

Leveraging Incumbents' Advantages at Their Technology-Based New Business Initiation Stage

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Abstract

Researchers often talk about leveraging incumbent's advantages. The ability of an organization to leverage its advantages accumulated in their existing fields for its new business development has been conceptualized as critical for incumbent manufacturing firms (IMf) long term development. Meanwhile, many studies have shown that most of the advantages (including knowledge which is this study's focus) accumulated in existing fields will become obstacles to their new business initiations. Thus, this paper aims to find a knowledge accumulated in their existing field, which will not bring obstacles, but is of great significance to the initiation of new business. By observing two typical cases, this paper identified a kind of knowledge accumulated in existing fields of incumbent firms, which is called AKET (architecture knowledge about existing technology), can be applied to the initiation stage of TBNB (technology based new business). However, this knowledge is only valuable if it can generate diversification and creativity for their new business launch. For such value generation, this paper proposed an AKET Applying Mechanism.

Keywords: incumbent firms, technology-based new business, existing knowledge

1 Introduction

In the rapidly developing economic environment, incumbents, especially the large manufacturing enterprises, have accumulated rich technology and manufacturing knowledge and formed competitive advantages. Meanwhile, they must constantly realize the diversification of knowledge in order to respond to market changes quickly and flexibly. More precisely, in order for long-term growth and survival of the organization, the development in its prior existing field is not enough; new businesses outside its prior existing field must also be created by taking advantage of their own formed competitive advantages. One way of such development is to combine its technology accumulated its prior existing field (called existing technology in this paper) with the technology from external sources to develop new business. This paper calls it technology-based new business (TBNB in short).

Many previous studies (Abernathy & Clark, 1985; Tushman & Anderson, 1986; Anderson & Tushman, 1990; Henderson & Clark, 1990; Christensen, 2001) have shown that incumbents fail in discontinuous innovation (including new business development). However, other researchers believe that incumbents may actually contribute much more to new business development than generally assumed in the literature (Tushman & O'Reilly, 1996; O'Reilly & Tushman, 2007; O'Reilly & Tushman, 2016 and so on). They suggest that incumbents should develop new businesses separately from its prior existing fields. This practice is called organizational separation.

As the limitation of the above suggestion (organizational separation), some works (Wi, 2001; Iansiti et al, 2003; Igami, 2018; O'Reilly & Tushman, 2016) point out that incumbents' new business cannot obtain knowledge from its existing field. They also investigate solutions for overcoming this limitation: such as suggesting relocation of engineers from existing field, sufficient support from top management of applying knowledge from existing field, different degree of existing knowledge importance at business initiation stage and developing.

However, this paper argues that the reason for underestimating the value of existing field knowledge for new business initiation is that prior studies are lack of a proper mechanism to inspire existing field knowledge's creative nature, which is necessary for business initiation. Thus, this paper investigates two research questions: which existing field knowledge and how can be applied in TBNB initiation stage. The following part is about the prior works of incumbents' new business creation, and on significance of existing field knowledge for new business. Part 3 is the research setting. We discuss the results in Part 4. The Part 5 will be the conclusion.

2 Literature Review

Existing prior studies have shown two main reasons why incumbents fail to create new business: some explain the reason for the failure and the others explain the solution.

2.1 Previous Works on Failure Reasons

Previous researches indicate that, as shown in Tab. 1, incumbents are difficult to innovate radically due to the technology rigidity that has traditionally given them competitive advantages, embeddedness of architecture knowledge, mainstream customers' needs satisfaction and so on (Abernathy & Clark, 1985; Tushman & Anderson, 1986; Anderson & Tushman, 1990; Henderson & Clark, 1990; Christensen, 2003).

Table 1. Prior works on incumbents' new business development difficulties

Difficulty	Reason	Previous works
Radical innovation	Incumbent firms tend to be handicapped by their previous successes with the old technological paradigm, and their existing skills and so on.	(Abernathy and Clark, 1985; Tushman and Anderson, 1990)
Incremental innovation with totally different architecture	The architectural knowledge is embedded in the structure and information processing procedures of incumbents firms.	(Henderson and Clark, 1990)
Main stream customer need satisfaction	Incumbent firms that have been dealing with existing customers will be difficult to deal with the new customers.	(Christensen, 2003)

