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A Discourse on Foresight and the Valuation of Explicit and Tacit Synergies in Strategic Collaborations

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Abstract: One of the most important questions in business partners' collaboration is whether their strategies create a collaborative synergy and thus add market value. This paper aims to develop a conceptual framework that will be useful for scholars and practitioners in developing foresight for explicit synergies and valuing tacit synergy in strategic collaborative ventures. The paper comprises a novel theoretical and empirical contribution to the foresight that is required for an explicit competence-based synergy in collaborative ventures from a resource-based view. It employs the ARCTIC framework and values a tacit competence-based synergy using simple and compound real options. Moreover, the paper makes several theoretical and empirical contributions to the study of strategic management, international business, and corporate finance disciplines. Finally, the paper discusses research limitations and future work.

Keywords: explicit synergy; tacit synergy; core competence; the ARCTIC framework; real options; collaborative ventures

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1. Introduction, Purpose, and Research Questions

Corporate foresight provides an ability to reconfigure the resource base of a firm by including the resources of collaborators and acquisitions. Foresight has a clear and systematic orientation toward the future (Fergnani 2022, p. 825). However, realizing the value-creating potential of collaborative strategies is very challenging (Bower 2001; King et al. 2004; Schweizer et al. 2022). The resource-based view (RBV) proposes that the accumulation of valuable, rare, inimitable, and organized (VRIO) resources is the basis for adding higher value in comparison with competitors (Barney and Hesterly 2015). For example, accumulating VRIO resources to enhance economic rent (added value) has become fundamental in academic and managerial strategic thinking (Lin and Wu 2014). Moreover, research remains rather fragmented regarding the relationship between the building blocks of a synergy-building mechanism joining the VRIO resources of cooperative partners and the foresight of their synergetic implications on the one hand and value-added economic rent on the other.

Schweizer et al. (2022) argued that most collaborative strategic transactions "do not seem to meet expectations, so scholars and practitioners alike have been calling for a deeper understanding of M&A performance" (Haleblian et al. 2006; King et al. 2004; Schweizer et al. 2022, p. 1). To value collaborative synergies, Rabier (2017) recommends quantifying an operating synergy (e.g., revenue growth through new product offerings or cost savings through the economies of scale) that is more likely to result in higher operating profit margins (EBIT/net sales) and financial synergies (e.g., improving free cash flows and optimizing the weighted average cost of capital (WACC)).

Explicit synergies are mainly analyzed by scholars with respect to cost reductions and revenue increases. However, achieving tacit synergy requires creating and developing new competencies that utilize merging partners' VRIO resources and thus provide "value in development" (Hao et al. 2020). The implementation of such a tacit synergy or "value

in development" requires consideration by scholars and practitioners. This paper aims to develop a conceptual framework that will be useful for scholars and practitioners in developing explicit synergies and valuing tacit synergy in strategic collaborative ventures. Therefore, this paper looks for answers to two research questions: (1) What determines the success or failure of explicit competence-based synergies? (2) How is tacit competence-based synergy measured, with applications for real options?

This study answers those research questions empirically by exploring the prerequisites of explicit competence-based synergies via the ARCTIC framework and measuring tacit synergy by considering the successful merger of Ahold and Delhaize in 2016, investigating the reasons for the termination of Tesco and Carrefour's international alliance (2018–2021), and valuing their unrealized synergies by way of sequential compound real (call-on-call) options. After carrying out two illustrative (deductive) case studies, the paper provides three theoretical propositions and explores explicit competence-based synergies in international alliances and mergers and acquisitions within global supermarkets through the RBV theoretical lens in general and the ARCTIC framework in particular. The paper measures tacit synergies or values in development with a simple and sequential compound real option application.

The remainder of the paper is organized as follows. Based on an in-depth literature review, the ARCTIC framework is developed and extended as a building block for competence-based synergies. Next, explicit and tacit synergies between allied firms and merging partners' firms are discussed. This section supplements the ARCTIC framework with the foresight of explicit synergies and combines the application of real options with a measurement of tacit synergies. Then, the paper discusses in detail the value of tacit collaborative synergies with complex or exotic real options (Hull 2022, p. 592). Three theoretical propositions are derived from the literature review. Then, illustrative case studies on the 2016 merger of Ahold and Delhaize and the international purchasing alliance between Tesco and Carrefour from 2018–2021 are conducted empirically to justify the developed propositions. Finally, the empirical results, the theoretical and empirical contributions, the limitations of the research, and future directions are discussed.

2. Key Literature Review

2.1. Core Competencies, Competence-Based Synergy, and the ARCTIC Framework

This paper adopts the core competence perspective in general, with a particular focus on the RBV approach, to demonstrate the importance, in international alliances and mergers and acquisitions, of the abilities of collaborative partners to transfer and absorb core competencies to create competence-based synergies. This core competency perspective is a well-established area of strategic theory and research. Core competencies are the resources and capabilities that comprise the strategic advantages of a business and underpin the ability of firms to establish value by developing and deploying idiosyncratic resources that are valuable, rare, difficult to imitate, and internally well organized (Barney and Hesterly 2015).

The author recently developed the ARCTIC framework by emphasizing the ability of partners that are likely to engage in collaborative ventures as an important prerequisite of core competency absorption and integration. The ARCTIC framework is based on the collaborative partners' motivation to create competence-based synergies in which the extent of effectiveness is expected to depend on several critical success factors, including the ability of the business partners to effectively develop collaborative strategies. According to the ARCTIC framework, synergies in strategic collaborative ventures are a function of strategic compatibility, complementarities, and transferability of core competencies that are fostered by the internal advantages (A) and external relevance (R) of core competencies of partnership companies and are underpinned by open and interactive communication and absorption capacities (C), mutual trust and commitment as well as time (duration) of integration (T), an integration plan for core competencies and institutional strategies (I), and cultural compliance of business partners (C).

