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The growth of knowledge through the resource-based view

The growth of
knowledge
through
the RBV

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Abstract

Purpose – The resource-based view (RBV) has not previously been conceptualized as a theoretical framework encompassing metaphysical and empirical perspectives. The purpose of this paper is to logically analyze the evolutionary process of the RBV, triggered by “rigidity.” It attempts to clarify the significance and limitations of the RBV.

Design/methodology/approach – Based on Popper’s methodological model of the growth of knowledge, the study analyzed and evaluated the evolution of the RBV.

Findings – The RBV has evolved in three phases. The sub-problems have changed through empirical testing on the basis of one metaphysical problem and one metaphysical theory. Thus, the evolution may indicate progress within one framework. However, during phase 3, the ambiguity of concept may inhibit the growth of knowledge. For further progress, it is necessary to overcome the vulnerability of the RBV’s metaphysical statements.

Research limitations/implications – This paper shows the possibility of the growth of knowledge within the RBV framework and for a new framework to emerge due to its limitations. It should contribute both theoretically and practically to the field of strategic management.

Originality/value – Popper’s model was used to examine a previously neglected topic, namely, the growth of knowledge in the evolution of the RBV. Moreover, considering “rigidity” as corresponding to a process of error elimination is a novel approach, clearly revealing the dynamism of the RBV’s evolution.

Keywords Resource-based view, Theoretical evolution, Rigidity, Popper, Growth of knowledge

Paper type Research paper

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1. Introduction

The resource-based view (RBV) is an important area within strategic management, and was developed to provide firms with practical options. While several strategic management studies have explored how firms acquire competitive advantages, a consistent analytic model is required to identify the characteristics of the RBV in a comprehensive and objective manner.

Consequently, this study aims to conduct an objective analysis of the RBV’s evolution as a single framework that encompasses both metaphysical and empirical perspectives. The study contributes to ongoing efforts to elucidate the growth of knowledge through the RBV.

A logical model based on Popper’s critical rationalism was used. Specifically, Popper’s model of the growth of knowledge was applied in analyzing the RBV’s theoretical evolution. Furthermore, introducing the “rigidity” concept draws attention to problem shifts triggered during this evolution.

The following section describes the analytical model, which is conceptually based on the growth of knowledge. This is followed by a discussion of the model’s application, revealing three processual phases in the RBV’s evolution. Finally, the growth of knowledge in the RBV is assessed, showing the implications for the further growth of knowledge.

2. Methodological framework

RBV in the strategic management literature

The RBV is considered to have been initiated in the mid-1980s by Wernerfelt (1984) and Barney (1986). However, there are various opinions on the scope of the RBV, leaving the concept vague.

For example, Grant (2002, p. 133) defined the RBV as “ideas concerning the role of a firm’s resources and capabilities as the principal bases for its strategy and primary



source of its profitability.” Grant also distinguished the RBV from the knowledge-based view and dynamic capability approach.

On the other hand, Helfat and Peteraf (2003, p. 997) asserted that the RBV “provides an explanation of competitive heterogeneity based on the premise that close competitors differ in their resources and capabilities in important and durable ways.” According to them, the dynamic capability approach is included within the RBV as the “dynamic resource-based theory.” They also contend that both a routine-based view and a knowledge-based view are included in the RBV.

These studies introduce and classify various theories. However, their classifications tend to be arbitrary due to the lack of a methodological framework with which to analyze theoretical evolution itself. Consequently, they are insufficient to find the significances and limits of the RBV. To address this situation, this study uses Popper’s model of the growth of knowledge to analyze the RBV’s theoretical evolution.

Relevance of Popper’s methodological model

Of the numerous well-known methodologies, Popper’s model was considered the most appropriate for revealing the growth of knowledge in terms of its theoretical evolution.

Kuhn (1962) introduced the “paradigm” concept, where paradigm means “a set of recurrent and quasi-standard illustrations” (p. 43). He developed a schema in which “normal” periods are dominated by a certain paradigm, followed by exceptional revolutions. Popper (1970) considered Kuhn’s discovery of what he termed “normal” science to be highly important. However, he contended that Kuhn’s doctrine, in which one dominant theory “normally” prevails within each scientific domain, and scientific progress entails a sequence of dominant theories with intervening revolutionary periods of “extraordinary” science, did not hold in reality. In particular, Popper (1970) pointed to a constant and fruitful discussion between competing dominant theories of matter, whereas Kuhn described periods of “extraordinary” science in which communication between scientists had apparently broken down due to the absence of a dominant theory.

In this context, Popper (1970) used the word “paradigm” in a slightly different sense to Kuhn to indicate a research program, i.e., “a mode of explanation which is considered so satisfactory by some scientists that they demand its general acceptance” (p. 55), rather than a dominant theory. Thus, according to Popper, a critical composition of competing theories and competing frameworks is always possible.

