The role of competitive environment and strategy in the supply chain's agility, adaptability and alignment capabilities

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Abstract

Purpose – This paper analyses the way that the industry's competitive environment and the company's strategy influence the implementation of the supply chain's (SC's) triple-A capabilities (agility, adaptability and alignment). Two competitive environment variables are analysed: competitive intensity of the industry and complexity of the SC. Two opposing competitive strategies are also considered: cost and differentiation.

Design/methodology/approach – The hypotheses have been tested using data gathered via a questionnaire given to 277 Spanish manufacturing companies, and structural equation modelling has been used for the analysis.

Findings – The results show that competitive intensity is the most influential factor followed by business strategy. SC complexity does not seem to affect agility. Moreover, although the competitive environment variables affect the business strategy, the latter has no mediating effects between the competitive environment and SC agility, adaptability and alignment capabilities.

Originality/value – This study presents new insights into the environmental and strategic drivers linked to the implementation of SC agility, adaptability and alignment capabilities and offers guidelines to managers involved in SC management.

Keywords Competitive environment, Business strategy, Triple-A supply chain, Supply chain agility, Supply chain adaptability, Supply chain alignment

Paper type Research paper

Introduction

The recently revitalised (Lee, 2021) triple-A supply chain (SC) conceptual framework developed by Lee (2004) emphasises the importance of orchestrating the agility, adaptability and alignment

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capabilities for SC effectiveness, which is essential for today's SCs (Cohen and Kouvelis, 2020). However, the contingency theory (CT) (Lawrence and Lorsch, 1967) states that contextual variables can affect the level of achievement or implementation of tools and business practices. Therefore, knowledge of the SC context is a key element for their adequate management.

Concerning contextual drivers, one of the most relevant aspects of the competitive environment is the intensity of the competition faced by the company. Among the consequences of intense competition are short product life cycles, product design sophistication, consistently high quality, cost reductions and customisation (Fynes *et al.*, 2005). All these create a more volatile, turbulent, unpredictable and demanding market environment that seems to foment SC agility, adaptability and alignment (Lee and Ra, 2016). Another important characteristic of a competitive environment is the complexity of the SCs in which companies operate. Greater complexity is usually associated with greater uncertainty, which heightens the requirement to develop agility, adaptability and alignment capabilities when competing.

On the other hand, companies try to successfully address the competitive environment by designing an appropriate strategy. Thus, firms seek to gain a competitive advantage by developing their strategies in line with their respective environments. According to Fisher (1997), certain/predictable products require efficient SCs, whereas, uncertain/unpredictable products require the SCs to be responsive. According to the dynamic capabilities view (DCV) (Teece *et al.*, 1997), as a set of complex capabilities might be difficult to develop and therefore difficult to replicate, the triple-A can generate a competitive advantage for the firm (Whitten *et al.*, 2012; Machuca *et al.*, 2021). Therefore, it seems reasonable to assume that the type of competitive strategy adopted by an organisation can shape the capabilities of the SC that it seeks to develop.

The triple-A SC framework has been mainly analysed with the focus on its impact on performance (e.g. Machuca *et al.*, 2021; Gligor *et al.*, 2020; Alfalla-Luque *et al.*, 2018; Attia, 2016). This study contributes to SC management (SCM) research by analysing new drivers related to the competitive environment, in particular SC complexity and competitive intensity, and strategies as antecedents of the triple-A SC capabilities and by identifying the individual roles that these drivers have on each of the triple-A capabilities. Therefore, this study addresses three relevant research questions: (1) How does a company's competitive environment influence its triple-A SC capabilities? (2) How does the type of competitive strategy affect triple-A SC capabilities? (3) Does strategy play a mediating role between competitive environment and triple-A SC capabilities?

The paper is organised as follows. Section 2 reviews prior studies on triple-A SC and the drivers analysed in this study. Section 3 describes the methodology used. Section 4 presents the results. Section 5 discusses them. Section 6 states the main contributions and implications, identifies some limitations and offers suggestions for further research.

Theoretical background and hypotheses

Theoretical framework

This paper builds on two theories frequently applied in SCM and operations management (MacCarthy *et al.*, 2016; Defee *et al.*, 2010) and, specifically, in the triple-A SC research (e.g. Whitten *et al.*, 2012; Alfalla-Luque *et al.*, 2018; Dubey *et al.*, 2018; Machuca *et al.*, 2021): CT (Lawrence and Lorsch, 1967) and the DCV (Teece *et al.*, 1997).