2.2 Previous Works on Solutions for Failures

As shown in Fig. 1, previous researches show that incumbents should develop new businesses separately from its existing businesses. Such as, Tushman and O'Reilly (1996) pointed out that incumbents develop new businesses in autonomous organizations independent of its existing businesses. They used three successful examples of ambidextrous organizations to explain what organizational separation is like in reality. One example is called ASEA Brown Boveri (ABB). ABB has more than 5000 profit centers, each with an average of 50 people. These centers are so small that operate like autonomous businesses where employees can feel ownership and responsibility. Moreover, Osanai (2015) pointed out that even if a new technology appears and its new business is successful, the old technology often retains a large market. This situation requires the company to develop its existing old technology business and new business at the same time within the company. He used television technology case. In the TV industry in the late 1990s, the old technology of CRT TV was replaced by the new technology of flat panel display (FPD). Although interest in flat-panel TVs is increasing, global shipments in 2006 included 130 million CRT TVs and 46 million flat-panel TVs. This situation requires enterprises to develop both new businesses of FPD and businesses of old technology inside within a period of time. The new business should be separated from the existing business, so that it can develop and grow independently; This avoids the risk of the old successful way of doing things undermining the new way. For example, since a new business is self-developed in an independent organization, it can avoid financing with existing businesses, which usually have greater sales than the new business and retain a larger market.

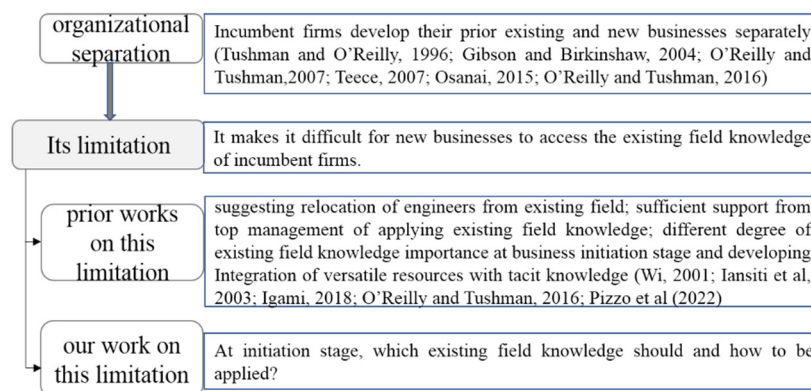


Figure 1. Organizational separation and its limitation

Other researchers have also noticed the problem: developing existing businesses and new businesses separately—an approach called organizational separation makes it difficult for new businesses to obtain the knowledge of existing businesses. They highlight the significance of applying existing field knowledge to new businesses. For example, Wi (2001) explains the way of applying existing field knowledge to new businesses of companies that develops new business of laptop PC separately from desktop businesses. He pointed out that this new business, developed separately in the new organization, obtains knowledge from its desktop business field by relocating engineers from the desktop business organization. Moreover, Iansti et al. (2003) pointed out that organizational separation is important for the new business initial stage, but the importance of support from existing organization will be increase over time. In addition, O'Reilly and Tushman (2016) demonstrated three common factors associated with successful organizational separation. The first one is new business' success management for applying knowledge (such as technologies, brand names and access to customers) from existing prior organizations to develop its competitive advantages. The second is sufficient separation from existing prior organization so that new business can carefully manage the interface necessary for applying knowledge from existing organization. The last one is support from enterprise's top management for dealing with conflicts between new and existing businesses. Furthermore, from the perspective of economics, Igami (2018) pointed out two situations in which incumbents can carry out radical innovation: the low substitution rate between new products in new business and its old products, and the overwhelming advantage in R & D capability. By observing mature organizations growing beyond their core industry facing digital innovations opportunities, Pizzo et al (2022) found that the integration of versatile resource with experience-based tacit knowledge embedded in a firm (and its human capital) generates competitive advantage in these new industries.

However, this paper argues that the reason for underestimating the value of existing knowledge (accumulated in prior existing businesses) for new business initiation is that prior studies are lack of a mechanism to inspire existing knowledge's creative nature, which is necessary for business initiation. Thus, this paper investigates two research questions: which existing field knowledge and how can be applied in TBNB initiation stage.

2.3 Arguments on Significance of Existing Field Knowledge for TBNB Initiation

Arthur (2011) suggests that new technologies must be generated by the combination of existing technologies. The existing technology here is not technology developed in prior existing fields of the enterprise, but technology that exists. He indicates that the internal components of technology are constantly changing, being replaced by better components, its materials or its combination methods are improved. Moreover, similar views can be seen in architecture innovation literatures. According to Ulrich (1995), product architecture is a design concept, which describes in detail how to decompose a product into a system and define the relationship between its subsystems. He shows that when architectural innovation occurs, the basic technology elements (subsystems or their relationships) will also change.