Lakatos (1976, 1978) developed a methodology of scientific research programs based on Popper’s concept of a (metaphysical) research program. Accordingly, the basic unit of appraisal should be a “research program,” not an isolated theory. Moreover, a research program contains a hard core that is stubbornly defended with its more flexible protective belt and elaborate problem-solving machinery. Lakatos (1978) considered a problem shift to be progressive if simultaneously theoretically and empirically progressive, and to be degenerating otherwise. Lakatos agreed with Kuhn’s criticism of Popper’s “naïve falsification,” but argued that Kuhn lacked understanding of Popper’s “sophisticated falsification.” Consequently, Lakatos (1976, 1978) attempted to explain and further strengthen this Popperian position. Thus, in a sense, Lakatos appears to have integrated the theories of Kuhn and Popper.

However, the methodology proposed by Lakatos had some logical flaws. Initially, Lakatos developed his model on the premise that the hard core and protective belt could be clearly distinguished, despite the difficulty of doing so in many cases, with the hard core only determined *ex post*. In this context, Lecocq *et al.* (2010), who demonstrated that business models were conceived as a Lakatosian research program within strategic management, argued that Lakatos’ model required moderation when applied in management, based on the findings of Tixier and Jeanjean (2000).

A more serious flaw in Lakatos' conceptualization can be primarily attributed to the introduction of two kinds of heuristics. According to Lakatos, a research program is built on methodological rules. While some rules prescribe what research paths to avoid (negative heuristic), others indicate what paths to pursue (positive heuristic) (Lakatos, 1978). Applying both negative and positive heuristics to protect the hard core of the research program would lead to logical contradictions and interrupt the growth of knowledge.

This paper acknowledges the contribution of Kuhn's paradigm concept and Lakatos' scientific research program by considering groups of theories, rather than a single theory; however, it argues that their methodological models cannot fully explain the growth of knowledge. Therefore, it analyzes the RBV as a single framework, drawing on Popper's model of the growth of knowledge and his concept of a research program.

This model is based on Popper's perspective after the 1950s, which Lakatos termed "sophisticated falsification." This is the idea that there should be another theory behind the observation statements as a refutation. According to Popper (1963), there are three requirements for the growth of knowledge. The first is that the new theory should proceed from some simple, new and powerful unifying idea about some connection or relation between hitherto unconnected things or facts, or new theoretical entities. The second is that the new theory should be independently testable, and the third is that the theory should pass some new and severe tests.

Moreover, even if individual theories are refuted, the research program itself is not immediately disproved. On the other hand, there is a possibility that the growth of knowledge may occur due to problem shifts within one research program.

Popper's model of the growth of knowledge

Popper (1972, 1976) argued that Cartesian dualism, which conceives of the mind and body as two entirely different but interacting entities or worlds that can presumably explain the world we live in, cannot provide an adequate answer to the question of what knowledge is. In place of Cartesian dualism, Popper (1972) distinguished the following three worlds: "world 1" of physical objects or states; "world 2" of states of consciousness, mental states or perhaps behavioral dispositions to act; and "world 3" of objective contents of thought, especially scientific and poetic thoughts, and of works of art.

Subjective knowledge in world 2 is a kind of disposition in which the organism may sometimes become conscious in the form of a belief, opinion or state of mind, and is regarded as an organ that produces objects of the human world 3 (see Popper, 1972, 1976). We may regard the world of problems, theories and critical arguments as a special case, as a world 3 in the narrow sense, or as the logical or intellectual province of world 3. World 3, in a more general sense, includes all the products of the human mind, such as tools, institutions and works of art (see Popper, 1976). The three worlds are related, so that worlds 1 and 2 and worlds 2 and 3 can interact, while worlds 1 and 3 can interact through the intervention of world 2[1].

Inhabitants of world 3 evolve autonomously through repeated trial and error. Empirical theories evolve in the context of real events in world 1, while metaphysical theories evolve in the context of other theories in world 3. Popper (1972) provides a more concrete depiction of the growth of knowledge as follows: $P_1 \rightarrow TT_1 \rightarrow EE_1 \rightarrow P_2 \rightarrow TT_2 \rightarrow EE_2 \rightarrow \dots$. When the first problem (P_1) is introduced, it is solved using a temporary theory (TT_1). Subsequently, TT_1 is refuted through critical error elimination (EE_1). When a new problem (P_2) is introduced, it is solved using a new temporary theory (TT_2).

According to this process, a particular theory is temporarily deemed true if it withstands refutation by disproof. Therefore, every law and every theory can be considered temporary hypotheses. Thus, the process continues, and if some temporary theories share a common explanatory mode based on consistent problems, they are deemed to belong to the same

framework as Popper's research program. According to Popper, the theory is progressive if our discussion shows that it has really made a difference to the problem we wanted to solve; i.e., if the newly emerging problems are different from the old ones (Popper, 1972, p. 288).