Lee (2004) established that SC efficiency is necessary, but only for companies that build agile, adaptable and aligned SCs (triple-A SC) to outstrip the competition. Nevertheless, CT suggests that firms align their performance priorities with their contextual factors. Hence, the context should play a role (i.e. as a driver or barrier) in the triple-A SC capabilities. Although many contextual factors might exist, Chi *et al.* (2009) highlight four key dimensions that shape a firm's environment: the degree of dynamism, complexity, diversity and munificence. Roscoe *et al.* (2020), Gligor (2016) and Gligor *et al.* (2015) have analysed some of these contextual factors, but only in relation to SC agility. This work will examine SC complexity and competitive intensity (inversely related to munificence) as antecedents of the triple-A capabilities.

A further theoretical foundation of this study can be found in the DCV framework. The traditional concept of dynamic capabilities, which were understood to be developed internally within the firm, has been extrapolated to the external level of the firm as "dynamic SC capabilities" (Aslam *et al.*, 2018; Dubey *et al.*, 2018). However, due to the emerging application of this concept to the SC context, the amount of research is limited and the literature on their theoretical underpinnings, in particular their antecedents, is still in the nascent stages (Aslam *et al.*, 2020). Whitten *et al.* (2012) argued that agility, adaptability and alignment are organisational dynamic capabilities that lead to competitive advantage and are developed and updated to respond to changes in customer demand and the structures of markets and economies. Consequently, the value of dynamic capabilities is dependent on the context. In this line, Barreto (2010) concluded that research in the field of DCV should focus on the internal and external factors that can enable firms to realise the potential of their dynamic capabilities or prevent them from doing so. With respect to internal factors, the previous research states that strategic orientation helps build dynamic capabilities (Zhou and Li, 2010; Tuominen *et al.*, 2004) since it guides a firm's interactions with its SC partners and thus influences the relative emphasis that companies put on achieving dynamic SC capabilities (Zhou and Li, 2010).

Triple-A supply chain

Gaining a competitive advantage is a priority for firms to survive in the highly competitive global context (Marin-Garcia *et al.*, 2018), where competition is not company-based, but SC-based. Therefore, SCs must be designed to achieve advantages over their competitors. According to Lee (2004, 2021), achieving a sustainable competitive advantage requires a triple-A SC. Agility, adaptability and alignment are capabilities that have been defined in a variety of domains (marketing, manufacturing, organisational, strategic, etc.) and are currently being developed in the SC domain.

SC agility has been defined as the capability to rapidly detect and respond to short-term changes in real demand and supply to generate or maintain a competitive advantage (Alfalla-Luque *et al.*, 2018). An agile SC can adapt to market variations efficiently, respond to final demand quickly, produce and deliver products on time and cost-efficiently and generate an inventory reduction and external integration (Gligor and Holcomb, 2014; Swafford *et al.*, 2006). *SC adaptability* can be defined as the capability to adapt strategies, products and/or technologies to structural market changes (Alfalla-Luque *et al.*, 2018). Unlike agility, which is primarily related to decisions at the SC's tactical and operational levels, adaptability is a strategic-level attribute (Mak and Max Shen, 2020). A complex and uncertain market environment (economic, political, and social changes, demographic trends, changing consumer needs, global context and technological advances) requires an adaptable SC to improve the chance of survival (Tuominen *et al.*, 2004). Finally, *SC alignment* is the capability to share information, responsibilities and incentives with SC members to coordinate activities and processes (Alfalla-Luque *et al.*, 2018). This holistic focus considers the SC as a single entity (Lee, 2004) and implies strategic collaboration between the different members, with coherent objectives, strategies and processes (Flynn *et al.*, 2010).

Most of the previous research focuses on the impact of triple-A SC capabilities on performance, but only a small number of articles are focused on triple-A SC drivers (e.g. Dubey *et al.*, 2018). Feizabadi *et al.* (2019) confirm the lack of a comprehensive triple-A SC framework and stress the need for research focused on the drivers of triple-A SC. In this sense, the present study analyses the roles played by the industry's competitive intensity, the SC's degree of complexity and the company's competitive strategy.

Competitive intensity and the triple-A SC capabilities

The literature states that, far from being atomistic entities, firms are embedded in a network of relationships that influence their competitive behaviour (Moyano-Fuentes and Martínez-Jurado, 2016; Ketchen *et al.*, 2004). What stands out in this network is the struggle between firms to obtain the limited resources and information required for survival, which is known as competitive intensity (Carroll and Hannan, 2000). A higher degree of competitive intensity involves highly competitive pressures, fast and unpredictable competitive moves and monitoring competitors (Hallgren and Olhager, 2009). Collectively, these factors create a volatile and demanding market environment in which customers find greater numbers of potential choices available and are free to switch to other firms (Heirati *et al.*, 2016).