It is not possible to proceed without deeper insight into the ARCTIC framework. Therefore, the author provides basic information on the framework, so that its innovations and scientific contributions can be discussed from this starting point. It is not enough if the core competencies of business partners are unique, rare, and difficult to imitate, such as brand management, geographic coverage, customer base, quality assurance, etc. (factor A); they should possess external relevance (factor R) or be valuable to current and future customers (Bauer and Matzler 2014; Barney and Hesterly 2015). In this vein, the first two factors (A and R) of the ARCTIC framework are about the value, rareness, and idiosyncrasy of partners' core competencies and are very similar to the first three factors of the VRIO framework. What is more, the organization factor (O) of the VRIO framework has been extended in terms of the process of mutual transferability of core competencies among collaborative partners.

Recently, Čirjevskis (2021a) found that frequent communication from the leaders, interpersonal respect, and mutual trust are important managerial routines that foster the success of the partners' collaboration. Therefore, open and interactive communication (the first C factor) which facilitates mutual absorption of core competencies is the third critical success factor of the competence-based synergy potential in strategic collaborative ventures. Moreover, Deloitte (2019) research in 2019 confirmed that trust in the collaboration's relationship is among the most important alliance routines (65%).

The mutual trust and interpersonal communication of collaboration, knowledge management, and absorption capacity fostering the synthesis of resources and competencies are key factors of tacit synergies (Lasker et al. 2001; Hao et al. 2020). Thus, trust and commitment (factor T) are also important (Jacquemod 2020) for the core competencies transfer of strategically collaborative partners. Regarding the merger and acquisition strategy, the speed of the competencies-sharing process or time of integration (T) is also a critical success factor in providing competence-based synergy. When two sets of different core competencies transfer quickly (Spanner et al. 1993; Netz et al. 2019), the answer is "Yes". When core competencies are difficult, costly, and time-consuming to absorb, the answer is "No".

The essence of a post-merger integration plan is very important for competence-based synergies and should be thoroughly planned and effectively and efficiently executed (Hitt et al. 2009; Bauer and Matzler 2014). Regarding institutional issues and integration plans (factor I), the partners' institutional strategies are likely to be grounded in whether to influence or comply with institutional regulations (Oliver and Holzinger 2008). If the partners developed a plan to integrate two sets of core competencies to create their collaborative synergies and engage in institutional strategies, the answer is "Yes".

Moreover, partners are more likely to engage in institutional actions when "they operate in industries that are concentrated and impose significant political pressures on them" (Oliver and Holzinger 2008, p. 505). The answer is "No" if there are no integration plans for core competencies and no institutional strategies in place. The final factor is the cultural compatibility or cultural fitness of core competencies of business partners (the second C factor). If the staff of two partnering or merging companies share an organizational and professional culture, the answer for this criterion is "Yes"; if there is a cultural clash, the answer is "No".

Therefore, the ARCTIC framework provides the prerequisites of collaborative competence-based synergies that are a function of strategic compatibility, complementarities, and transferability of core competencies of collaborative partners. The ARCTIC framework is worthy of further analysis, and the Ahold–Delhaize merger and the Tesco–Carrefour alliance case studies are convenient opportunities. To confirm the generalizability of the ARCTIC framework, at least one case of validation would be needed. However, before that, the types of synergies in collaborative ventures should be discussed.

2.2. Foreseeing Explicit Synergies and Valuing Tacit Collaborative Synergies

The concept 'synergy' refers to the co-existence and mutual promotion of two or more subsystems based on resource sharing (Ansoff 1965; Hao et al. 2020). "This is due to network effects, synergy, and the ability to leverage on existing projects to provide growth options for the future" (Mun 2002, p. 356). Synergies in collaborative endeavors are a function of strategic similarity, complementarities, and transferability of core competencies of collaborative partners. Recent research by Hao et al. (2020) has shown that a strategic collaboration of a business partnership relates to different types of synergistic effects: explicit and tacit. Regarding operating and financial synergies, they are easy to understand and easy to quantify. They are explicit types of synergy. "Explicit synergy can be pursued by leveraging transmittable organizational elements that are invisible or codified forms (Zaheer et al. 2013; Hao et al. 2020).

For example, when IBM and Walmart began to ally, thinking about how they could leverage technology to make their food supply chain more efficient and get fresher produce to customers, explicit synergies (operational synergies) were a result. The partners started programming and developing user interfaces (Aitken 2017). Therefore, the alliance of IBM with Walmart has reduced purchasing costs and increased revenue, taking up the best digitalization practice of the global grocery business. Walmart explicitly expected that with collaboration across the industry and IBM to help create and analyze all the points of data, it would bring transparency and traceability "from farm to fork".

In this vein, the ARCTIC framework views and foresees explicit collaborative synergies in the way they are built. However, in real business practice, some new core competencies that may be dynamically created within collaboration are tacit. This alternative view of tacit synergy was referred to by Hao et al. (2020) as "value-in-development" (Hao et al. 2020, p. 434). Hao et al. (2020) argued that such collaborative synergies as "value in development" emerge when the combination of partners' core competencies facilitates the development of new thinking or ideas about how value can be created (Lasker et al. 2001; Hao et al. 2020, p. 433).

A tacit synergy is much more difficult to foresee and value. Tacit synergy mainly derives from the transformation of attitudes and fostering of new modes of thinking for doing business and building new core competencies. The alliance between Carrefour and Google (Alphabet) is a good example of tacit synergies. Carrefour has responded to an increasingly competitive market in France by entering an alliance with the Alphabet corporation. Carrefour has opened an innovation lab in Paris with Google Cloud and developed new customer value propositions employing artificial intelligence (Floridi 2018). Starting in 2019, Carrefour customers could buy Carrefour products through Google Assistant-connected speakers, such as Google Home, as well as a new Google shopping website in France (Floridi 2018). This way, the strategic partnership has created a tacit synergy, in particular a "new grocery shopping experience" for hundreds of millions of consumers.

Thus, tacit synergy and "value in development" are rooted in partner firms' knowledge bases and their joint learning, innovation, and inspiration for each other (Baum et al. 2010; Hao et al. 2020, p. 434). Tacit synergies are almost impossible to measure with operating or net profit margins or with a free cash flow forecast but can be valued by way of real options. A real options approach that borrows ideas from financial options offers a fresh perspective for this. It views collaborative strategy as being crafted as a series of options that are continually being exercised to achieve both short and long-term returns on collaboration; therefore, it measures a management's flexibility to adapt to changes in technology and the market.