3. Theoretical model

The use of "rigidity" for EE

The RBV emphasizes the importance of enhancing each firm's specific resources associated with path dependency. This is reflected in Barney's (1991) argument that if a firm acquires rare and valuable resources due to its unique historical path, it will be able to exploit those resources to implement value-creating strategies that cannot be duplicated by other firms. This is because firms that have not proceeded along that particular historical path cannot acquire the resources necessary to implement the strategy. However, the efforts of firms to enhance their path-dependent resources will inevitably lead to unintended consequences, increasing the possibility of experiencing a loss of advantage, while contributing to a gain in their competitive advantages.

A resource is defined as "anything which could be thought of as a strength or weakness of a given firm" (Wernerfelt, 1984, p. 172). In this context, Sirmon *et al.* (2010) argued that contemporary scholarship has examined capability strengths, while largely ignoring weaknesses. They focused on the direct and integrated effects of sets of capability strengths and weaknesses relating to competitive advantages and empirical correlates. They argued that their logic regarding capabilities also held for resources. Based on these studies, Warnier *et al.* (2013) introduced the concept of "ordinary resources" and "junk resources" alongside strategic resources, showing how, in conjunction with using an appropriate business model, they could contribute to a firm's performance. They presented and discussed several illustrative cases to support the argument that applying the RBV was necessary for examining such resources.

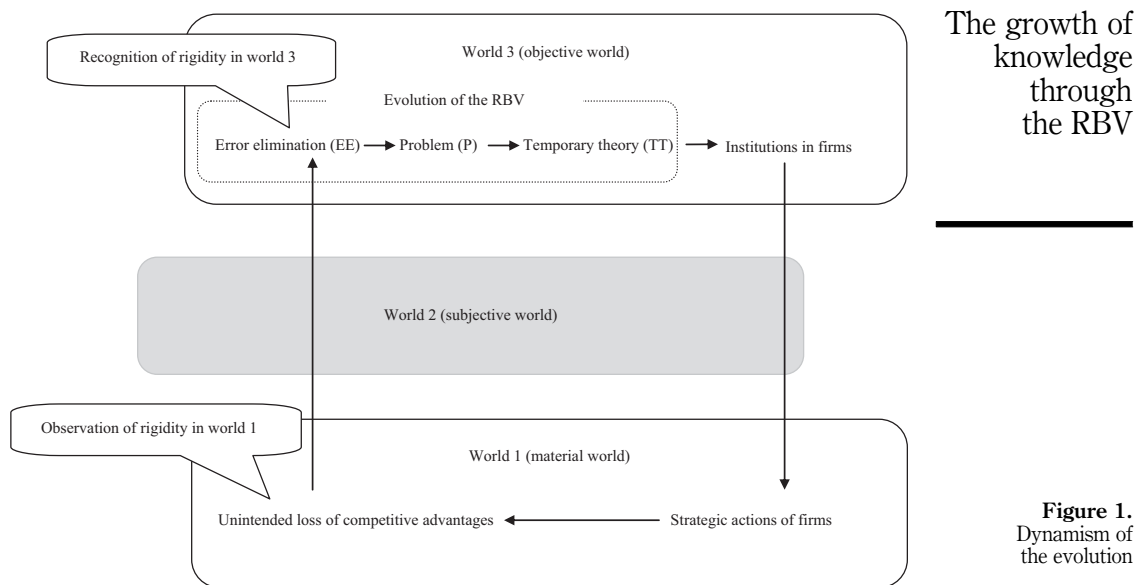
The studies cited above suggest that a resource enhanced by a firm that serves as a strength may become a weakness and inhibit its competitive advantages. Furthermore, due to its path dependency, the firm would tend to notice that a resource has become a weakness only after experiencing the unintended loss of competitive advantages. This paper uses the term "rigidity," which generally refers to a lack of flexibility within organizations, to denote unintended consequences caused by the dysfunction of path dependency within firms. In the RBV's evolution, indications of "rigidity" can be considered to correspond to a process of critical EE.

Dynamism of the RBV's evolution

By expanding the concept of rigidity, as described above, the dynamism of the RBV's evolution can be more precisely elucidated. As noted by Popper (1976), theories and institutions inhabit world 3, and therefore change autonomously. These changes are indirectly connected to world 1 via world 2. Within firms, institutions, such as the systems or routines belonging to world 3, may affect real activities within world 1 and may, in turn, be changed by these activities. Thus, the following process unfolds.

Within a firm, institutions (in world 3) are influenced by path dependency, affecting strategic action (in world 1) through the interests and concerns of members (in world 2). Strategic action can lead to unintended consequences, such as the loss of competitive advantages in world 1. These consequences, which relate to rigidity, are of particular concern. Indications of rigidity can change institutions in world 3 (through an interpretation occurring in world 2). Therefore, the RBV's evolution could be conceptualized as an attempt, through the above-described process, to substantiate a theoretical claim in world 3.