Fynes *et al.* (2005) found that in contexts of high competitive intensity, companies need to continuously monitor market changes and manage the SC accordingly. SCs operating in highly competitive industries are likely to have a greater need to ensure a sustainable competitive advantage at the SC level than those operating in stable industries. In other words, competitive intensity should be positively related to all the triple-A SC capabilities.

In settings of high-competitive intensity, firms need to adapt to changes in demand and modify their products (Fynes *et al.*, 2005) and delivery times accordingly. The characteristic turbulence of this business environment leads to an agile SC being an essential feature of management, not only for the individual chain constituents but for the entire SC. Agile SCs outperform less-agile SCs by "assisting firms in improving their capability of collaboration, process integration and information integration" (McCullen *et al.*, 2006). So, agile SCs provide value by mitigating risks in the competitive landscape and through rapid response measures (Braunscheidel and Suresh, 2009). Therefore, the following hypothesis is proposed:

H1a. Competitive intensity is positively related to SC agility.

On the other hand, competitive intensity is an external driver that can be used to act on strategic positioning (Hallgren and Olhager, 2009) as it can influence SC adaptability, that is, the ability to reshape the SC to add value for the customer (Ketchen *et al.*, 2008). SC adaptability emphasises the need to sense changes in the SC and to be flexible when addressing them (Eckstein *et al.*, 2015). Since SC adaptability prepares SC members to adjust to the situation and gain the desired competitive advantage (Dubey *et al.*, 2018), an adverse environment of high competitive intensity would be expected to be positively related to SC adaptability. Consequently, the following hypothesis is formulated:

H1b. Competitive intensity is positively related to SC adaptability.

Lastly, competitive intensity determines inter-firm knowledge acquisition and has led organisations to reassess the need for cooperative, mutually beneficial SC partnerships to improve business performance (Flynn *et al.*, 2010). An intense rivalry environment encourages SC partners to seek an opportunity for collaboration to develop competitiveness (Wu *et al.*, 2017). The goal is to achieve effective and efficient flows of information, products, services and money to provide maximum value to customers (Moyano-Fuentes and Martínez-Jurado, 2016). Furthermore, information flow integration provides the basis for financial and physical flow integration (Sacristán-Díaz *et al.*, 2018). A context of high competitive intensity is what makes the benefits of collaboration with SC partners more positive (Heirati *et al.*, 2016), so the following hypothesis is formulated:

H1c. Competitive intensity is positively related to SC alignment.

Supply chain complexity and the triple-A SC capabilities

Complexity is inherent in management, but the shift from managing an organisation internally to managing the SC entails a major increase in the level of complexity that needs to be addressed. Blecker *et al.* (2005) state that, in most cases, SCs operate in dynamic environments with multiple connections between companies, so they are exposed to many sources of complexity. There is also a consensus that SCs have become more complex over recent years (Bode and Wagner, 2015).

The term complexity is a multidimensional and multidisciplinary concept, so there is no commonly accepted definition (Blecker *et al.*, 2005). Following Manuj and Sahin (2011), SC complexity can be defined as "the structure, type and volume of interdependent activities, transactions, and processes in the supply chain that also includes constraints and uncertainties under which these activities, transactions and processes take place" (p. 523). According to Bode and Wagner (2015), two qualities of complexity (structure and behaviour) are usually distinguished. The first is static complexity (also called structural or detail complexity) and refers to the number and variety of elements that define the system. The second is dynamic complexity (or operational complexity) and refers to the interactions between the elements of the system.

Despite prior research on SC complexity being relatively scarce, Blome *et al.* (2014) indicate that the predominant, overall conclusion on the SC's upstream side is that greater supply complexity negatively influences performance. Manuj and Sahin (2011) warn that a lack of understanding of the drivers of complexity and poorly designed and executed strategies to address complexity in SCs often lead to undesirable outcomes. Bode and Wagner (2015) synthesise this in three outcomes: a decrease in operational performance, more complicated decision-making and the triggering of disruptions. The present study argues that the triple-A SC capabilities can also be affected by SC complexity.

Several authors claim that complexity and agility are inversely related. The main argument is that a less complex firm is easier to change and consequently more agile, so complexity has been used as a surrogate measure for agility (Sherehiy *et al.*, 2007; Arteta and Giachetti, 2004). This argument can be extended to the SC, where Christopher (2000) states that complexity is argued to be a barrier to achieving SC agility. Likewise, Prater *et al.* (2001) state that agility should decrease as the exposure of the SC to uncertainty and complexity increases. Therefore, we propose the following hypothesis:

H2a. SC complexity is negatively related to SC agility.

As for SC adaptability, some authors propose that SC complexity can lead organisations to develop adaptability capabilities (Manuj and Sahin, 2011), and, as globalisation increases the complexity that affects the SC, adaptability is increasingly crucial (Hoole, 2005). Meanwhile, other authors state that complexity hinders the ability of a firm to react to change by reconfiguring its products, processes or organisational structure (Sherehiy *et al.*, 2007). Given these contradictory antecedents, we tentatively propose the following hypothesis:

H2b. SC complexity is positively related to SC adaptability.