The real options reasoning appreciates the value of strategic managerial flexibility and the potential of achieving improved returns on investment (Yeo and Qiu 2003) or competence-based synergies in the case of cooperative strategies. Managerial flexibility to adapt to technological changes and market uncertainty requires dynamic capabilities that Teece et al. (1997) defined as an ability to build, integrate, and reconfigure internal and

external core competencies. In this vein, the value of tacit competence-based synergies in collaborative strategies rises because dynamically integrating and developing new core competencies can be measured with a real options valuation technique (Čirjevskis 2021b). A comparison between explicit and tacit synergies is shown in Table 1.

Table 1. A comparison between the prediction of explicit synergies and valuation of tacit synergies.

	Explicit Synergies (Predicted with an ARCTIC Framework)	**Tacit Synergy (Valued with a Real Options)**
Description	Exchange core competencies between partners to generate competence-based synergies	Synthesize existing core competencies to develop new competencies and therefore new competence-based synergies
Condition	Complementarity, compatibility, and transferability of core competencies that can be shared	Partner firms come from related industry or market areas that entail the potential to inspire each other to develop new core competencies
Predictability of synergies	Synergies can be easily predicted in advance	Synergies cannot be predicted until collaboration has proceeded
Value (synergism) created	Value in exchange	Value in development
Examples	Partnering with IBM brings traceability and transparency to Walmart's entire food supply network through blockchain (Aitken 2017). Blockchain reduces waste, spoilage, and contamination incidents (Lawrence 2018), thereby facilitating an explicit type of synergy	Alphabet's core competencies in high tech and Carrefour's core competencies in retail grocery have been integrated into new customer value proposition development, thus updating the retailer's business model, reframing their modes of thinking, and adding tacit synergetic value

Source: Adapted from Hao et al. (2020, p. 434) and extended by the author.

While explicit synergy emerges when business partners share complementing core competencies (Zaheer et al. 2013), tacit synergy can be pursued when business partners' knowledge bases spur learning and inspire new core competencies that could not be predicted upfront (Baum et al. 2010) but can be valued as a real option. Thus,

Proposition 1. *Explicit collaborative synergies can be foreseen via the ARCTIC framework and tacit synergies can be valued by the application of real options.*

Foresight methods, particularly strategic (real) options techniques, have been identified by several authors as methods that provide the real value of foresight for competitive advantage (Fergnani 2022, p. 828). In this vein, because of this paper's interest in the application of real options theory to measure collaborative tacit synergies, the next section is devoted to real options reasoning and application.

2.3. Valuing Collaborative Synergies with Simple and Exotic (Complex) Real Options

Li et al. (2007) called for future generations of researchers to enhance the impact of real options as an emerging dominant conceptual lens in strategic management. Real options theory originated in 1977 with the ground-breaking idea of Stewart Myers based on the Black–Scholes financial option pricing model that was developed in 1973. Myers (1977) originally defined "real options" as "opportunities to purchase real assets on possibly favorable terms". Since the inception of the term, it has been extended substantially (Adner and Levinthal 2004; Tong and Reuer 2007). As Li et al. (2007) noted, it currently implies a variety of meanings in the fields of economics, finance, and management.

European simple financial options are exercisable only at maturity, whereas American options are exercisable at any date before the option's expiration (Hull 2022). Luehrman's (1998) writings on real options addressed investments in real assets as European options, wherein only a single real option, deferral, was considered. However, his approach has since been acknowledged as too simplistic and flawed (Borison 2005). Most real options resemble American-style options albeit with a more complex structure (Mun 2002, p. 172). To measure a simple call option premium the Black–Sholes model is usually applied with the following Formula (1) (Black and Sholes 1973)

$$\begin{gathered} C = N(d_1)S\, e^{-dT} - N(d_2)\, E\, e^{-rT} \\ d_1 = \frac{ln(S/E)+(r-d-\sigma 2/2)\ T}{\sigma\ \sqrt{T}} \\ d_2 = d_1 - \sigma\ \sqrt{T} \end{gathered} \tag{1}$$

where E and T are the strike price and the exercise date; S is the current stock price; r is the continuously compounded risk-free interest rate (% p.a.); σ is the volatility; d is the continuously compounded dividend yield (% p.a.); and $N(x)$ is the probability that a normally distributed variable with a mean of zero and a standard deviation of 1 is less than x.

Having specified the components of the Black–Scholes option pricing model to measure collaborative synergies as a value of the call option (C) above, the probability factors $N(d_1)$ and $N(d_2)$ must be discussed in detail, explaining their mathematical and practical meanings in terms of real options valuation. "Among the major research papers, Black and Sholes (1973) did not explain or interpret $N(d_1)$ and $N(d_2)$" (Nielsen 1992, p. 1). Having explored the difference, Nielsen (1992) split the payoff to the call option into two components, showing how their future expected values (computed using the risk-adjusted probabilities) and present values involve the probability factors $N(d_1)$ and $N(d_2)$, and argued why $N(d_1)$ is larger than $N(d_2)$.

$N(d_1)$ is the factor by which the discounted expected value of the stock exceeds the current value of the stock. $N(d_2)$ is the factor of risk-adjusted probability that the option will be exercised. The present value of contingent receipt of the stock multiplied by $N(d_1)$ is not equal to but larger than the current stock price multiplied by $N(d_2)$. Regarding real options reasoning, $N(d_1)$ is the factor by which combined values of the collaborating firms exceed the current values of these firms without collaboration. The value of firms without collaboration is discounted by the factor of risk-adjusted probability $N(d_2)$. To put it simply, the present values of the collaborating firms are dependent on the synergies, and collaboration only happens when the market values of collaborative partners are higher than without collaboration. Thus,

Proposition 2. *The tacit synergies of mergers and acquisitions deals can be valued by way of simple (call) real options.*

Regarding the European sequential compound option, it is an option on an option and has two expiration dates and two strike prices; in this paper, it is a call option on a call option. If an investor buys a compound option at time 0, then, on the first expiration date $T1$, the option holder has the right to buy a new call option at the strike price $K1$. The new option gives the holder the right to buy the underlying asset at the strike price $K2$ at time $T2$ (Wang et al. 2014).