As shown in Figure 1, rigidities should be observed in world 1 and recognized in world 3. While the former signals the unintended loss of competitive advantages from the



intensification of a firm's strategic actions, the latter entails a critical discussion of observations of rigidity that cannot be explained by existing theories.

Unless rigidity is recognized within world 3, existing theories cannot reach the stage of refutation. Consequently, only the recognition of rigidity within world 3 leads to a problem shift and the establishment of a new problem. To understand the RBV's evolution, it is critical to consider how rigidity is recognized within the domain of world 3 through its observation in world 1.

4. Analysis: three phases in the RBV's theoretical evolution

Origin of the RBV

The RBV was originally developed as an alternative concept to Porter's (1980) positioning school, which focuses on firms' external environment (see Nagano, 2015). Researchers who have adopted the RBV have questioned the claim of positioning approach advocates that firms' competitive advantages fundamentally depend on the applicable industrial structure. Specifically, they contend that differences in firms' profitability depend much more on their specific internal factors than on external factors. Moreover, whereas the positioning approach assumes resources are always readily available in markets, RBV proponents argue that firms are greatly limited in their ability to acquire resources (Wernerfelt, 1984).

P₁ and TT₁

The first evolutionary phase of the RBV centered on the following problem, P₁: What kinds of internal resources are required by firms to build competitive advantages? A solution to this problem would explain firms' competitive advantages without requiring analysis of a specific industry.

TT₁ was introduced by Rumelt (1984), Barney (1986) and Dierickx and Cool (1989) as a solution to P₁. Barney (1986) introduced four empirical indicators of the potential for individual resources to generate sustained competitive advantages: valuable, rare, imperfectly

imitable and non-substitutable. Of these indicators, Rumelt (1984) and Dierickx and Cool (1989) focused especially on imperfectly imitable and non-substitutable.

Rumelt (1984) conceptualized isolating mechanisms for protecting a firm's individual resources. In contrast, Dierickx and Cool (1989) suggested that non-appropriable assets such as R&D know-how that competitors could not easily imitate could provide the basis for a firm's competitive advantages. Thus, the theoretical statement on the problem's solution was as follows: if firms reinforce their specific individual resources, they will gain competitive advantages.

EE₁: the first rigidity

EE₁, formulated to refute TT₁, entailed recognition of the first rigidity, which could be framed as dysfunction relating to weakened internal complementarity that results from reinforcing individual resources. This entails the possibility that each effort to reinforce individual resources in any part of the organization may weaken internal complementarity and lead to the unintended loss of competitive advantages.

Prahalad and Hamel (1990) argued that if the focus of individual efforts was overly narrow, opportunities for blending their functionality with those of others in new and interesting ways within firms would not be recognized. For instance, if a firm held rich stocks of individual resources within each branch or section but was unable to blend individual resources at firm level, it would lose its competitive advantages.

Hamel and Prahalad (1994) later provided actual examples of rich firms such as Volkswagen, Upjohn, Xerox and Westinghouse that had lost significant market share to firms with far fewer visible resources, such as Honda, Glaxo, Canon and Hitachi. They noted that "too often competitors are judged in terms of resources rather than resourcefulness" (Hamel and Prahalad, 1994, p. 128). Here, "resources" can be understood as individual resources and "resourcefulness" as the internal complementarity of individual resources. They also pointed out that reinforcing individual resources would result in a lack of consistency and the loss of competitive advantages within rich firms.

P₂ and TT₂

Recognition of EE₁ propelled a shift in the RBV to a second phase. P₂ was thus established, which addressed the question of what kinds of internal resources are required to overcome the first rigidity.

To solve this problem, TT₂ was developed by Prahalad and Hamel (1990), Stalk *et al.* (1992), Kogut and Zander (1992), Hamel and Prahalad (1994), Grant (1996) and others. During this phase, addressing the question of how to enhance internal complementarity within firms was key to overcoming the first rigidity. Consequently, internal resources such as "core competence" and "capability" in relation to the use of individual resources emerged as focal concepts.

Prahalad and Hamel (1990) and Hamel and Prahalad (1994) demonstrated that firms' development of "core competences" led to their success. These researchers defined core competences as "a bundle of skills and technologies that enabled a company to provide a particular benefit to customers" (Hamel and Prahalad, 1994, p. 119)[2]. They could also promote "collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies" (Prahalad and Hamel, 1990, p. 82).

On the other hand, Stalk *et al.* (1992) proposed "capabilities-based competition" as a new concept relating to corporate strategy. They defined a capability as "a set of business processes strategically understood" (Stalk *et al.*, 1992, p. 62), and argued that, for a firm to succeed, it must weave its key business processes into hard-to-imitate strategic capabilities that would distinguish it from competitors in the eyes of customers[3]. Subscribing to the

knowledge-based view, scholars such as Kogut and Zander (1992) and Grant (1996) have also emphasized the importance of capability. For example, Kogut and Zander (1992, p. 384) introduced the concept of combinative capability to “synthesize and apply current and acquired knowledge.”