Regarding SC alignment, Fawcett and Magnan (2001) consider network complexity to be a barrier, and alignment mechanisms to be one of the most important bridges to effectively achieving SC integration. Gimenez *et al.* (2012) consider SC integration is only effective in a context characterised by high supply complexity. In the same line, Wong *et al.* (2015) find that SC information integration is more useful when firms work with many partners to market a wide variety of products, i.e. in the case of high market complexity. Hence, we hypothesise that:

H2c. SC complexity is positively related to SC alignment.

Competitive strategy and the triple-A SC capabilities

Sousa and Voss (2008) highlight the role of strategic context as one of the contingency factors traditionally considered in operations management and state the relevance of the fit between the production system and the organisation's priorities. In contrast, as stated previously, research in the DCV field suggests that both external and internal factors need to be focused on to enable firms to realise the potential of their dynamic capabilities (Barreto, 2010). Among these internal factors, the choice of competitive strategy, in the Porterian sense of orientation towards cost leadership or differentiation, could benefit or hinder the development of the triple-A capabilities. Three different types of SC strategy are usually identified: lean, agile and leagile SCs, depending on whether the chain focuses on efficiency, differentiation or a combination of both (Christopher *et al.*, 2006).

The connection between the company's competitive strategy and SC strategy has been analysed by various authors, who highlight that a fit between competitive strategy and SCM positively impacts firm performance (Hofmann, 2010). In this regard, a lean SC would be appropriate for a cost-leadership competitive strategy, whereas an agile SC would be suitable for a differentiation competitive strategy in which speed is the priority (Mason-Jones *et al.*, 2000).

Gligor *et al.* (2015) state that SC researchers (e.g. Sebastiao and Golicic, 2008; Christopher *et al.*, 2006) connect efficiency and waste minimisation strategies with lean management and suggest that agility is not linked to efficiencies to the same extent. In this regard, Hallgren and Olhager (2009) empirically find that, as suggested, agile manufacturing is negatively associated with a cost-leadership strategy. Thus, when a company follows a cost-leadership strategy, a lean SC strategy and lower levels of the triple-A SC capabilities should be expected. However, SC research provides no definitive empirical evidence to indicate that agile SCs cannot also be efficient, and arguments exist that suggest that the main difference between lean and agility appears to be related to the flexibility performance dimension, not cost (Gligor *et al.*, 2015). Indeed, Qi *et al.* (2011) conclude that cost leaders tend to implement both lean and agile SC strategies, although their emphasis on an agile strategy is significantly greater in a volatile environment than in a stable environment. More recently, Qi *et al.* (2017) found that a lean SC is appropriate for firms with higher priorities on cost, quality and delivery strategies, but not flexibility. Therefore, the literature suggests that a cost strategy could be negatively related to the triple-A SC capabilities.

In contrast, Hallgren and Olhager (2009) investigate internal and external factors that drive the choice of lean (focused on efficiency) and agile (focused on flexibility) operations capabilities and their findings point to agile manufacturing being directly affected by a differentiation strategy. Indeed, empirical evidence exists that firms focusing on a differentiation strategy emphasise the agile SC strategy (Qi *et al.*, 2011) and that an agile SC is appropriate for firms competing on the flexibility strategy (Qi *et al.*, 2017). Thus, when a company follows a differentiation strategy, an agile SC strategy should also be required and, consequently, a higher level of the triple-A SC capabilities should be expected. So, the literature leads us to propose the corresponding hypothesis:

H3. A more differentiation-oriented business strategy (vs. cost) is positively related to the implementation of triple-A SC capabilities (H3a: agility, H3b: adaptability and H3c: alignment).

On the other hand, according to Porter (1980), a company's strategy is expected to respond to its competitive environment, and therefore, competitive intensity and SC complexity are expected to influence the competitive strategy's orientation. So, the impact of both of the environmental variables on triple-A capabilities may be mediated by the strategy adopted by the company. Consequently, we add two exploratory mediation hypotheses:

H4. Business strategy plays a mediating role in the influence of competitive intensity on the triple-A SC capabilities (H4a: agility, H4b: adaptability and H4c: alignment)

H5. Business strategy plays a mediating role in the influence of SC complexity on the triple-A SC capabilities (H5a: agility, H5b: adaptability and H5c: alignment)

Based on all the above, our research model is presented in Figure 1.