Therefore, when the value of the option of the successor (e.g., merger and acquisition) is determined by the value of the real option of the predecessor (e.g., alliance), a compound option is put in place (Copeland and Keenan 1998). Moreover, Childs et al. (1998) argued that a sequential compound option exists when the prior phase of the strategic project is successful, which also determines the success of the next phase. To put it simply, the value of synergy in the merger and acquisition deal (the next sequential compound option) is derived from the synergy of an alliance (the preceding real option).

Folta and Miller (2002) have also noted that a manager acquires additional equity stakes of a partner when the partner's business has larger growth potential. Therefore, a sequential compound option can be employed when a strategic alliance goes to acquisition, which happened when the French-based corporation Renault organized a successful alliance in 1999 with Japan-based giant Nissan (the first option) and later, in 2016, the Renault–Nissan group acquired through Nissan 34% of the shares of Mitsubishi (the second option) by generating significant synergism of collaboration (e.g., Čirjevskis 2021c). Geske (1979) extended the Black–Scholes option pricing model to price compound options and suggested Formula (2) to apply as follows:

$$\begin{gathered} C = SN_2\,(d_1, d_2, p) - K_2\, e^{-rT}{}_2\, N_2\,(d_3, d_4, p) - K_1\, e^{-rT}{}_1\, N\,(d_3) \\ d_1 = \frac{ln(S/S*)+(r+(1/2)\,\sigma 2)\,T1}{\sigma\,\sqrt{T1}} \\ d_2 = \frac{ln(S/K_2)+\left(r+\left(\frac{1}{2}\right)\sigma 2\right)T2}{\sigma\,\sqrt{T2}} \\ d_3 = d_1 - \sigma\,\sqrt{T1} \\ d_4 = d_2 - \sigma\,\sqrt{T2} \\ p = \sqrt{T1/T2} \end{gathered} \tag{2}$$

where $T1$ and K_1 are the first exercise date and strike price; $T2$ and K_2 are the second exercise date and strike price; S is the current stock price; S^* is the stock price at $T1$ for which the option price is $K1$; r is the risk-free rate of return; σ is the volatility, which is calculated iteratively; and $N(d_1, d_2, d_3, d_4)$ is the joint (bivariate) cumulative distribution function or the probability that the deviation will be less in the conditions of the standard normal distribution (Chen and He 2015).

Therefore,

Proposition 3. *The tacit synergies when a strategic alliance goes to an M&A deal can be valued by way of sequential compound (call-on-call) real options.*

3. Design, Methodology, and Approach

Having analyzed a case study of the Ahold and Delhaize merger in 2016 and the strategic alliance between Tesco and Carrefour during the period of 2018–2021 and the potential collaboration after the alliance, the paper has explored the probable challenges in the global supermarkets' alliances through two contemporary theoretical lenses: the resource-based view and real options theory. To find the causes of the success or failure of explicit competence-based synergies related to the international contexts of the Ahold and Delhaize merger and the Tesco and Carrefour alliance, the author has employed the ARCTIC framework.

The research confirmed that synergies in strategic collaborative ventures are a function of strategic compatibility, complementarities, and transferability of core competencies that are fostered by the internal advantages (A) and external relevance (R) of core competencies of partnership companies and are underpinned by open and interactive communication and absorption capacities (C), mutual trust, commitment, and integration promptness (T), the ability to deal with the impact of an institutional dimension and implement a robust implementation plan (I), and cultural compliance of business partners (C).

As shown in Table 2, the author has adopted the recommendation of Dunis and Klein (2005) on real options variables to calculate the tacit competence-based synergies as the real options premium value of the merger of Ahold and Delhaize in 2016 by applying a simple option using the Black–Scholes option pricing model according to Formula (1) and to measure the collaborative synergies of the international alliance between Tesco and Carrefour and assess the potential synergies in the case of their future merger by applying sequential compound options according to Formula (2).

Table 2. The correspondence between real and financial call options.

Variables of a Financial Call Option	Variables of a Real Call Option	Sources of Data Used
Stock price (S)	The cumulated market value of collaborative business partners before announcement of deal terms, excluding the week of announcement (four-week average)	YChart.com; companies' reports
Strike prices (E, K1, K2)	The hypothetical future market value of the separate partners without collaboration: forecast by the EV/EBITDA-based multiples	Finance. Yahoo.com; Marketscreener.com; Finbox.com; companies' reports; the author's own calculation;
Volatility (σ)	The annualized standard deviation of the weekly stock movement of the leading partner after the announcement of the deal	V-Lab GARCH Volatility Analysis; United States Securities and Exchange Commission (SEC) Reports; the author's own calculation
Risk-free rate (r)	Domestic three-month rate of the country of the leading partner of the collaboration	Statista.com; Gurufocus.com
Time to maturity of the option (T1; T2)	Three years or the assumption of the partners on the duration of gaining synergy	The lifecycle of a collaborative synergy

To justify its propositions, the paper further discusses and interprets the research findings of the Ahold and Delhaize merger and Tesco and Carrefour purchasing alliance case studies.

4. Illustrative (Deductive) Case Study of the Ahold and Delhaize Merger

In 2015, Dutch grocer Ahold announced the acquisition of Belgian food retailer Delhaize for USD 28 billion, and the deal was completed in 2016. The two merging corporations are now known as the Ahold Delhaize group and have become number four among the largest US-based grocers. The Ahold–Delhaize merger "adds scale, allows us [to invest more] in innovation, and provides opportunities to develop our store formats in a highly competitive market," said Ahold Chief Executive Dick Boer. (Walker and Gasparro 2015, p. 1).

According to analysts, the companies had relatively little geographic overlap in the US and could leverage their scale to lower transportation and warehousing costs, as well as garner more purchasing power with food suppliers (Walker and Gasparro 2015). To explore the explicit and tacit competence-based synergies that had been generated within the Ahold and Delhaize merger process, the ARCTIC framework and simple real call option valuation were applied.