Thus, we can make the following argument. Even if an incumbent has difficulties in developing radical innovation because its architecture knowledge is embedded in process or embodied in individuals, if it has the ability to replace the component(s) of the old existing technology with new external technology, radical technology can be produced by combining the old existing technology with external technology. The premise is that external technology is heterogeneous. In another wards, if the external technology that replaces the existing technology component(s) is radical for the company, the newly developed (combined) technology is novel for the enterprise and brings radical technological innovation. In this case, it is key to identify these two replaceable technologies. Henderson and Clark (1990) called knowledge about the linkages between components of a product as architectural knowledge. Thus, we argue that if someone who understand the linkage and the functions of each component of old existing technology, he can identify which components are complementary (mutual complementary) and which components can be replaced by external technology (substitutable). This recognition (or capability and knowledge) is important for initiation stage of TBNB, where the successful start-up depends on the managers' perspectives (in specific, their thinking) about business idea (such as what new product to develop). This paper calls it as architectural knowledge about existing technology (AKET).

Based on the above assumptions, we argue that in the initiation stage of TBNB in incumbent firms, AKET should be applied from its existing field.

3. Research Settings

This study is to answer specific research questions to find out the causal relationship between human intelligence (or capability and knowledge) and his recognition of new business idea, thereby choose case study, which can observe many variables even in a case and determine what conditions activate the causal mechanism.

This paper chooses two large Japanese enterprises' new business initiation cases: Denso's agriculture support

business and Panasonic's agriculture engineering business, with the new "ProFarm" and "Passive House" products, respectively. "ProFarm" is a greenhouse environment control system. "Passive House" is a plant house, which uses natural energy. The reasons for choosing these two cases are their suitability for the research objectives and their contribution. Firstly, these cases are new businesses successfully created by applying external technology in incumbent firms. The existing core business of Denso is the automobile industry, which has nothing to do with its new business, agricultural business. Panasonic's core products are consumer electronics, housing, etc.; nevertheless, it has initiated a new business in the field of agricultural engineering. Profarm is regarded by customers as a high-quality product and contributes to solving the problem of labor shortage in Japanese agriculture. Passive House can reduce energy costs because it uses natural energy instead of air conditioning.

3.1 Case One: Denso's Agriculture Support Business

3.1.1 Business Initiation Strategy in Case One

In order to enter new business areas, Denso actively applies its capabilities accumulated in the automotive field (technology and human resources). The employees will actively move into new business units from core existing field of automobile components. The interview survey clarifies that Denso's new business project leader has worked as a designer of IC (integrated circuit) in automobile component systems. His job is to develop semiconductor circuits for airbags, in specific, to evaluate and deliver prototypes, consider circuits that meet airbag specifications, etc. Therefore, he knows how the computer system works in the control system. In another words, he carries the architecture knowledge about the automobile environment control system.

With regard to external technology search, the project leader must determine the appropriate external technology to integrate with the existing technology. According to the interview survey, he attended an exhibition in Tokyo and exchanged contact information with a correspondent from the Sakata Seed Corporation in Japan. His suggestions helped him explore potential partnerships with Toyotane.

In terms of selecting new products to be developed, in Denso, the new business project leader is responsible for deciding what products to develop in a given business area. Specifically, Denso's top management has decided to enter the field of agriculture; however, what products they will develop in agriculture has not been decided. The new business project leader has the right and obligation to make decision on it.

3.1.2 Existing and New Technologies' Architecture in Case One

As mentioned above, the project leader who decides which new product to develop has working experience as a designer of automotive environmental control system. This part graphically shows the architectures of existing technology (automotive environmental control system) and new technology (agriculture environmental control system) in Fig. 2.

Fig. 2 shows that in these two technologies, the components of "computer" and "sensor" are complementary and form a system. The "computer" component generally includes controller system, which closely connected to the computer. The hardware comes from the existing field. It uses the computer of Denso wave robot. The software is originally developed for in car environmental control and is reprogrammed according to the cultivation technology provided by Toyotane. This reprogramming process brings a competitive advantage to the new business, because the process of transforming Toyotane's cultivation technology tacit knowledge into explicit software program is difficult to imitate.

