

1 **Exploitation- and exploration-based innovations: The** 2 **role of knowledge in inter-firm relationships with** 3 **distributors**

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12 **ABSTRACT**

13 Learning capacity is a critical factor for a firm's innovation and competitiveness. This study
14 explores the issue of how knowledge in inter-firm relationships with distributors influences
15 manufacturers' exploitation- and exploration-based innovations and performance. The
16 empirical model examines the effect of three different types of knowledge-related issues in
17 inter-firm relationships: (i) the acquisition of substantial knowledge (about products,
18 technology, or markets) from distributors; (ii) the learning about collaborating with each
19 distributor as the relationship evolves; and (iii) the general firm's knowledge about managing
20 distributors. A model of learning—innovation—performance is developed and tested in a
21 sample of 201 firms in the food and beverages sector. The results reveal that: (i) knowledge
22 about managing distributors promotes continuous learning from them; (ii) learning to
23 collaborate is critical, as it favours knowledge acquisition and both types of innovations
24 (exploitation- and exploration-based); (iii) learning from distributors weakens firms' tendency
25 to stress one type of innovation strategy over another; and (iv) knowledge in inter-firm
26 relationships with distributors affects performance in a completely mediated way, that is,
27 through innovation. Theoretical and managerial implications of these findings are discussed in
28 the conclusion of the paper.

29 **Keywords:**

30 **Inter-firm knowledge; innovation; exploration; exploitation; performance; food-and-beverages**
31 **sector; channels of distribution**

33 1. Introduction

34 The last decades of research have demonstrated that innovation is an important source of competitive
35 advantage (Adner and Kapoor, 2010; Song and Thieme, 2009). Among the different factors that may
36 contribute to innovation success (see, for instance, Song and Parry, 1997) knowledge- and learning-related
37 issues have entered in the literature in more recent times, as knowledge is recognised a vital resource—not
38 only for the development of specific innovations in products and processes but also for the effective
39 implementation of other resources in the overall innovation process (Garcia et al., 2003). In particular,
40 learning from external relationships is important, as it expands the firm’s knowledge base (Amara et al.,
41 2008; Bierly et al., 2009), so that the firm’s ability to recognise the value of new information from external
42 relationships and then apply it to commercial ends—which constitutes a firm’s so-called ‘absorptive
43 capacity’ (Cohen and Levinthal, 1990)—is increasingly associated with successful innovation (e.g., Lane et
44 al., 2006; Zahra and George, 2002).

45 Whereas research on this topic has notably increased lately, there are issues that still require
46 clarification. First, empirical studies have tended to focus on knowledge transfer and its internalisation by
47 the firm (e.g., Kale et al., 2000) with relatively little consideration of the multiple types of knowledge-
48 related issues involved in inter-firm relationships. This study addresses this gap in the literature by taking
49 into account three types of knowledge: (i) acquisition of substantial knowledge related to product,
50 technology, or markets; (ii) the learning about how to collaborate with specific relationships; and (iii) the
51 firm’s accumulated knowledge about the management of inter-firm relationships.

52 Secondly, although the literature highlights the importance of external learning in promoting
53 innovation (Dyer and Singh, 1998), empirical investigation of the extent to which inter-firm learning
54 influences exploration- and exploitation-based innovations is scarce and very recent (Holmqvist, 2009;
55 Bierly et al., 2009). Therefore, this study is one attempt to give an answer to Holmqvist’s (2009) call “to
56 extend the small but growing inter-organisational learning literature by empirically linking inter-
57 organisational learning processes to the problem of exploitation and exploration” (p. 282).

58 Moreover, although knowledge is of the utmost importance for any firm that wishes to sustain a
59 competitive advantage through product, process, and/or organisational innovation (Wernerfelt, 1984; Grant,
60 1996; Garcia et al., 2003), empirical work concerning the impact of inter-firm knowledge-related issues on
61 a firm’s competitiveness is scarce. For instance, Yeoh (2009) has recently stated that testing the effects of
62 inter-organisational learning on firms’ performance still remains intellectually challenging.