4.1. Justification of the First Proposition. Exploration of the Prerequisite of Explicit Competence-Based Synergies in the Ahold and Delhaize Merger with the ARCTIC Framework

Employing the VRIO framework, the two sets of core competencies of collaborative partners were explored by asking four questions regarding resources and capabilities: Are they valuable? Rare? Costly and/or time-consuming to imitate? Efficiently and effectively organized? Then, employing the ARCTIC framework, complementarity (factors A and R), compatibility (the first C factor), and transferability (factors T, I, and second C) of the core competencies were analyzed.

The results of the VRIO and, as an extension, the ARCTIC analyses show that both grocers have compatible, transferable, and mutually complementary core competencies.

Practically, by employing the VRIO framework, the core competencies as a source of competitive advantage of each collaborative partner must be explored. Then, by applying the ARCTIC framework, the core competencies of the first collaborative partner (Ahold) should be explored regarding their complementarity (factors A and R), compatibility (the first C factor), and transferability (factors T, I, and second C) to the second partner (Delhaize) by answering "Yes" or "No"; thus, opportunities to create explicit collaborative competence-based synergies can be foreseen.

In the same manner, the second collaborative partner, namely, Delhaize, should explore the core competencies of Ahold in terms of the correspondence to the ARCTIC framework so that it can also foresee explicit collaborative competence-based synergies. Finally, in the case of six "Yes" answers, the foreseen explicit synergies in the M&A deal can be valued by employing a simple real options application involving the Black–Scholes option pricing model (BSOPM) and sequential compound real options in the case of an alliance to a merger and acquisition strategy.

Regarding the complementarity core competencies (factors A and R) of Ahold and Delhaize, one of them is geographic complementarity in terms of locations in the US market. Ahold was more active in urban zones of the USA, whereas the US-based Food Lion grocery chain of Delhaize is more active in rural areas. This core competence gave them a significant competitive advantage by engaging almost all types of customers in the USA.

Regarding the compatibility of core competencies (the first C factor), the similar business model that fit each market should be mentioned as well. Ahold and Delhaize acquired local grocers rather than promoting their brand in acquired supermarkets. Both grocers began as family-based businesses. Therefore, their business models and corporate cultures are compatible.

When it comes to the transferability of core competencies (factors T, I, and second C), digitalization of grocery retailing, which has a strong impact on the retail customer, should be mentioned as well. Ahold had a well-developed digital undertaking (click and collect) in Europe and the US thanks to Bol.com subsidiaries, and Delhaize could benefit from it. Transferability of core competencies and their effective integration provided an explicit competence-based synergy that could be foreseen by employing the ARCTIC framework as shown in Table 3.

Having employed the ARCTIC framework to foresee prerequisites of explicit synergies of the Ahold Delhaize merger, it became quite evident that complementarity (A, R), compatibilities (first C), and transferability (T, I, and second C) of core competencies of Ahold Delhaize helped the partners to reciprocally benefit each other. To put it simply, several featured reasons drive explicit competence-based synergies as follows. Having integrated two sets of core competencies, the Ahold Delhaize group now provides exhaustive product mix options to their customers and caters to various customers in terms of geographic segments in the retail (grocery) industry. The Ahold Delhaize group has extensive dealer networks and associates' networks that help in managing competitive advantages (cost reduction and differentiation) in the retail (grocery) industry. Even though most off-line players in the grocery industry strive to innovate, the Ahold Delhaize group has already advanced a successful record in consumer-driven digital innovations (e.g., Čirjevskis 2020).

Table 3. The ARCTIC framework: analysis of compatibility, complementarity, and transferability of core competencies of the Ahold Delhaize deal as prerequisites of explicit competence-based synergy.

The Core Competencies of Ahold and Delhaize	(A)?	(R)?	(C)?	(T)?	(I)?	(C)?
The core competence of Ahold in supply chain management and strong long-term relationships with suppliers that provide high-quality products and services	Yes	Yes	Yes	Yes	Yes	Yes
The core competence of Ahold regarding the vast network of 750+ stores and 200+ fuel stations, operating under many brand names such as Giant Carlisle, Stop & Shop, Martins, and Giant Landover	Yes	Yes	Yes	Yes	Yes	Yes
The core competence of Ahold in managing operations across many states of the US and the District of Columbia	Yes	Yes	Yes	Yes	Yes	Yes
Core competencies in extensive customer reach through the e-retail platform www.peapod.com	Yes	Yes	Yes	Yes	Yes	Yes
The core competence of Delhaize is in a diverse brand portfolio with brands spread across products: fruits and vegetables, dairy products, sweets, bread, and meat specialties	Yes	Yes	Yes	Yes	Yes	Yes
The core competence of Delhaize is a strong network of 154,000 associates who are trained to deliver the best customer service	Yes	Yes	Yes	Yes	Yes	Yes
The core competence of Delhaize in different customer-centric training programs across geographies such as "Count on me" in Delhaize Serbia, "Power of you" at Hannaford's in the USA, and associate engagement surveys	Yes	Yes	Yes	Yes	Yes	Yes
The core competence of Delhaize is being among the four food retailers featured on the Dow-Jones sustainability index, which is a leading benchmark for investors with sustainability considerations	Yes	Yes	Yes	Yes	Yes	Yes

Source: Developed by the author.

4.2. Justification of the Second Proposition. Valuation of Tacit Competence-Based Synergies with a Simple Real (Call) Options Application

To value tacit competence-based synergies or "value in development" of the Ahold and Delhaize collaborative venture as a simple real call option, the Black–Scholes simple option pricing model (Black and Sholes 1973) was employed, namely: C (S, t) = S0 ∗ N(d1) − K ∗ e^{-rT} ∗ N(d2), where N(d1) and N(d2) are the cumulative distribution functions of the standard normal distribution; C (S, t) is the call option price (a tacit synergy value) at time t; S0 is the price of the underlying asset at time 0; K is the exercise price at time t; T is time in years; r is a risk-free rate; e is a mathematical constant approximately equal to 2.71828, the base of the natural logarithm; σ is expected volatility of an underlying asset's value. To value the tacit synergy or a value in development synergy with a real options application, the author used the data shown in Table 4.

Table 4. The valuation of tacit synergies of the Ahold Delhaize group with the Black–Scholes option pricing model (in the period of 2016–2018).