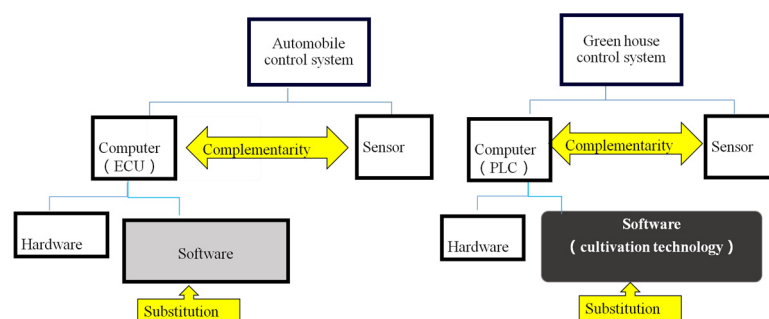


Figure 2. Existing and new technologies' architecture (based on interview data)

3.2 Case Two: Panasonic's Agriculture Engineering Business

3.2.1 Business Initiation Strategy in Case Two

The author found a similar situation with Denso in Panasonic's agricultural engineering business: Panasonic is actively applying its existing field knowledge in the consumer electronics and housing field to develop new businesses. Panasonic's housing control system technology has been applied to agriculture engineering new venture (Katayama, 2014). Specifically, the person responsible for the planning and development of "Passive House" commercialization has been committed to developing the algorithm of massage-chair control system program in the existing field units of Panasonic (Katayama, 2014). This program includes microcomputer development. This shows that he understands the architecture of existing field environmental control system technology (including internal environmental control system), as well as the functions of each component and how the whole system works. In another ward, he carries the architecture knowledge about the housing control system.

As for the external technology searching, according to the public data of the report (Katayama, 2014) interviewed the project leader of passive house, the idea of Passive House is to meet the needs of agricultural housing industry to develop new products that can reduce cost investment, as before, Panasonic has begun to develop closed planting house facilities. They have had problems in reducing the cost of materials in the closed planting house facilities business. In order to solve this problem, they developed the agricultural environmental control system by using the purchased materials, thus reducing the initial investment cost. The individual responsible for planning the commercialization of new products refines the purchased materials by testing and searching for the best conditions (such as maximum and minimum temperatures) for spinach growth, and then find equipment that can be used to establish the best condition. This conditions are the cultivating technology which is necessary for programming the software of plant house controlling system. He was able to complete the above work because he was familiar with the architecture of residential environmental control system. In another word, the external technology of planning conditions is purchased from the market.

3.2.2 Existing and New Technologies' Architecture in Case Two

As mentioned above, the person who is responsible for planning new project has working experience as a designer of housing control system. This part graphically shows the architectures of existing technology (housing control system) and new technology (agriculture housing control system) in Fig. 3.

The architecture of these two technologies is shown in Fig. 3. The existing technology consists of two components: controlling and sensing. These two is complementary, making a system. Furthermore, the controlling includes two components of "environment control unit and control terminal" and "air conditioning device". Similarly, the new technology also consists of controlling and sensing. The controlling includes "control device and drive devices" and "curtains and windows". Moreover, it should be noticed that the computer, which is for the control terminal in existing technology or control device in new technology, has software and hardware. The software of this new product is programmed based on cultivation technology, purchased from the market and further improved in Panasonic. In another words, the software in existing technology is replaced (substituted) by new software based on cultivation technology (optimal crop conditions).

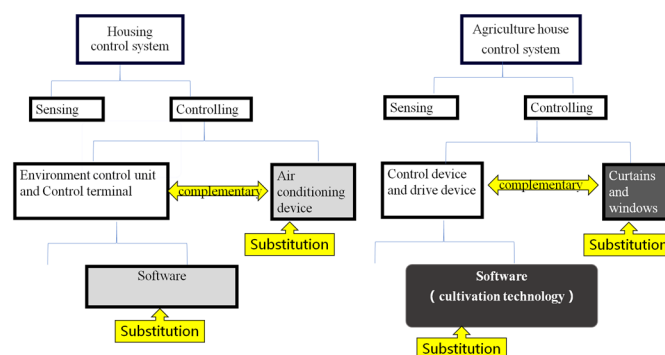


Figure 3. Existing and new technologies' architecture (based on patent library data)

4. Discussions

4.1 What Existing Field Knowledge Can Be Applied in TBNB Initiation?

From Fig. 2 and Fig. 3, we can observe similar features in two cases, as shown in Fig. 4: existing technology and new technology have similar architectures; the two components complement each other, and one of other components is substituted with (replaced by) external technology to generate new technology. In addition, in both cases, the individual responsible for planning the new product has experience in developing algorithms for existing technologies in the existing field.