Methodology

Population, questionnaire and data gathering

The hypotheses were tested using data gathered via a questionnaire with items drawn from the literature and measured on Likert scales. A draft version of the questionnaire was tested by a panel of five internationally recognised experts, and a pilot study was then conducted with five heads of SCM to ensure that the item definitions were meaningful and comprehensive. This minimised response bias and ensured the quality and validity of the survey instrument.

A population of 2,650 Spanish manufacturing companies with at least 50 employees (to guarantee concern for SCM in the company (Sacristán-Díaz *et al.*, 2018)) was established as the object of the study. The population framework was obtained from the SABI (Iberian Balance Sheet Analysis System) website. Companies were classified into sectors according to the CNAE catalogue (Spanish Standard Industrial Classification).

The data gathering method consisted of a telephone survey using a computerised system (computer-aided telephone interviewing, CATI) to contact all the companies in the sample. In addition, a web questionnaire was designed by the mid-point of the expected fieldwork period to make it easier for any remaining interviewees to respond. The fieldwork was carried out in 2018 during the January–July period. The final sample comprised 277 valid questionnaires (10.5% response rate), with a sample error of 5.6%, for a confidence level of 95% for $p = q = 0.5$. This is an adequate sample for detecting small effect sizes ($f^2 = 0.02$) with the usual significance ($\alpha = 0.05$) and statistical power ($1-\beta = 80\%$) levels in business studies for a model with 3 predictor variables (G*Power 3.1.9.7).

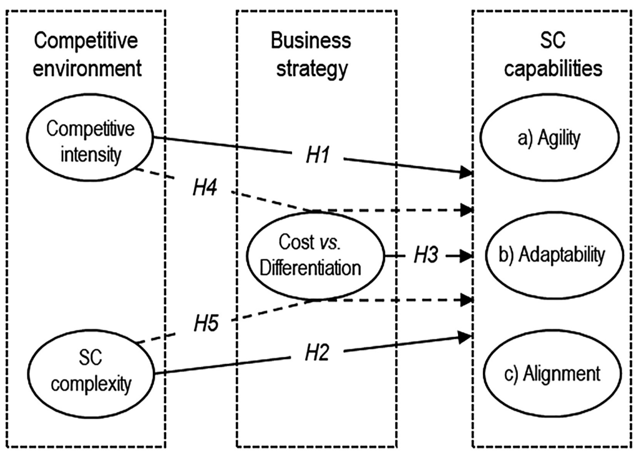

Figure 1.
Research model

Table 1 shows the firm distribution in both the population and the sample according to the CNAE sector classification and a similar distribution of companies across the various sectors.

No evidence of response bias was found in a comparison of respondents with non-respondents. No specific characteristics were observed in firms that decided not to participate and no pattern in the reasons that they gave to justify their refusal to take part. The first 40 responses and the last 40 responses were also compared, and no late response bias was found. Finally, the telephone survey responses and the web questionnaire responses were compared, and no significant differences were found for any of the study variables. With respect to common method variance, a full collinearity test (Kock, 2015) was conducted using WarpPLS 7.0 (Kock, 2020), and the obtained variance inflation factors (VIFs) ranged from 1.018 to 1.488, well under the level of 3.3 that would indicate problems. In sum, the data and analysis prove that the sample used in the study was randomly obtained and that it statistically represented the population.

Measures

The measures used in this study are all based on previous studies of similar topics to ensure their content validity. All the variables were targeted at one of three different respondents: SC or logistics manager, operations manager and CEO.

Competitive intensity. Competitive intensity was captured using the items adapted from Hallgren and Olhager (2009). Respondents were asked to indicate their opinions on a set of statements on a five-point Likert scale ranging from "strongly disagree" to "strongly agree".

SC structural complexity. Based on other studies (Roh *et al.*, 2014; Bozarth *et al.*, 2009), static or structural external complexity was measured by the number of suppliers and customers. As usual, these variables have been transformed with logarithms.

Competitive strategy. Following the Hallgren and Olhager (2009) study, cost leadership and differentiation (flexibility-based) have been measured using two items for each competitive strategy. Respondents were asked to indicate the relative importance of the four items (market and manufacturing goals) as an order-winning factor on a five-point Likert scale ranging from "absolutely crucial" to "least important". The two cost items were reversed to build this scale, so a low value indicates a cost strategy and a high value indicates a differentiation strategy.