Parameters of Financial Options	Parameters of Compound Real Option (Call-on-Call) Application	Data
Stock price (So)	The cumulated market value of the target (Delhaize) and acquirer (Ahold) before the announcement (So)	24.9 EUR bn
The strike price of underlying (K)	The future market value of the separate entities (Ahold and Delhaize) in one year was calculated with the EV/EBITDA (enterprise value/earnings before interest, taxes, depreciation, and amortization) multiples	25.5 EUR bn
Expiry time of underlining (T)	Duration of gaining collaborative tacit synergy in the merger or acquisition deal	3.0 years
Volatility (σ)	Expected volatility (σ) was determined based on historical volatilities for three years following the United States Securities and Exchange Commission (SEC) reports	22.20%
Risk-free rate (r)	The risk-free rate of return (rf) in 2015 was defined as long-term government bond yields (10 years) for The Netherlands	−0.20%

Source: Developed by the author.

The real option variables of the Black–Scholes option pricing model to value the tacit competence-based synergies of the Ahold and Delhaize collaborative venture were calculated employing a Microsoft Excel spreadsheet in Office 2010 and are given in Table 5.

Table 5. Real option sub-variables of the Black–Scholes simple option pricing model to value the tacit competence-based synergies of the Ahold and Delhaize collaborative venture (in EUR bn).

Option Sub-Variables	Data	Option Sub-Variables	Data
T =	3.0 years	d_1 =	0.1164
S_0/K =	0.9765	$N(d_1)$ =	0.5463
$\ln(S_0/K)$ =	−0.0238	d_2 =	−0.2708
variance/2 =	0.0246	$N(d_2)$ =	0.3933
[risk-free rate + variance/2] × T =	0.06889	−rT =	−0.0061
the square root of variance =	0.2220	e^{-rT} =	1.0061
the square root of T =	1.7440	$S_0 \times N(d_1)$ =	13.603 EUR bn
(square root of variance) × (square root of T) =	0.3873	$K \times e^{-rT} \times N(d_2)$ =	10.086 EUR bn
		Real option value (C)	3.514 EUR bn

The value of tacit synergies confirms the proposition given and provides evidence that Ahold Delhaize maximized market value added according to the estimated simple real (call) option value that equaled 3.5 EUR bn. To conclude, the application of simple real options provided for the estimation of a tacit synergy or value in the development of mergers and acquisitions deals.

5. Illustrative (Deductive) Case Study of the Tesco–Carrefour Purchasing Alliance

5.1. Rationales behind Entering an Alliance and the Impact of Institutional Context

A central rationale for entering an alliance for both Tesco and Carrefour (2018–2021) was firstly developing sales of their own product brands and, secondly, eliminating the

middlemen in the face of suppliers. If the government did not intervene in the process, then the alliance would work perfectly for both companies. It was found that, being a very profitable form of collaboration for both Tesco and Carrefour, the alliance impacted the fairness of the market in the following aspects: decreasing the market power of supplies and decreasing suppliers' involvement in innovations. As an outcome of the problems found, the French Competition Authority decided to adjust the cooperation terms for five years by (1) excluding several product families from the scope of the alliance, (2) limiting volumes for eight product categories, (3) and re-establishing the possibility for small suppliers to respond to calls for tenders (Gauthier 2020).

By imposing strict restrictions on the Tesco–Carrefour alliance, French authorities supported suppliers in the market (especially small ones) and limited the partners' operations with their own product brands, which was the highest priority for the alliance. Moreover, an influential role was played by the COVID-19 pandemic that started in 2019. Firstly, the UK and French governments introduced several restrictions on gatherings, mobility, and collaboration for safety purposes. Thus, customers started to visit offline grocery stores less often and for shorter periods. A big portion of customers moved towards online shopping. Secondly, the general purchasing power of consumers decreased due to increased unemployment. Moreover, the Brexit event in the life of the UK had some serious consequences for the Tesco–Carrefour alliance.

First, with the complication of paperwork (legal environment), it became much more difficult for both countries to perform logistics between countries and interact in general. Second, many immigrants living in the UK left the country due to the complicated process of receiving residence permits (Butcher and Schraer 2018). Thus, with Brexit, Tesco and Carrefour faced regulatory problems which they could not predict and which, finally, slowed down the development of their own product brands.

5.2. Justification of the First Proposition. Exploration of the Prerequisite of Explicit Competence-Based Synergies in Tesco and Carrefour's International Alliance using the ARCTIC Framework

When analyzing the core competencies of the collaborative partners, it can be concluded that Tesco and Carrefour were both successful in maintaining their leadership status within the highly unpredictable retail sector, where the companies followed cost leadership strategies and differentiation. Tesco and Carrefour were successful in obtaining both with the support of precise and smart management of the supply chain. The strategic use of geographical presence and customer loyalty also played a vital role in their success. Both companies made sure to align their internal core competencies with the market environment. However, the insufficient institutional strategies and somewhat neglected integration plan for core competencies highlighted a negative scenario for competence-based synergy in the future of this alliance, as shown in Table 6.

When assessing the prerequisites of the competence-based synergy of the international alliance between Tesco and Carrefour by applying the ARCTIC framework application, it is clear that the complementarity and compatibility (factors A, R, C, T) of the core competencies of Tesco and Carrefour were not enough to deelop their further growth and generate competence-based synergies due to insufficient dynamic political capabilities and planning of integration of core competencies (factor I). Recently, Oliver (2016) found that the UK and France differ concerning Hofstede's six dimensions of national culture.

There are significant differences in the dimensions "uncertainty avoidance", or the attempt to make life predictable and controllable (France's index is 86 and the UK index is 35), and "power distance", or accepting the hierarchy of power and authority (France's index is 68 and the UK index is 35) (Hofstede et al. 2010). In this vein, cultural differences (the second C factor) between the collaborative partners could have also become insurmountable obstacles to creating a competence-based synergy. As a result, after the alliance formation, the partners did not benefit from each other's competencies as shown in Table 1.

Table 6. The ARCTIC framework: analysis of complementarity, compatibility, and transferability of core competencies of the Tesco–Carrefour international alliance partners as prerequisites of explicit competence-based synergy.