63 Finally, research on inter-firm learning is frequently concentrated in the area of strategic alliances
64 (e.g., Kale et al., 2000), especially with regard to R&D collaborations in high-tech industries (e.g., Lane and

65 Lubatkin, 1998). However, the study of this phenomenon in supply-chain, vertical relationships in mature
66 industries like the food-and-beverages industry is scarce, even though inter-organisational learning is an
67 important contributor to supply chain relationships' performance (Hernandez-Espallardo et al., 2010) and
68 the food-and-beverages industry is of high economic and social relevance (Pfitzer and Krishnaswamy,
69 2007).

70 Innovation activity is very important in this industry, with a strong emphasis on product innovations
71 addressing new and differentiated demands as well as health, safety and quality concerns, with market
72 dynamics dominating the reasons for innovations (Hauknes, 2001). Moreover, process innovations are
73 commonplace as the result of supply chain integration initiatives directed to reduce costs and improve
74 efficiency. The food-and-beverages supply chain in the front line with respect to supply chain practices like
75 EDI (Electronic Data Interchange), VMI (Vendor Managed Inventory), QR (Quick Replenishment), CM
76 (Category Management), or CPFR (Collaborative Planning, Forecasting and Replenishment) (Van Donk et
77 al., 2008). Particularly interesting is the adoption of ECR initiatives that not only encompass logistical
78 process-oriented improvements but also collaborative frameworks between distributors and manufacturers
79 to optimise new product developments (Corsten and Kumar, 2005; ECR Europe, 2005). Therefore, this
80 industry is a clear example of a demand-oriented industry and, as a result, knowledge inputs regarding
81 markets and trends are central elements in its innovations (Stewart and Martinez, 2002). As a result, the
82 channel of distribution acquires a great relevance as an external source of innovation for food-and-beverages
83 manufacturers (Hauknes, 2001).

84 This sector has evolved in recent decades in the direction of a greater degree of influence of
85 distributors (Cosgrove, 2003). In this study, we use the term 'distributors' with a wide perspective to refer
86 to those independent firms that participate in the manufacturer's channel of distribution, which may include
87 manufacturers' local agents, wholesalers and retailers. With respect to innovation in the industry, the
88 distributors participate actively not only in initiatives to get operational efficiencies through the expansion
89 of process innovations (e.g., CM) but also on the manufacturers' product innovation programs with the
90 purpose of getting products better fitted to the distributors' strategy and final market demands (Deromedi
91 and Körber, 2003). This type of collaboration relationship-based innovation between distributors and
92 suppliers has therefore been recognised as a major supply chain trend (Ganesan et al., 2009) and is
93 accompanied by a call to perform research on the role and influence of supermarkets on the R&D agenda
94 of manufacturers (Estrada-Flores, 2008). The present research represents one effort in this direction.

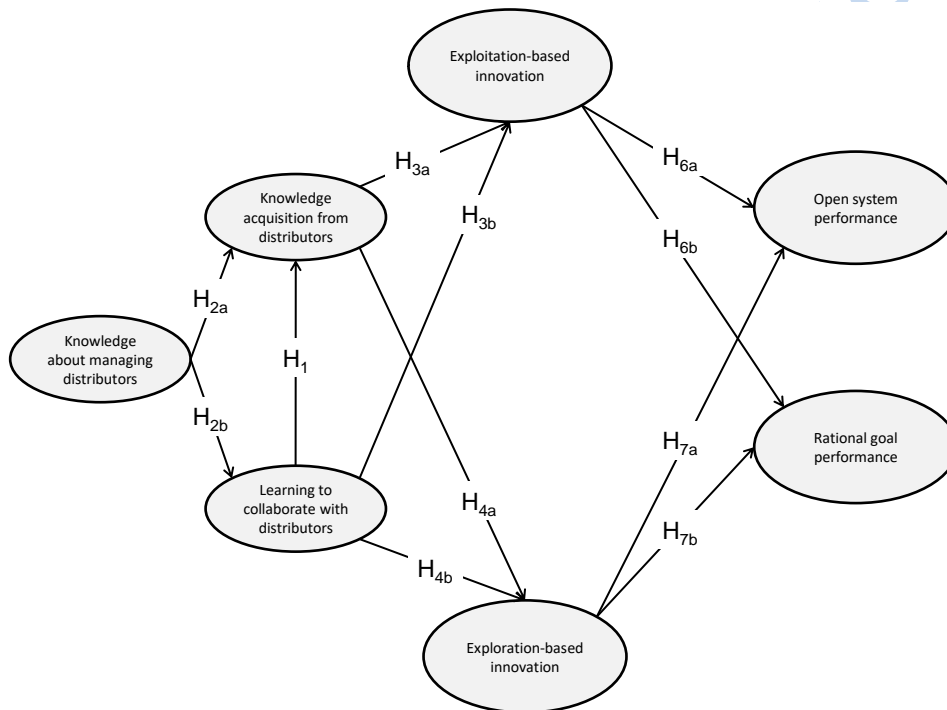
95 The remainder of this paper is arranged as follows. The next section presents the conceptual model
96 for the study and explains the hypothesised relationships among the constructs in the proposed model. Later,