Sector	Population		Sample		
	Number	%	Number	%	Response rate%
Food products and tobacco	543	20.49	48	17.33	8.84
Chemicals and pharmaceutical products	422	15.92	48	17.33	11.37
Manufacture of metal products	322	12.15	43	15.52	13.35
Manufacture of machinery and equipment	275	10.38	34	12.27	12.36
Motor vehicles	273	10.30	23	8.30	8.42
Meat industry	158	5.96	6	2.17	3.80
Electrical machinery and materials	141	5.32	14	5.05	9.93
Manufacture of beverages	106	4.00	7	2.53	6.60
Furniture industry	82	3.09	8	2.89	9.76
Informatics, electronics and optics products	81	3.06	13	4.69	16.05
Manufacture of other transport material	77	2.91	12	4.33	15.58
Shoes and leather	63	2.38	5	1.81	7.94
Other manufacturing industries	60	2.26	10	3.61	16.67
Fabrics and textile	47	1.77	6	2.17	12.77
Total	2,650	100	277	100	10.45

Table 1. Sample, population distribution of companies and response rate by industry

Triple-A SC capabilities. SC agility items have been adapted from previous research on this topic (Qi *et al.*, 2011; Tachizawa and Gimenez, 2010). SC adaptability and alignment scales have been adapted from Marin-Garcia *et al.* (2018). All items have been measured using a five-point Likert scale ranging from "strongly disagree" to "strongly agree".

Analysis

The research model was tested using PLS-SEM (partial least squares-structural equation modelling) with WarpPLS 7.0 (Kock, 2020). PLS-SEM is a non-parametric, multivariate approach based on iterative ordinary least squares (OLS) regression that seeks to maximise the explained variance of endogenous latent constructs. PLS-SEM was chosen because, in this study, we are more interested in maximising the predictability of the dependent variables and understanding the variation in these explained by the dependent variables (i.e. PLS-SEM) than in evaluating how well the model fits our data set (CB-SEM). WarpPLS also allows the use of non-linear estimation algorithms, which are usually closer to reality.

Results

Measurement model

Evaluation of the goodness of the measurement model usually includes three criteria (Hair *et al.*, 2017): internal consistency or reliability, convergent validity and discriminant validity. Some items in the original questionnaire were removed in this evaluation process following the Hair *et al.* (2017, pp. 112–115) criteria. Internal consistency has been evaluated by composite reliability, which ranges between 0.75 and 0.90 and always exceeds the minimum of 0.70 (see Table 2). Convergent validity at the construct level is measured by average variance extracted (AVE), which is above 0.50 in all the constructs except for business strategy, which is very close to this value (see Table 2).

Discriminant validity of the constructs has been verified with the Fornell-Larcker criterion, according to which the square root of each construct's AVE must be higher than its correlation with the other constructs. Table 3 shows that this criterion has been met. Additionally, discriminant validity is proven through the heterotrait-monotrait (HTMT) ratios (shown in the upper part of Table 3), and these are well below the most conservative threshold of 0.85 (Hair *et al.*, 2019).

In view of the above, the measurement model can be stated to be acceptable.

Structural model

Once the measurement model has been validated, the structural model is evaluated and the research hypotheses are tested. The first measure used to validate the model as a whole is standardized root mean squared residual (SRMR). In this case, the value is 0.095, which is below 0.1 and can be considered acceptable in the context of PLS (Kock, 2020).

As for the relationships in the structural model (the hypotheses), it can be observed in Table 4 that competitive intensity has a positive and significant impact ($p < 0.001$) on all the triple-A SC capabilities (H1a, H1b and H1c). SC structural complexity, however, positively affects SC adaptability and alignment – H2b and H2c ($p < 0.05$ and $p < 0.01$) – but not SC agility – H2a – even though the sign of the coefficient is negative, as hypothesised. Regarding business strategy, all three relationships are positive and significant, especially the relationships with SC agility and alignment ($p < 0.001$), and also with adaptability ($p < 0.01$). However, neither of the mediation relationships are significant (H4 and H5), despite the strategy being significantly influenced by the two environmental variables.

Next, we evaluate the coefficients of determination of the endogenous constructs. The capabilities that are best explained by the model are SC alignment ($R^2 = 0.18$) and SC

Table 2.
Reliability and convergent validity of latent variables

Latent variable	Item	Loadings	VIF	Composite reliability	AVE
Competitive intensity	A11a	0.784	1.562	0.812	0.525
	A11b	0.854	1.795		
	A11c	0.589	1.157		
	A11d	0.640	1.219		
SC complexity	A2	0.777	1.046	0.753	0.604
	A7	0.777	1.046		
Business strategy	A12ar	0.781	1.374	0.790	0.487
	A12br	0.673	1.200		
	A12c	0.640	1.184		
	A12d	0.689	1.230		
SC agility	C2a	0.714	2.052	0.873	0.533
	C2b	0.731	1.913		
	C2c	0.709	1.512		
	C2d	0.708	1.805		
	C2e	0.745	1.915		
	C2f	0.773	1.771		
SC adaptability	C3c	0.704	1.543	0.846	0.580
	C3d	0.714	1.549		
	C3e	0.819	2.351		
	C3f	0.803	2.301		
SC alignment	C4c	0.779	1.847	0.897	0.594
	C4d	0.789	2.080		
	C4e	0.833	2.420		
	C4f	0.716	1.617		
	C4g	0.712	1.586		
	C4j	0.787	1.899		