The Core Competencies of Tesco and Carrefour	(A)	(R)	(C)	(T)	(I)	(C)
Tesco's core competence in the distribution network in Europe and East Asia	Yes	Yes	Yes	Yes	No	Yes/No
Tesco's core competence is a strong presence in the UK retail industry	Yes	Yes	Yes	Yes	No	Yes/No
Tesco's core competence in e-commerce	Yes	Yes	Yes	Yes	No	Yes/No
Tesco's core competence in supply chain management at a low cost	Yes	Yes	Yes	Yes	No	Yes/No
Carrefour's core competence in the distribution network in Europe, South America, and East Asia	Yes	Yes	Yes	Yes	No	Yes/No
Carrefour's core competence is its strong presence in the French retail industry	Yes	Yes	Yes	Yes	No	Yes/No
Carrefour's core competence in its own brands	Yes	Yes	Yes	Yes	No	Yes/No
Carrefour's core competence in e-commerce in cooperation with Google	Yes	Yes	Yes	Yes	No	Yes/No
Carrefour's core competence in logistics-based processing	Yes	Yes	Yes	Yes	No	Yes/No

Source: Developed by the author.

Even though competence-based synergy potential can be found in global purchasing power, reducing the cost of goods according to customers' needs, acquiring more and more customers, selling their own product brands, and sharing market profitability, their inability to cope with institutional context (factor "I") was central to the failure of collaborative synergies of this international alliance. Although the partners did not demonstrate strong dynamic political capabilities, what could they have done differently anyway?

What is next for these companies and why is a possible future merger of Tesco and Carrefour not out of the question? Looking at the successful digitalization strategy of the Ahold Delhaize group, Carrefour and Tesco could accelerate their focus on innovation and create a seamless online and offline experience for their customers. Recent research on the success of the Ahold and Delhaize (AD) merger (Čirjevskis 2020) confirms the argument that "enterprise digitalization is a way for companies to make their processes more efficient" (Eremina et al. 2019, p. 1).

As an example of innovation, the Ahold Delhaize group has created automated checkout, self-scanning technology, and digital price labelling on the shelf. It turned out that the digitalization challenge in the grocery business, changing customer demand, and the fierce competition in the grocery market were the main rationales behind the merger of Ahold Delhaize and could be the next step in close collaboration between Tesco and Carrefour. To what extent is this possible?

5.3. Justification of the Third Proposition. Valuation of Tacit Competence-Based Synergies by applying Sequential Compound Real Options

Having discussed the rationales behind the alliance's termination, the sequential compound option is applied to value tacit competence-based synergies provided by the alliance (as a first growth option) and tacit synergies of a hypothetical future merger (as the second growth option). The European type of compound option is exercisable only at expiration, where the duration of an option (T1 and T2) is the expectation of management of gaining collaborative synergy. Previous studies on the periods of gaining synergies in

M&A deals of stock-listed companies have recommended using a 10-year period (T) for achieving synergies (Damodaran 2005, p. 14), three years after the merger (Vergos 2003), or even up to one year (Dunis and Klein 2005, p. 7). The duration of gaining collaborative tacit synergy in an alliance formation (T1) is three years or the duration of the alliance lifecycle.

Because the merger could have been started, hypothetically, on 1 January 2022, for the valuation of the second call option (merger and acquisition), the assumption was made that the duration of gaining synergy would be three years till the end of 2024. Similarly, when Dutch grocer Ahold acquired Belgian food retailer Delhaize for USD 28 billion in 2015, it was reported that three years were needed to gain synergy (Board Report Ahold 2015). The sequential compound option parameters have been calculated by applying the file extension XLSM that is assigned to spreadsheets created by Microsoft Excel 2007 and later versions, employing the function: @CallonCall(StockPrice; Strike1; Strike2; Expiry1; Expiry2; RiskFreeRate; Dividend; Volatility) where dividends equal zero (see Table 7).

Table 7. Parameters of financial and sequential compound real options: the Tesco and Carrefour alliance.

Parameters of Financial Options	Parameters of Compound Real Option (Call-on-Call) Application	Data
Stock price (So)	The cumulated market value of Tesco and Carrefour before the announcement of the deal	EUR 53.46 bn
The strike price of compound (K1)	The hypothetical future market value of the separate entities is forecast by the EV/EBITDA multiples of Tesco PLC and Carrefour SA in 2018	EUR 41.38 bn
The strike price of underlying (K2)	The future value of Tesco PLC was calculated with the EV/EBITDA multiple of Tesco PLC and Carrefour SA in 2022	EUR 75.48 bn
Expiry time of compound (T1)	Duration of gaining collaborative tacit synergy in the alliance formation	3.0 years
Expiry time of underlying (T2)	Duration of gaining collaborative tacit synergy in the merger or acquisition deal	6.0 year
Volatility (σ)	Carrefour SA's historical volatilities within the first week after the announcement of the alliance formation with Tesco PLC (1 July 2018–8 July 2018)	34.50%
Risk-free rate (r)	The annualized risk-free interest rate in France in 2018	1.60%
The option price (call-on-call)	Tacit synergies of collaborative strategies: from an alliance to merger and acquisition (2018–2024)	EUR 2.51 bn

Source: Developed by the author.

Having applied a combined sequential compound real option to value Tesco and Carrefour collaboration synergies, the option valuation result (tacit synergies) was estimated at EUR 2.17 bn, evidencing that a possible merger of the two global grocery retailers might not be excluded in the future.

6. Conclusions, Contributions, Research Limitations, and Future Work

This paper constitutes a novel theoretical and empirical contribution to foreseeing an explicit competence-based synergy in international collaborative ventures from the resource-based view and values a tacit competence-based synergy by applying real options. This is the main theoretical contribution of this paper. Moreover, the paper makes several theoretical and empirical contributions to the strategic management, international business, and corporate finance disciplines.

In this paper, two research questions have been answered empirically. By employing deductive logic, the case studies represent important critical success factors that impact

explicit synergy and provide a tacit competence-based synergy in M&A deals and international strategic alliances. Having analyzed the acquisition of Delhaize by Ahold Delhaize in 2015 and the creation of the Ahold Delhaize group in 2016, the case study has confirmed that the ARCTIC framework helps foresee explicit competence-based synergies in M&A processes (first proposition). What is more, a tacit synergy can be valued with a simple real option (second proposition). This is the paper's important theoretical and practical contribution to global M&A issues.