These features show that he understands the architecture of the existing technology, and his AKET (architecture knowledge of existing technology) has been reflected in the new technology. Specifically, he knows the architecture of the existing technology, such as how many components it has, which components have complementary relationships, and which components can be replaced (substituted), thereby, he is more likely to recognize the value of appropriate external technology that can replace (substitute) some component(s) of the existing technology.

Thus, we argue that existing field knowledge of AKET are applied in TBNB initiation in both cases.

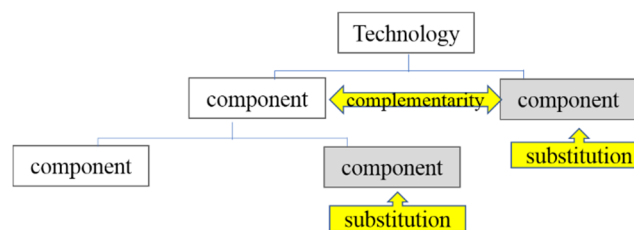


Figure 4. New technology generation

4.2 How to Apply AKET at TBNB Initiation Stage?

This section discusses new business initiation strategy in two cases, referring to Zahra and George (2002)'s four dimensions of a firm's absorptive capacity: acquisition, assimilation, transformation and exploitation, and delivers our suggestions (Fig. 5).

First, Suggestion 1 is summarized as follows: individuals with AKET search and find external sources to establish inter-firm relationships with.

The acquisition refers to a firm's identifying and acquiring externally generated knowledge (Zahra and George, 2002). In Denso's case, the new business project leader looks for partners who can cooperate with him to make use of existing technology to generate new technology in agriculture business field. He has AKET of automobile environment control system. The project leader attended an exhibition and met with people from Sakata. Their suggestions helped him explore potential partnerships with Toyotane.

Furthermore, this paragraph discusses the significance of Suggestion 1. If the relationship between large enterprises is dominated by enterprises, this relationship can be neither flexible nor diversified. Nevertheless, if the relationship between enterprises is based on some individual's private social relations, the relationship between enterprises can be diversified. Individuals with AKET have the opportunity to meet different people from different fields (for example, people with extensive knowledge of markets and industries). This diverse interpersonal relationship can help individuals find the right external technology. Finally, the large enterprise can establish a cooperative relationship with external resource, which can provide appropriate external technology for its radical new business initiation.

In Panasonic's case, the external source is the market, therefore, the relationship construction between firm and market is flexible and diversified, and there is no need for the involvement of individual employees to establish diversified relationships.

To sum up the significance of Suggestion 1 is that it can help individuals with AKET meet with diversified people and find appropriate external technology from new fields outside the core existing fields of the incumbent firms, as shown in Fig. 5.

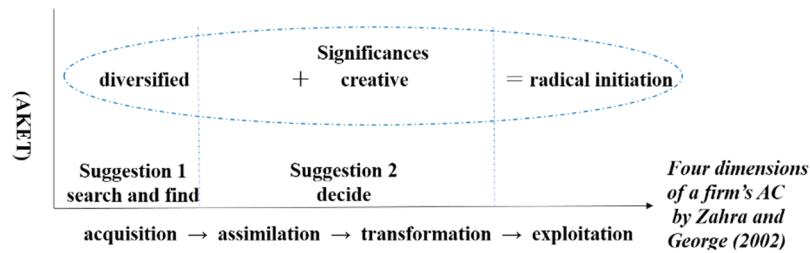


Figure 5. AKET applying mechanism at TBNB initiation stage

Second, Suggestion 2 is summarized as follows: individuals with AKET decide what new products to develop in the new fields determined by top management.

Zahra and George (2002) indicate that the assimilation refers to analyzing and interpreting the information acquired from outside sources, and transformation denotes the action of facilitating the combination of existing knowledge and the newly acquired and assimilated knowledge. As for interpreting the value of external technology and facilitating its integration with existing technology, a common feature is observed in the two cases. Any existing technology (the project leader has its AKET) can be integrated with any external technology (it can be integrated with existing technology to develop products that meet the market demand of designated fields, such as agriculture in our cases). The following introduces the process of finding this feature.

In Denso's case, top management decided to venture into a new field of agriculture rather than decide what products to develop. This means that they chose agriculture as a new target field without defining specific target customer needs (such as specific products). The new business project leader has the right and obligation to decide what new products to develop in the agricultural field (the new target field). Therefore, as for what kind of external technology is needed, it can be said that the new business project leader can search and select any external technology that can be integrated with the existing technology to develop products that meet the needs of customers in the agricultural field.