97 we present the empirical test of the model and the results. The paper concludes with a discussion of the main
98 results and their managerial implications.

99 2. Theory development and hypotheses

100 The focus of this article is therefore on: (i) the manufacturers' application of knowledge obtained
101 from distributors regarding exploitation- and exploration-based innovations: (ii) the role played by the
102 manufacturers' expertise in managing relationships with distributors and (iii) the effects on the
103 manufacturers' performance. The proposed conceptual model for the present study is shown in Figure 1.
104 The constructs within the model and the hypothesised relationships between them are discussed below.

105



106

107 **Fig. 1.** A model of knowledge in inter-firm relationships with distributors, innovation, and performance

108 2.1. Knowledge in inter-firm relationships with distributors

109 During the last two decades, a growing number of organisational learning studies have analysed
110 inter-organisational learning processes under the assumption that inter-organisational relationships are
111 unique learning entities (Holmqvist, 2009). A review of the literature suggests that three interrelated
112 constructs should appear in any proposed model with regard to knowledge in inter-firm relationships with
113 distributors: (i) knowledge acquisition from distributors; (ii) learning to collaborate with distributors; and

114 (iii) knowledge about managing distributors (Kale et al., 2000; Zollo et al., 2002; Hibbert and Huxham,
115 2005).

116 *Knowledge acquisition from distributors* refers to the extent to which one organisation acquires
117 knowledge from its distributors, disseminates it internally, and uses it for organisational change. This
118 definition adopts the perspective of organisational learning as a process of knowledge internalisation,
119 dissemination, and deployment (Huber, 1991). Research in alliances (Kale et al., 2000; Zollo et al., 2002)
120 describes the outcome of this type of learning as the firm's internalisation and use of substantial knowledge
121 obtained from its partners about product-, technological-, or market-related issues. In relationships with
122 distributors, this knowledge is acquired as the result of a process of (i) adapting to environmental changes
123 in every distributor's market, (ii) adjusting the visions about how to understand the environment and to take
124 actions accordingly, and/or (iii) developing a knowledge base about the activities involved, its outcomes
125 and their adequacy (Lukas et al., 1996). The value of this type of knowledge resides in the fact that it offers
126 an alternative perspective to the current knowledge base of the manufacturer (Grant and Baden-Fuller,
127 2004), thus enhancing market knowledge (Sinkula, 1994) and value for customers through improved market
128 sensing and intelligence sharing (Day, 1994; Hult et al., 2000). Because of the closeness of distributors to
129 the market, they can offer manufacturers a more accurate description of the end consumer's current demands
130 and dynamics as well as market intelligence on competitors and other agents that might influence
131 manufacturers' success in the market (Hernandez-Espallardo and Arcas-Lario, 2003).

132 Concerning *learning to collaborate with distributors*, as a manufacturer develops closer collaborative
133 relationships with one distributor over time, it learns "about the partner's intended and emergent goals, how
134 to redefine joint tasks over time, and how to manage the *inter-firm* interface" (Kale et al., 2000; p. 220).
135 Therefore, learning to collaborate refers to the manufacturer's adaptation of the processes and structures of
136 collaboration as the relationship progresses (Ring and Van de Ven, 1994), and the manufacturer gradually
137 learns about the distributor's internal organisational structures and decision-making styles (Mayer and
138 Argyres, 2004). This includes knowledge about its purposes and processes of collaboration, its language,
139 culture, traditions, its distinctive strengths (or weaknesses), its resources and external and internal
140 environment (Hibbert and Huxham, 2005). It also includes knowledge about the tasks involved in the
141 collaborative relationship, their interactions, skills involved, and goals intended (Doz, 1996). In this regard,
142 Gulati (1995) finds that firms in business relationships learn to collaborate more efficiently over time, and
143 Zollo et al. (2002) demonstrate that this has a positive impact on the relationship's performance.