Regarding the contribution to the strategic management discipline, the application of the ARCTIC framework goes beyond the application of VRIO resources to operations of an individual corporation in individual foreign countries (Kogut 1985; Ghemawat 2007) and thus contributes to a resource-based view on strategy (Barney 1991) in the international and institutional contexts of collaborative ventures. The research has confirmed the six success factors of the ARCTIC framework that enable one to foresee explicit competence-based synergies of collaborative ventures (*first proposition*). The research has also confirmed that, even though the Tesco and Carrefour purchasing alliance mainly generated strengths for the groups (factors A, R, C, and T), there were nevertheless some significant weaknesses (factors I and second C) that led to the alliance's termination.

Moreover, the ARCTIC framework helped to foresee prerequisites of explicit synergies of the Ahold Delhaize merger, making it quite evident that complementarity (A, R), compatibilities (first C), and transferability (T, I, and second C) of core competencies of Ahold Delhaize helped the group to create a collaborative synergy. The application of simple real options valued the tacit synergy of this collaborative deal and confirmed the *second proposition*.

In contributing to the real options theory, Kogut (1991) argued that "when a firm initiates an alliance, the firm obtains an option to expand or acquire in response to future market developments while retaining the option to defer complete commitment" (Tong and Reuer 2007, p. 38). In this vein, initiating an international alliance between Tesco and Carrefour has been considered as exercising the initial option to generate alliance-based synergies, which in turn would have led to the creation of other real options, such as the option to acquire or the option to abandon (Li et al. 2007). Therefore, the paper contributes to the intersection between corporate finance and strategic management by demonstrating that tacit competence-based synergies of collaboration strategy from alliance to merger can be valued by sequential compound real options (*third proposition*).

Within most salient future research opportunities on corporate foresight, Fergnani recommends two-stage mediation as follows: corporate foresight > new business opportunities > resource-based changes > performance (Fergnani 2022, p. 836). This paper contributed to this scientific recommendation by demonstrating the following discourse on mediation stages of foresight: *corporate foresight (collaborative strategies) >> new business opportunities (identification of VRIO resources of potential collaborative partners) >> resource-based changes (exploration with the ARCTIC framework) >> performance (real options valuation of competence-based synergies as added market value)* as given in Figure 1.

Having empirically answered the two research questions of the paper, the relationship among the developed propositions and the conceptual model of foresight of explicit synergies and valuation of tacit competence-based synergies comprises the theoretical and managerial contributions of the research and can be employed by practitioners for decision-making and scholars for similar future research as shown in Figure 1.

Figure 1 illustrates the likely relationships among the main constructs presented in the paper, with the ARCTIC framework shown as a building block of explicit synergism of collaborative ventures and the application of real options valuations to quantitatively measure tacit competence-based synergies.

What lesson can be distilled from the case studies conducted that should be considered in future research? When it comes to the limitation of real options application to measure competence-based synergies, Ragozzino et al. (2016) argued that " . . . If some attributes of real options are not observable and are, moreover, dependent on the unique assets held

by heterogeneous firms and the synergies and complementarities that such investments can generate, then the analytical exercise surrounding the study of real options becomes complex as well as qualitative and subjective" (Ragozzino et al. 2016, p. 433). In this vein, more interviews with industry practitioners are needed, to obtain their expert opinions, as is further quantitative research.

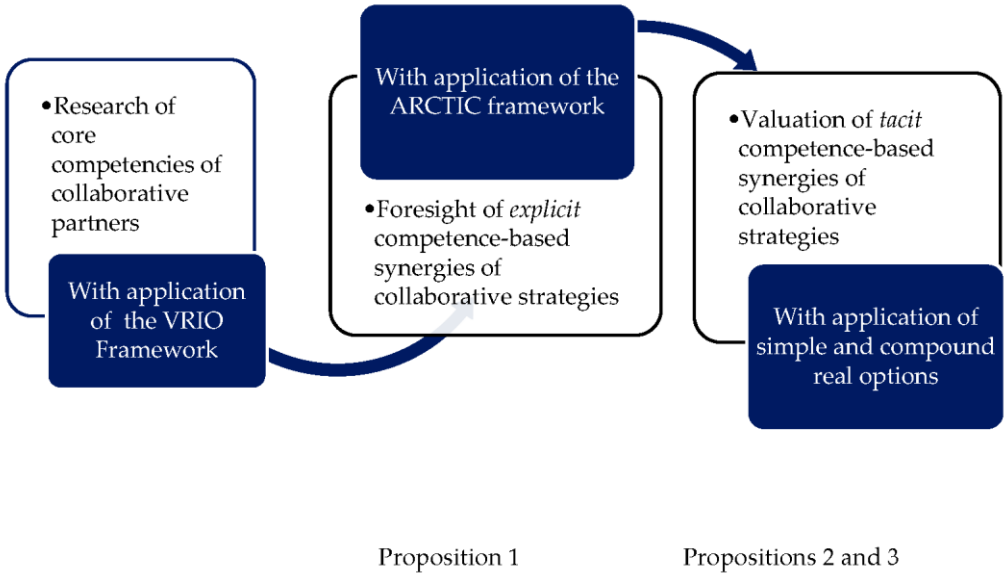

Figure 1. The relationship between the developed propositions: The conceptual model of foresight of explicit synergies and valuation of tacit competence-based synergies. Source: Developed by the author.

The evaluation of competence-based synergies was made based on the assumption that all six factors of the ARCTIC framework have the same weight of significance. However, the case study results confirm that institutional context and dynamic political capabilities could be a key to the creation of competence-based synergies in an international alliance. Therefore, the weighting of each factor of the ARCTIC framework for each strategic context, particularly for the global grocery industry and, for instance, the global ICT industry, comprises a promising future research arena. Moreover, future research could further explore the role of the six factors of the ARCTIC framework as a driver of dynamic capabilities that underpins explicit and tacit competencies-based synergies in collaborative strategies.

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