Although core capabilities are technical in nature, whereas capabilities are social, both co-exist within organizational routines for using individual resources (Ulrich and Smallwood, 2004). In line Leonard-Barton’s (1992, 1995) proposition, “core capabilities” can be considered to encompass the concepts of “core competence” and “capability.” This leads to the following theoretical statement (TT₂): if firms reinforce their specific core capabilities, they will gain competitive advantages. In addition, given the assertion that core capabilities are reinforced by collective learning within firms, learning theory can be considered to have been introduced into the RBV during this second phase.

EE₂: the second rigidity

EE₂, which denotes the second rigidity, can be recognized in the “core rigidity” concept demonstrated by Leonard-Barton (1992, 1995) and used to refute TT₂. Specifically, core rigidities were defined as “the flip side of core capabilities” (Leonard-Barton, 1992, p. 118), and it was noted that in the face of a changing business environment, or if the system itself matures into mindless routine, firms find themselves fighting the interdependent system associated with core capabilities (Leonard-Barton, 1995).

As examples of core rigidities, Leonard-Barton (1995) cited cases of Japanese automakers, arguing that the “overuse” of core capabilities that had created competitive advantages in the 1980s became the source of a new problem emerging in the 1990s. That is, the formerly “lean” Japanese producers, such as Toyota, had overshot their customer satisfaction targets and overspecified their products, creating a “long laundry list” of features and pursuing their quest for quality to an extreme that could not be cost-justified when the yen appreciated in 1993.

Furthermore, there have been studies of the dysfunction of reinforcing core capabilities, focusing on management processes. For example, Sirmon *et al.* (2007) presented the causal flow of the resource management model, in which resource management comprises processes to structure the resource portfolio, bundle resources and leverage capabilities in relation to environmental uncertainty. They viewed bundling as the process whereby capabilities, as conceptualized by scholars such as Hamel and Prahalad (1994), are formed. They identified stabilizing, enriching and pioneering as the three kinds of bundling processes affected by environmental contexts. Specifically, under conditions of high environmental uncertainty, the stabilizing bundling process is unlikely to create optimum value for customers, and firms must engage in continuous enriching and pioneering bundling processes.

Leonard-Barton (1992, 1995) and Sirmon *et al.* (2007) suggested that reinforcing core capabilities disrupted adaptation to changes in the business environment. Consequently, EE₂, as the second rigidity, can be framed as dysfunction associated with the weakening of external complementarity, resulting from the reinforcement of core capabilities.

P₃ and TT₃

Following EE₂, the RBV shifted to its third phase and the establishment of P₃, which posed the question of what kinds of internal resources are required to overcome the second rigidity.

The dynamic capability approach (Teece *et al.*, 1997; Zollo and Winter, 2002; Adner and Helfat, 2003; Helfat, 2007; Teece, 2007, 2009) and the resource orchestration approach (Sirmon *et al.*, 2007, 2011; Sirmon and Hitt, 2009) within TT₃ provided a solution for P₃. During the third phase, the solution for overcoming the second rigidity centered on

enhancing not just internal complementarity within firms but also external complementarity. Thus, dynamic capabilities, and especially dynamic managerial capabilities, emerged as the key concept.

There are slight differences in how scholars have defined dynamic capabilities. A closer examination of the components of dynamic capability reveals two trends related to this approach. Studies applying the dynamic capability approach have emphasized the importance of a manager's capabilities. However, conceptualizations of these capabilities differ.

On the one hand, scholars such as Zollo and Winter (2002) and Adner and Helfat (2003) portrayed dynamic capabilities merely as higher-level routines. They also focused on processes and routines when considering a manager's capabilities. Thus, Adner and Helfat (2003) used the term "dynamic managerial capabilities" to refer to a manager's ability to create, extend or modify an organization's resource base. They showed that dynamic managerial capabilities, such as using business acquisitions, are patterned behaviors of managers.

On the other hand, Teece (2009) suggested that dynamic capabilities include microfoundations and entrepreneurship. It can be argued that Teece's microfoundations comprise higher-level routines that resemble Winter's concept of dynamic capability. However, entrepreneurship is not a process or routine, but more a function of managers' subjective knowledge[4].

Analysis is needed of the "deciding" aspects of the management process, especially in relation to the first view (see Helfat, 2007, p. 115). In this context, the recently introduced resource orchestration approach provides useful models. For example, drawing on a dynamic resource management model such as that of Sirmon *et al.* (2007), Sirmon and Hitt (2009) focused on dynamic managerial capabilities by viewing them as managers' resource-related decisions. According to Sirmon *et al.* (2007), asset orchestration, as a central component of managers' dynamic managerial capabilities and of resource management, highlights the importance of integrating (matching) resource investments and deployment decisions. They examined the contingent nature of resource investment and deployment decisions, showing that resource management via asset orchestration is vital for superior performance.