Note(s): All factor loadings are significant at $p < 0.001$

Table 3.
AVE square root (diagonally), correlations between constructs (lower triangular part) and HTMT (upper triangular part)

	1	2	3	4	5	6
1. Competitive intensity	*0.725*	0.281	0.214	0.272	0.461	0.451
2. SC complexity	0.139	*0.777*	0.254	0.133	0.243	0.131
3. Business strategy	−0.079	0.044	*0.698*	0.133	0.099	0.125
4. SC agility	0.195	0.026	0.072	*0.730*	0.389	0.514
5. SC adaptability	0.319	0.122	0.009	0.300	*0.762*	0.552
6. SC alignment	0.346	0.071	0.016	0.435	0.440	*0.771*

adaptability ($R^2 = 0.15$). The value for SC agility ($R^2 = 0.08$) is practically half that of the other two capabilities.

The f^2 has been used to analyse the size of the effects (Table 4, last column). This is related to the practical significance of the coefficients rather than their statistical significance As can be seen, the size of the effect of competitive intensity on SC adaptability (0.10) and SC alignment (0.11) is small, and even smaller on SC agility (0.05). The effect of business strategy is quite small on all three As (0.04, 0.02 and 0.4 on agility, adaptability and alignment, respectively). The effect of SC structural complexity on SC adaptability and alignment is also close to the minimum (0.02 and 0.3, respectively).

Finally, the Stone-Geisser Q^2 values, which measure out-of-sample predictive power, are above zero for all the endogenous constructs, which provides support for the predictive relevance of the model (Table 4).

Direct effects	Coeff	Std. Dev	*p*-value	LCI 95%	UCI 95%	f^2
H1a: Competitive intensity → SC agility	0.208	0.058	<0.001	0.094	0.322	0.045
H1b: Competitive intensity → SC adaptability	0.309	0.057	<0.001	0.197	0.421	0.104
H1c: Competitive intensity → SC alignment	0.323	0.057	<0.001	0.212	0.435	0.113
H2a: SC complexity → SC agility	−0.055	0.060	0.180	−0.171	0.062	0.005
H2b: SC complexity → SC adaptability	0.121	0.059	0.021	0.005	0.236	0.021
H2c: SC complexity → SC alignment	0.159	0.059	0.003	0.045	0.274	0.033
H3a: Business strategy → SC agility	0.193	0.058	<0.001	0.079	0.307	0.038
H3b: Business strategy → SC adaptability	0.162	0.059	0.003	0.047	0.277	0.024
H3c: Business strategy → SC alignment	0.189	0.058	<0.001	0.075	0.303	0.036
Competitive intensity → business strategy	−0.116	0.059	0.025	−0.232	-0.001	0.012
SC complexity → business strategy	0.131	0.059	0.013	0.016	0.246	0.016

Indirect effects	Coeff	Std. Dev	*p*-value	LCI 95%	UCI 95%	f^2
H4a: CI → strategy → SC agility	−0.022	0.023	0.163	−0.067	0.023	0.005
H4b: CI → strategy → SC adaptability	−0.019	0.028	0.255	−0.074	0.036	0.006
H4c: CI → strategy → SC alignment	−0.022	0.028	0.218	−0.077	0.033	0.008
H5a: SC-C → strategy → SC agility	0.025	0.029	0.191	−0.032	0.082	0.002
H5b: SC-C → strategy → SC adaptability	0.021	0.032	0.253	−0.042	0.084	0.004
H5c: SC-C → strategy → SC alignment	0.025	0.032	0.223	−0.038	0.088	0.005

Model estimation	R^2	R^2 adjusted	Stone-geisser's Q^2
Competitive strategy	0.027	0.020	0.031
SC agility	0.078	0.068	0.087
SC adaptability	0.148	0.139	0.143
SC alignment	0.182	0.173	0.177

Note(s): CI: competitive intensity; SC-C: supply chain complexity; LCI: lower confidence interval; UCI: ppper confidence interval. Values of f^2 higher than 0.020, 0.150 and 0.350 can be interpreted as small, medium and large size effects, respectively

Table 4. Structural model results

Discussion

This research shows that the contextual variable with the strongest influence on the triple-A SC capabilities is competitive intensity (H1), which affects all three capabilities and has effects on SC adaptability and SC alignment that are approaching medium size. Thus, companies respond to higher competitive intensity with higher levels of SC agility, adaptability and alignment to add greater value for customers. A high level of competitive intensity encourages what Ketchen *et al.* (2008) call "best value SC".