144 Learning to collaborate with one distributor may favour knowledge acquisition. As a manufacturer
145 learns to collaborate with a distributor, partner-specific absorptive capacity increases, as the relationship
146 develops an overlapping knowledge base and the manufacturer becomes informed about who knows what

147 and where the critical expertise resides within the distributor (Lane and Lubatkin, 1998). Moreover, both
148 the frequency and intensity of interactions increase as interpersonal trust develops, which enhances
149 transparency and knowledge-sharing in the business relationship (Zollo et al., 2002). This is important not
150 only to get information and knowledge from the relationship in the first place but also to maintain the
151 learning stream in the long run, as learning to collaborate will contribute to avoiding such negative issues
152 as the “learning race” or the “co-operators that turn into competitors” (Hamel, 1991). Therefore, absorptive
153 capacity and transparency, both preconditions to inter-firm knowledge acquisition (Hamel, 1991), increase
154 when manufacturers learn to collaborate with distributors. This leads to the following hypothesis:

155 **H₁:** *Learning to collaborate with distributors positively influences manufacturers’ acquisition of knowledge*
156 *from distributors*

157 An increasing number of studies in the area of business alliances focus on the firm’s ability to manage
158 the process of formation and maintenance of business relationships, which receives the name of alliance
159 capability (e.g., Kale et al., 2002; Draulans et al., 2003). In the specific context of the relationships that one
160 manufacturer maintains with its distributors, we use the term *knowledge about managing distributors* to
161 refer to the company’s accumulated stock of knowledge and ability to manage business relationships with
162 distributors. This capability is the result of the manufacturer’s accumulation of experience in forming and
163 developing long-term, close, and collaborative relationships with other firms in general and with distributors
164 in particular (Anand and Khanna, 2000; Hibbert and Huxham, 2005). It is boosted “by pursuing a set of
165 explicit processes to accumulate and leverage the *inter-firm* management know-how associated with the
166 firm’s prior and ongoing *relationship* experience” (Kale and Singh, 1999; p. 220). In consequence, one part
167 of this knowledge consists of the transfer of collaborative experiences within and between relationships.
168 More generally, the manufacturer’s knowledge about managing distributors is determined by the amount
169 and depth of the firm’s relationship networks, the use of relationships’ performance evaluation methods,
170 training in collaborative relationships themes and the presence of specialists (e.g., key accounts, trade
171 managers, category managers) (Draulans et al., 2003).

172 It is therefore an organisational capability that translates into improved performance in the multiple
173 activities and processes involved in the relationship the manufacturer maintains with every specific
174 distributor. In this research, we focus on the effects on knowledge acquisition from the distributor and
175 learning to collaborate with that distributor. In alliance theory, Zollo et al. (2002) use Cohen and Levinthal’s
176 (1990) concept of absorptive capacity to propose that the more experience and accumulated knowledge a
177 firm has about managing alliances, the more successful it will be in its alliances and the more satisfied it
178 will be with the knowledge acquired. The ability to learn from a particular relationship is enhanced by past
179 learning experiences with the same and other business relationships (Anand and Khanna, 2000), as

180 continuous exposure to a variety of external contacts increases the firm's new knowledge integration skills
181 and thereby the speed and depth of subsequent learning (Zahra and George, 2002). This suggests a positive
182 impact of knowledge about managing distributors on the manufacturer's knowledge acquisition from
183 distributors.

184 The same kind of influence is expected on the manufacturer's learning to collaborate with distributors.
185 Individuals within a manufacturer who have been exposed to a broad repertoire of experiences with
186 distributors will find it easier to respond to new unforeseen contingencies in the current relationships with
187 distributors (Anand and Khanna, 2000), smoothing the progress of the collaboration, that is, facilitating
188 learning to collaborate.