Therefore, although these scholars presented slightly different views regarding managers' capabilities, they all subscribed to the notion that dynamic capabilities are internal capabilities for changing core capabilities through the operation of internal and external resources. Consequently, the following theoretical statement emerged from these studies: if firms reinforce their specific dynamic capabilities, they will gain competitive advantages. In addition, given the focus on the concept of evolution and selection within markets, it appears that evolutionary theory was introduced into the RBV during the third phase of its development.

5. Findings and discussion

The growth of knowledge in the RBV as one framework

Figure 2 depicts the previously described evolution of the RBV. To recap, the process began with a critique of the positioning approach and the subsequent formulation of P_1 . During the evolution, a sequence of problem shifts occurred from P_1 to P_2 and finally to P_3 , illustrating successive attempts to overcome rigidity by clarifying internal resources.

Sustained effort to solve the original problem has been apparent throughout the evolutionary process. P_1 , P_2 and P_3 can thus be viewed as sub-problems for solving the following meta-problem: What kinds of internal factors are required to build competitive advantages? On the basis of the three problems' consistency, the claims made during each phase have also demonstrated consistency. While the focal concepts have evidently shifted from one phase to the next, each claim has consistently maintained that if firms reinforce any of their specific internal resources, they will gain competitive advantages.

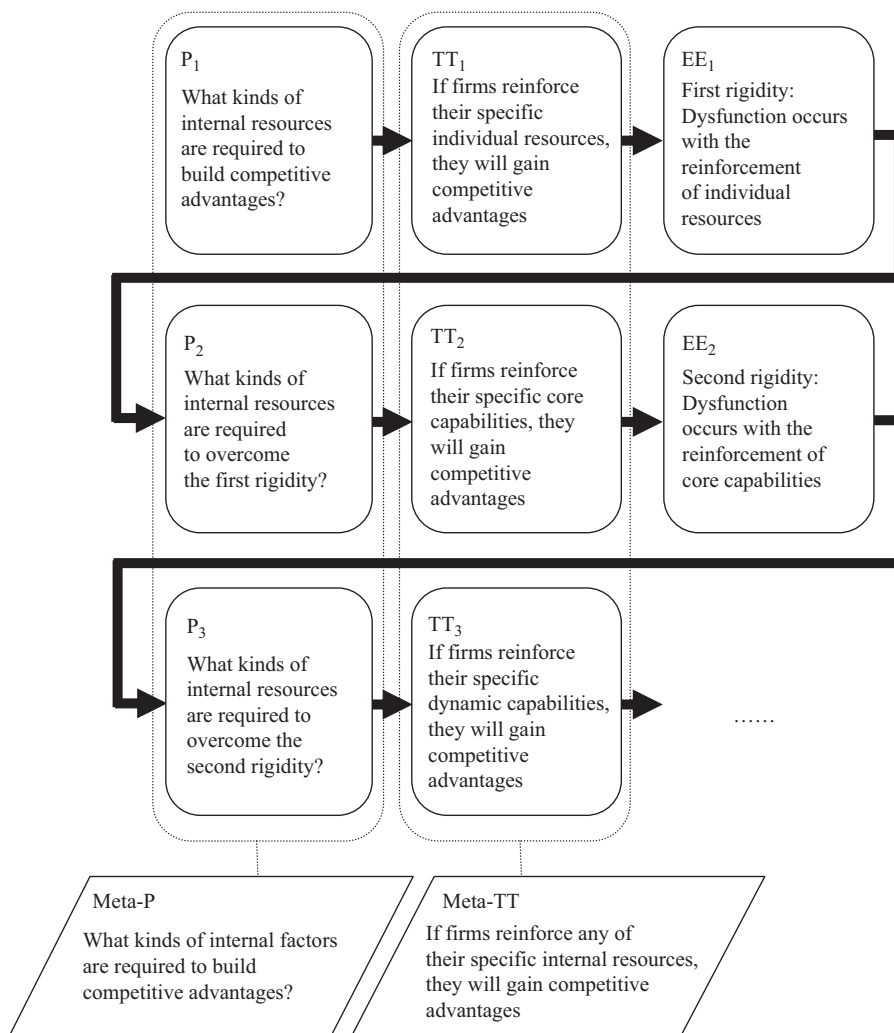


Figure 2.
The evolution of the RBV as one framework

The meta-TT is a metaphysical statement on which the RBV, considered as a single framework, is based. Therefore, all studies adopting the “core competence approach,” “knowledge-based view,” “dynamic capability approach” and “resource orchestration approach” should be included within a single “RBV” framework. This framework clearly differs from that of the positioning school, based on the structure–conduct–performance paradigm, which assumes that performance is determined by the conduct of firms within the boundaries of a specific industry, which in turn depends on the structure of the market.