A similar situation can be observed in the case of Panasonic. This study finds out that Passive House is developed by integrating existing technology (new business project leader has its AKET) and external technology (it can be integrated with existing technology to develop products that meet the market demand of designated fields, such as agriculture housing facilities market in our case). The following introduces the process of finding this feature. In Panasonic's case, it can be said that the new field of agriculture housing is decided, because it has begun to develop closed planting house facilities and has difficulties in reducing the cost of materials. The new business project leader has to find an external technology which can be integrated with existing technology to develop products that meet the needs of reducing cost in agriculture housing facility industry. As mentioned above in the case introduction, the individual responsible for planning the commercialization of new products refines the purchased materials for spinach growth, and then find equipment that can be used to establish the best condition for spinach growth. This conditions are the cultivating technology which is necessary for programming the software of plant house controlling system. He was able to complete the above work because he was familiar with the architecture of residential environmental control system.

Furthermore, this paragraph discusses the significance of Suggestion 2. It can be seen that such new business initiation strategy encourages individuals (people with AKET) to think and act flexibly; Therefore, they can recognize and interpret the value of "appropriate external technology". It also helps them recognize the possibility of creatively integrating this external technology with existing technology. "Appropriate external technology" refers to technology from new fields outside the core existing field of the large enterprise, and furthermore it can integrate with existing technologies and develop technologies in new fields outside existing fields. This "creative integration" refers to the creation of a new technology by integrating technologies in two different fields.

To summarize the significance of Suggestion 2, it can encourage individuals with AKET to find appropriate external technologies and recognize (interpret) the possibility of creative integration by integrating newly found external technologies with existing technologies, as shown in Fig. 5.

5. Conclusion

This paper analyzed the cases of Denso and Panasonic to examine the organizational strategy of incumbent firms' TBNB (technology-based business) initiation. Three commonalities were observed. First, the architecture of existing technology and new technology is similar in the two cases of Panasonic and Denso. Second, in both cases,

individuals with AKET (architectural knowledge of existing technology) decided which new products to start developing for TBNB. Third, Individuals with AKET will search for and find external sources with which to establish inter-company relationships.

Therefore, by discussing the significance of these three points, we draw the following conclusions. A kind of knowledge accumulated in existing fields of incumbent firms, which is called AKET, can be applied to the initiation stage of TBNB. This knowledge is only valuable if it can generate diversification and creativity for their new business launch. For such value generation, this paper proposed an AKET Applying Mechanism (shown in Fig. 4). This mechanism provides two suggestions for firms: individuals with such knowledge should search and find external sources to establish inter-company relations with, and decide which new products to develop for TBNB initiation, because such strategic management can make the above knowledge provide diversification and creativity for the new business launch of incumbent firms.

This finding is consistent with previous studies (Wi, 2001; Iansti et al., 2003; Igami, 2018; O'Reilly and Tushman, 2016; Pizzo, 2022), emphasizing the importance of existing field knowledge of incumbent firms to their new business development (as shown in Tab. 2). They emphasized its significances without separating new business development into different stages, as shown in Tab. 2. One of their views, specifically the view of Iansti et al. (2003), who has investigated its significances separating different stages, has been further developed through this paper. Iansti et al. (2003) pointed out that in the initial stage of new business development, organizational separation is very important, so it is not recommended to apply the knowledge of existing fields, but the importance of existing organizations will increase over time. However, this study identifies what existing field knowledge can be applied in the initial stage, and puts forward two strategic suggestions for applying this knowledge.

Table 2. Significance of existing field knowledge for new business

		This study	Iansti et al (2003)	Pizzo et al (2022)	Igami (2018)	O'Reilly and Tushman (2016)	Wi (2001)
New business development	Initiation stage	Yes	No (or less)	Yes	Yes	Yes	Yes
	Developing stage	(not mentioned)	Yes (or more)				

However, this study has some limitations. Firstly, it is necessary to further explore several other cases to test the result obtained in this paper. Secondly, this research mainly focuses on system product development. More extensive research is needed to test the finding on other types of products. Third, his study puts forward two strategic suggestions for the application of AKET in the initial stage of TBNB. However, the effectiveness of these strategy suggestions also depend on the individual's understanding ability and cognitive flexibility. These remaining issues need to be further studied in future research.

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