling

Xiaomi has made itself a place in such a fierce competitive environment through disruptive innovation. Xiaomi mobile phones are cheap, targeted at the low-end market, and use the Internet's basic technology to reshape the intrinsic value network. Xiaomi mobile phones are so cheap and the configuration is high, so how does it achieve profitability? The reason is that it implements disruptive innovation.

At the beginning of the survey, semi-structured interviews were conducted with Xiaomi's corporate managers. Also, the secondary literature sources as well as company public data were consulted to study the sample's many typical forms of disruptive innovation, such as: entering the low-end market with affordable prices and gaining high sales; development of new products, research and development of the Xiaomi IS Youth Edition has gained market attention; with new skills, and Xiaomi NTOE has reached the international first-class level in design. In terms of knowledge spillovers, Xiaomi's use of trade and investment, R & D cooperation, and geographical proximity will generate knowledge spillovers. Xiaomi is a late-developing mobile phone company. It is far inferior in technology to other smart phone companies. It cooperates with other mobile phone companies and competes to improve and make up for its own shortcomings through the spillover of knowledge. Xiaomi has just entered the market. Like other mobile phones, the focus is on the sales of physical stores, but through online sales, they occupy non-mainstream markets and attract online mobile phone customer groups. Then, with the expansion of customer groups and the enhancement of brand influence, Xiaomi gradually occupied the mainstream market and shifted from occupying the non-mainstream market to the mainstream market. This is a typical example of disruptive innovation of late-developing enterprises. Therefore, Xiaomi's case can meet the requirements of research sample validity and scientificity.

After determining the sample enterprises, it was decided to use the expert scoring method to obtain data. The accuracy of the data depends on the experience and relevant knowledge of the experts. Therefore, the experts participating in the scoring must have a high level of knowledge and rich work experience. This research finally selected 15 expert members, including 7 managers, 6 R & D experts, and 2 sales directors. The 15 experts who participated in the scoring are all people who are very knowledgeable about Xiaomi's destructive new activities and knowledge spillovers, so the selected experts have higher credibility. 15 experts used Liker's 5-level scale to quantify the index system of disruptive innovation and knowledge spillovers of enterprises. The score indicates the proportion of the index in the total system. The higher the score, the greater the contribution.

4. RESULTS AND DISCUSSION

Equation 1 is used to normalize the original data to obtain a standard matrix. The entropy weight method equation 3 is used to calculate the index weights of disruptive innovation and knowledge spillover of the late-developing enterprises, as follows:

Using the weight values from Table 3 into the comprehensive evaluation function equation 6, system coupling degree function equation 7, and coupling coordination degree function equation 8,we get the results depicted in Table 4.

As can be seen from Table 4, the value of the system coupling degree C is 0.4983. According to the division of the system coupling degree stage, it shows that the disruptive innovation and knowledge spillover of late-developing enterprises are in the middle-level coupling stage, and the two interact. The overall coordination effect T is 0.8994 and the coupling coordination degree D is 0.6695. The system coupling coordination degree of the two is highly

Table 3. Calculation results of indicator weights

Subsystem	Index	Weights
Disruptive innovation (A)	Development of new products (A1)	0.1655
	new skill (A2)	0.1178
	New supplier relationships (A3)	0.1165
	New knowledge (A4)	0.2259
	New user (A5)	0.1029
	New consumption concepts (A6)	0.1564
	New communication model (A7)	0.1150
Knowledge spillover (B)	The flow of knowledge (B1)	0.2706
	Trade investment (B2)	0.1178
	R & D cooperation (B3)	0.1959
	Entrepreneurship (B4)	0.1263
	Patent citations (B5)	0.1368
	Geographical proximity (B6)	0.1527

coordinated. Although the state of highly coordinated coupling has been reached, it is still the lowest stage of highly coordinated coupling and needs to be further improved to achieve the effect of benign resonance between the two.

Table 4. Calculation results

Index	Value
α	0.5
β	0.5
U1	0.7426
U2	0.8752
Coupling C	0.4983
Overall coordination effect T	0.8994
Coupling coordination D	0.6695

5. CONCLUSION

This paper analyzes the coupling relationship between the disruptive technology innovation and knowledge spillover of late-developing enterprises by empirical analysis. The results show that disruptive innovation and knowledge spillover of late-developing enterprises are in the stage of moderate coupling and highly coordinated coupling. The importance of latecomers to disruptive innovation and knowledge spillover will affect the overall coordination and coupling coordination, and will affect whether the two systems can reach a benign resonance, and whether they can promote the overall system to change from disorderly to orderly. The importance that latecomers pay to knowledge spillovers will affect disruptive innovation. If knowledge spillovers are over-protected, it will affect the positive effects of innovation activities. Disruptive innovation is leapfrogging and breakthrough, and promotes the flow of knowledge in production networks and knowledge networks. At the same time, knowledge spillovers are needed to create a knowledge environment and reduce innovation costs.

In addition, it is not difficult to see from the weight of the evaluation index system of disruptive innovation and knowledge spillover of late-developing enterprises that the contribution of disruptive innovation to new knowledge is relatively high, indicating that the enterprises that have undergone disruptive innovation have created new knowledge. It has accelerated the ability to absorb and transform knowledge, increased the knowledge base of enterprises, and enhanced competitiveness. In terms of evaluation indicators of knowledge spillovers, the flow of knowledge talents accounts for a large proportion of the indicators, indicating that the exchange and exchange of knowledge talents have a greater impact on knowledge spillovers, and the exchange of talents has promoted knowledge sharing, transfer and innovation.

Based on a large amount of literature, this article takes Xiaomi enterprises as the survey object and collects data through expert scoring to construct a coupling model of disruptive innovation and knowledge spillover of late-developing enterprises. There are many limitations in the selection of samples, which makes the conclusions limited in universality and objectivity.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not

intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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