As mentioned in Section 2, if newly emerging problems differ from the old ones, the theory is evaluated as progressive (Popper, 1972). During the RBV’s evolution, the meta-level problem did not change from the first to the third phase. However, this does not mean that no progress occurred during the process.

Whereas meta-TT is a metaphysical statement, TT₁, TT₂ and TT₃ are empirical statements that can be empirically tested. Indeed, premised on meta-TT being a

metaphysical framework, scholars upholding the RBV have tested empirical statements during each phase. These empirical tests fostered critical discussions about “rigidity.” Through these attempts, new problems emerged during each shift of the RBV to the next phase. Therefore, progress, recognized as the growth of knowledge, occurred within a single framework based on the same metaphysical problem.

Interaction between the shifts in worlds 1 and 3

The evolutionary shifts of the three phases discussed above occurred at the theoretical level. However, similar processes can be found in the history of actual firms. The history of the major Japanese firm Kao Corporation provides a useful illustration.

The Kao Group develops consumer products for general consumers in three fields: beauty care, human health care and fabric and home care. According to former Chairman Fumikatsu Tokiwa (1999, 2014), the history of the Kao Group can largely be classified into different phases depending on the stage of management innovation activity, with each referred to as a TCR[5].

The first TCR, “Total Cost Reduction,” started in 1986 and aimed to reduce direct costs, focusing mainly on establishing an efficient division of labor system. In this phase, the organization’s inefficiencies were eradicated, and an efficient way of working was introduced in each business unit. Consequently, sub-optimization was achieved for each business unit and individual resources were efficiently accumulated.

However, in the 1990s, Kao found that departmental efforts, which led to sub-optimization in each unit, had produced a lack of overall optimality. To solve this problem, the second TCR, “Total Creative Revolution,” involved building systems for using each unit’s individual resources toward the firm’s goal for growth entitled “stretch and jump.” In particular, vertical integration was emphasized, and consistent business processes were established within the firm, from procurement of raw materials to research and product development, production, logistics and sales.

However, under conditions of a severe environmental change, Kao recognized the limit of its traditional selfishness and strengthened its overall optimization in certain market environments. Kao’s selfishness had led to its direction being overly influenced by the firm’s internal circumstances, leading to a lack of flexibility. To overcome this problem, Kao started the third TCR, “Total Consumer Response,” from 2000, the fourth TCR, “Total Chain Revolution-i,” from 2007, and the fifth TCR, “Global Transformation for Cost Reduction-S,” from 2013. In these phases, Kao actively used external resources, emphasizing concepts such as “demand chain” and “collaboration.” Kao established flexible systems through direct dialogue with consumers, sharing information with trading firms and joint research with competitors or academic societies.

Each observation of dysfunction within a TCR has then led Kao’s next TCR. Additionally, the history of Kao’s TCRs is similar to the evolutionary process of the RBV: the aim of first TCR corresponds to the implication of TT_1 ; the aim of the second TCR corresponds to the implication of TT_2 ; and the aims of the third, fourth and fifth TCRs correspond to the implication of TT_3 . Such similarities in institutional and theoretical shifts symbolically show the interaction between worlds 1 and 3. In other words, the RBV has clarified the shift in thinking behind such practical movements and so has implications for firms.

Facilitating further growth of knowledge

The RBV has progressed through empirical testing. However, it should be noted that some factors interrupted the further growth of knowledge during phase 3. This issue relates to Popper’s (1959) assertion that the use of undefined concepts inevitably destroyed the system’s empirical character.

Compared to phases 1 and 2, phase 3 was characterized by more focus on implicit elements through the dynamic capability approach. As mentioned in Section 4, the dynamic capability approach has two trends: one portrays dynamic capabilities as higher-level routines, and the other posits entrepreneurship as a key component of dynamic capabilities. While these high-level routines are defined explicitly to a certain extent, this conception of “entrepreneurship” basically refers to tacit knowledge, and is not yet clearly defined. A result of using “entrepreneurship” in this non-empirical sense, as if implicitly defined, is that the theoretical claim of Teece’s dynamic capability approach has the following tautology: if firms reinforce their specific dynamic capabilities, they will gain competitive advantages, while firms with competitive advantages have specific dynamic capabilities.

Studies of entrepreneurship and the role of strategic leaders are advancing mainly in the area of cognitive approach. For example, Murphy (2009, 2011) applied methodological concepts from *The Poverty of Historicism* to contemporary research in the area of entrepreneurship and reported a 2×2 conceptual foundation for entrepreneurial discovery theory, and Gavetti (2012) focused on a manager’s superior ability to overcome focal behavioral bounds. However, whether it is appropriate to complement Teece’s entrepreneurship using these studies should be determined from the metaphysical assertion on which Teece’s dynamic capability approach is based.