189 This idea is further developed by Hibbert and Huxham (2005). Knowledge about managing
190 distributors is a general accumulated knowledge that is applicable across a range of collaborative
191 relationships: "Thus though managers are encouraged to use this learning in their own specific collaborative
192 situations, the learning itself is intended to be transferable to other circumstances" (p. 60). From the
193 manufacturer's perspective, learning to collaborate is about understanding the particular collaborative
194 situations and, therefore, it draws on knowledge about managing distributors "where this is relevant, but
195 customizes it to the specific circumstances of the particular situation" (p. 61). According to the authors,
196 learning to collaborate "is concerned with the process by which people take account of the idiosyncrasies
197 of the particular situation and modify whatever general understanding they may have (even though they
198 may not be aware of having any) to fit the individual circumstance" (p. 61). Therefore, drawing on
199 knowledge about managing distributors is an important aspect of learning to collaborate in specific
200 relationships. Moreover, a general understanding of the management of distributors is helpful for managerial
201 actions in more particular and idiosyncratic relational settings. Finally, this is particularly relevant, as "the
202 constant potential for change as particular situations develop implies a continual need to learn, adjust and
203 apply such understandings" (p. 61). Altogether, the preceding reasoning allows us to propose the following:

204 **H₂:** *The manufacturers' knowledge about managing distributors positively influences manufacturers':*

205 *a. knowledge acquisition from distributors*

206 *b. learning to collaborate with distributors*

207 2.2. Influence on exploitation- and exploration-based innovations

208 In this study, we examine the effects of learning from distributors on: (i) the enhancement or
209 refinement of existing products and processes (exploitation-based innovations); and (ii) the development of
210 new technologies, products, or services that could make existing ones obsolete or non-competitive
211 (exploration-based innovations) (Bierly et al., 2009). In particular, exploitation-based innovations include

212 such things as refinement, choice, production, efficiency, selection, implementation, and execution (March,
213 1991). Levinthal and March (1993, p. 105) define exploitation as “the use and development of things already
214 known” so that firms pursuing an exploitation strategy will essentially search market opportunities in their
215 surrounding landscape (Armagan and Ferreira, 2005). On its side, exploration-based innovations include
216 elements captured by such terms as search, variation, risk taking, experimentation, play, flexibility, and
217 discovery, and they are associated with experimentation with new ideas that lead the old one to become
218 obsolete (March, 1991).

219 The impact of inter-organisational knowledge on exploitation- and exploration-based innovations
220 is an issue that has not received empirical attention until very recently (e.g., Bierly et al., 2009; Holmqvist,
221 2009), although that inter-organisational learning creates conditions for intra-organisational exploration and
222 exploitation is an older assumption in literature (e.g., Holmqvist, 2003). In more general terms, several
223 studies have shown the importance of the innovation of close relationships between firms sharing
224 overlapping knowledge (Von Hippel, 1988; Cohen and Levinthal, 1990), and knowledge acquisition from
225 distributors contributes to develop this overlapping knowledge. About learning from distributors, it is
226 important to innovation because it: (i) enhances the breadth and depth of relation-specific knowledge
227 available to the firm, thereby increasing the potential for innovative combinations; (ii) enhances the speed
228 of product development through reduced development cycles; and (iii) increases the willingness of the
229 manufacturer to develop new products or processes for its key distributors (Yly-Renko et al., 2001).

230 Moreover, organisational factors explain a positive effect of learning in relationships with
231 distributors on manufacturers’ innovations (Menon and Pfeffer, 2003). From a resource-dependence
232 perspective, it is conceivable that the personnel and groups involved in any phase of the innovation process
233 will defer to one source of knowledge, such as distributors, insofar as they recognise its value to cope with
234 critical problems (Pfeffer and Salancik, 1978). For instance, Song and Zhao (2004) find that the
235 manufacturers’ dependence on distributors ranks first among other relational factors on the former’s
236 awareness of the need to cooperate with the latter in the new product development process. In addition, as
237 the channel of distribution becomes critical for the manufacturer’s innovation success, the departments and
238 personnel in contact with the channel (e.g., key account managers and trade marketing departments) are
239 given the authority to compel the organisation to incorporate the knowledge obtained from the distributors
240 to innovate (Menon and Pfeffer, 2003). They will argue that adaptation to distributors’ demands is critical
241 to obtaining their support in getting the product at the final consumers’ disposal (Deromedi and Körber,
242 2003) and that their information, due to their closeness to the final markets, is of great value for sustaining
243 market orientation (Hernandez-Espallardo and Arcas-Lario, 2003). At the same time, these organisational

244 structures will strive to introduce their learning from distributors into the firm's innovation processes as a
245 means to justify their presence and increasing power within the organisation (Menon and Pfeffer, 2003).