As for the other analysed competitive environment variable – SC structural complexity (H2) – it can be seen that the higher the numbers of suppliers and customers in the SC, the more the companies seek to increase their SC adaptability and alignment capabilities, but SC agility is not affected. These results are in line with some previous studies. For example, Gimenez *et al.* (2012) found that SC integration (related to alignment) is only effective in buyer–supplier relationships characterised by high supply complexity. As for agility, Roscoe *et al.* (2020) found that SC complexity seems to have a limited impact on the effectiveness of internal process connectivity to enable SC agility. However, our results partially contradict Blome *et al.* (2014) as supply complexity negatively affects SC flexibility, which is related to SC agility. Some theoretical models (Serdarasan, 2013; Manuj and Sahin, 2011) show that other strategic and tactical variables can be used to manage complexity, and, perhaps because of this, the relationship between SC complexity and the triple-A SC capabilities is weaker.

The obtained results also support our hypothesis (H3) regarding the expected influence of the company's business competitive strategy on the levels of the triple-A SC capabilities; the more differentiation-oriented the business strategy, the higher the implementation of the triple-A SC capabilities. These results build on those of other authors (Sebastiao and Golicic, 2008; Christopher *et al.*, 2006) by highlighting the fact that cost strategy is much more rigid than differentiation strategy. Regarding the relationship between differentiation strategy and the triple-A SC capabilities, these results are also in line with the findings of other research (Qi *et al.*, 2011, 2017; Hallgren and Olhager, 2009). However, these works focus on a single dimension (agility), while our work takes a more holistic approach and considers the effect of strategy on all three As.

Companies that seek competitiveness through triple-A SC capabilities need to be aware that the competitive environment and a differentiation-oriented strategy are drivers of these capabilities.

One interesting finding of our study is that company strategy does not seem to play any mediation role between the environmental variables and the triple-A capabilities (H4 and H5 are rejected). This means that the competitive environment directly affects the triple-A, irrespective of the company strategy adopted and even though the environment influences the strategy in a differentiated way. Greater competitive intensity seems to be associated with a more cost-oriented strategy. However, greater SC structural complexity is positively related to a more differentiation-oriented strategy.

Conclusions and further research

Triple-A is essential for SC success (Cohen and Kouvelis, 2020), and it has become even more relevant (Erhun *et al.*, 2020) due to the increasing turbulence and uncertainty in today's markets and economies. The major contribution of the present research is to empirically analyse the drivers that achieve triple-A SC capabilities through the lens of the CT and the DCV. This study, therefore, responds to the calls for further research focused on the drivers of the triple-A SC (Feizabadi *et al.*, 2019); more contingency-based research to evaluate the fit between the environment, strategies and practices in the SCM context (Sousa and Voss, 2008); and, from the DCV, to analyse both the external and internal contextual factors on which the validity and effectiveness of the organisational capabilities might depend (Barreto, 2010). This work goes further by identifying how some contingent factors and competitive strategy are linked to the triple-A SC capabilities. The study results not only confirm the CT-based hypotheses that the context affects the triple-A capabilities but are also in line with the DCV in stating that these capabilities are dependent on the context.

Our findings have some interesting implications for managers. They show that when competitive intensity and SC structural complexity are high, triple-A SC capabilities may be necessary. They also show that the competitive strategy that the company pursues can determine the development of the triple-A capabilities. If the company focuses its competitive strategy on cost leadership, it will find it more difficult to develop agility, adaptability and alignment. It is also important to note that the influence of the competitive environment does not depend on the chosen strategy. So, SC managers should develop and manage SC agility, adaptability and alignment in light of external circumstances (i.e. competitive intensity and SC complexity) and the competitive strategic orientation of the company.

Individual analyses of the triple-A SC capabilities have determined the influence that the different drivers have on each of these. This will allow managers to take the most appropriate approach to improve of any of these capabilities. As the previous literature concludes, each of the triple-A SC capabilities has a specific effect on the different performance measures

(Alfalla-Luque *et al.*, 2018), which may lead managers to prioritise one over the others according to their business objectives.

This research has several limitations that can be viewed as directions for future research. The first is related to the use of a focal firm and its perceptions of SC relationships. A more general view of the SC involving informants from different companies would enable fuller and more accurate results to be obtained. Another limitation may be the way that some variables have been measured, especially SC complexity, which is a multifaceted concept, and competitive strategy, which is a construct that is difficult to approximate. Furthermore, the data that are used from Spanish industrial sectors, so it might be interesting to conduct a cross-country analysis to test this model for other countries.

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Appendix

Appendix is avaialble at https://www.emerald.com/insight/content/doi/10.1108/EJMBE-01-2021-0018/full/html

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