The bottleneck here is that the RBV does not clarify assumptions about human rationality and behavior as metaphysical statements (cf. organizational economics assumes bounded rationality and principles of transaction cost economization). For the growth of knowledge in this trend, it is essential to clarify these metaphysical statements, which should lead to the derivation of more causal propositions and more critical discussions in Popper’s world 3.

6. Implications

Theoretical implications

The first key contribution of this work is the methodological clarification of the RBV doctrine. It is proposed that the RBV is a framework which has evaluated each phase’s sub-PP and sub-TT through empirical tests related to “rigidity,” on the basis of its meta-PP and meta-TT. The RBV’s significance was thus demonstrated by observing the growth of knowledge to date.

Second, the analysis of three phases reveals two ways for facilitating further growth of knowledge and a limitation of the RBV. During phase 3, there were two trends in the components of dynamic capabilities: one portrayed dynamic capabilities as merely higher-level routines, while the other suggested that dynamic capabilities include microfoundations and entrepreneurship.

In the former, refinement of the concept of dynamic capabilities and repeating empirical tests may lead to the growth of knowledge. In other words, as in phases 1 and 2, if rigidities are observed even in companies that are strengthening dynamic capabilities in the future, and they are recognized at the theoretical level, a new evolution is required to solve the new problem.

In the latter, the obstacle to the growth of knowledge is the ambiguity of “entrepreneurship,” suggesting a limitation of resource-based theory. The metaphysical statements of the RBV, based only on the above-mentioned meta-PP and meta-TT, are extremely fragile. To conduct critical tests on entrepreneurship, it is necessary to establish a fundamental metaphysical framework and to present more deductive propositions. Incidentally, it is highly plausible that Teece’s dynamic capability approach is based on a metaphysical theoretical system that should be distinguished from the previous RBV. If this occurs, the resulting approach cannot be included within the RBV framework.

Practical implications

The findings of this work also could improve current firms’ management with regard to interaction between worlds 1 and 3.

First, this paper attempts to show managers how to reinforce resources that lead to competitive advantages by clarifying the growth of knowledge within the RBV framework up to this point. This work additionally seeks to guide managers to notice the possibility of their firms losing competitive advantages by clarifying the issue of rigidity in the RBV.

Second, if the above theoretical implications induce further theoretical evolution in strategic management, then those theories will subsequently provide more helpful suggestions for firms to gain a competitive advantage. Incidentally, theoretical evolution can occur by recognizing new problems through the observation of firms' responses to RBV implications.

7. Conclusion

This study revealed the following evolutionary pathway of the RBV: $P_1 \rightarrow TT_1 \rightarrow EE_1$ (first rigidity) $\rightarrow P_2 \rightarrow TT_2 \rightarrow EE_2$ (second rigidity) $\rightarrow P_3 \rightarrow TT_3$. Whereas TT_2 encompassed both the core competence approach and the knowledge-based view, TT_3 entailed the dynamic capability and resource orchestration approaches. Furthermore, based on this analysis, the RBV's evolution has been evaluated and recommendations for future knowledge growth made.

The problems and claims made during each of the three phases were consistent. Thus, the meta-P is: What kinds of internal factors are required to build competitive advantages? The meta-TT suggests that if firms reinforce any of their specific internal resources, they will gain competitive advantages. Although TT_3 appears to be strongly associated with the external environment, dynamic capabilities are situated within firms. TT_1 , TT_2 and TT_3 are all encompassed within the RBV, and can be viewed as a single overarching framework. However, given the clear changes in each sub-problem resulting from empirical testing within the same metaphysical research program, there has been evident progress in the form of the growth of knowledge.

The two trends of phase 3, respectively, regard dynamic capabilities as higher-level routines and consider microfoundations and entrepreneurship to be dynamic capabilities. The former trend has been refined toward the growth of knowledge by various studies, such as those considering the resource orchestration approach. However, in the latter trend, further growth of knowledge has been interrupted by the ambiguous conception of entrepreneurship. Further growth of knowledge in the latter trend requires metaphysical theories about entrepreneurship, such as assumptions about human rationality and behavior, beyond the scope of the RBV framework.

This paper shows the possibility for further growth of knowledge within the RBV framework and for a new framework to emerge due to its limitations. It thus contributes both theoretically and practically to the field of strategic management.

Notes

1. For example, a "book" itself belongs to world 1, but its messages and information belong to world 3, and its contents will change the physical world through readers' world 2 understanding and interpretation.
2. Prahalad and Hamel (1990) referred to Japanese firm NEC, which articulated a strategic intent to exploit the convergence of computing and communications as their core competences.
3. They identified Wal-Mart's "cross-docking" system as a good example of hard-to-imitate strategic capabilities.
4. For example, according to Teece's view, the iPod's success is not based only on Apple's innovation routines but also the entrepreneurship of managers, including Steve Jobs.
5. The acronym TCR had a different meaning in each stage, as elaborated below.

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