246 All these arguments support a positive effect of knowledge acquired from distributors and learning
247 to collaborate with distributors on exploitation-based innovations.

248 **H₃:** *Manufacturers' exploitation-based innovations are:*

249 *a. positively influenced by knowledge acquisition from distributors*

250 *b. positively influenced by learning to collaborate with distributors*

251 The same rationale presented to defend a positive influence of both types of learning in inter-firm
252 relationships with distributors on exploitation-based innovations might also be used for exploration-based
253 innovations. However, the latter are substantially different than the former and, therefore, we can expect
254 differential effects of learning in inter-firm relationships on each one (Song and Thieme, 2009). Actually,
255 in the area of alliances, marketing or commercial alliances are defined as exploitative, as it is difficult for
256 them to defy the manufacturers' current practices, compared to R&D or even supplying relationships
257 (Rothaermel and Deeds, 2004). Moreover, knowledge acquisition means the internalisation of knowledge,
258 a process in which knowledge from distributors is sought, found, and moulded by own knowledge, values
259 and preconceptions of the manufacturers (Zahra and George, 2002). Therefore, it is foreseeable that,
260 whereas knowledge acquisition from distributors positively influences exploitation-based innovations (H_{3a}),
261 the effect on exploration-based innovations may be non-significant.

262 From the manufacturer's perspective, learning to collaborate with distributors refers to improving
263 the knowledge about the process of collaboration with specific distributors and is therefore related to
264 improvements in the cooperation with them (Child, 2001). This is a particularly important factor for
265 exploration-based innovations, where effective collaboration with distributors plays a prominent role. First,
266 learning to collaborate determines the manufacturer's ability to use the distributor's resources, capabilities
267 and knowledge to complement its own resources and capabilities in the collaborative value-creation process
268 (Grant and Baden-Fuller, 2004; Hibbert and Huxham, 2005). More radical or exploratory innovations will
269 emerge as a consequence of this combinative process. In support of this idea, Im and Rai (2008) state that
270 as the relationships mature, partners are likely to experience a greater need to address new problems and
271 discover sources of value from exploratory innovation. Learning to collaborate is a precondition for the
272 relationship maintenance and progression (Ring and Van de Ven, 1994). Second, exploration-based
273 innovations are more risky, in part because the consumers' final acceptance is uncertain, and distributors
274 may play a critical role in this issue by supporting the product in the channel of distribution (Sikdar and
275 Vel, 2010). Distributors may be reluctant to stock the product if they fear slow sales due to consumers'
276 resistance to the innovation (Garcia et al., 2007): "Distributors do not recognize that they may be

277 propagating the slow takeoff of products through their own resistance” (p. 84). Therefore, as learning to
278 collaborate with distributors increases, collaboration becomes more effective, distributors become more
279 committed and, therefore, the risks associated with exploratory innovation initiatives decrease. In
280 consequence, we propose the following:

281 **H₄:** *Manufacturers’ exploration-based innovations are:*

282 *a. non-significantly influenced by knowledge acquisition from distributors*

283 *b. positively influenced by learning to collaborate with distributors*

284 Both exploration and exploitation are necessary for the long-term survival of a firm. Firms that
285 neglect exploration and focus on exploitation may lack the capability to adapt to an evolving environment,
286 whereas firms that disregard exploitation and focus on the exploration of new and uncertain possibilities
287 may face severe difficulties to compete in the current market (March, 1991). Together, H₃ and H₄ propose
288 that learning in relationships with distributors simultaneously favours both types of innovation strategies.
289 However, a review of literature on the issue of exploitation and exploration strategies shows that there are
290 other factors that may cause a conflict between the two innovation strategies (Im and Rai, 2008). For
291 example, they compete for scarce resources, so that resources devoted to one innovation strategy may be at
292 the cost of under-investing in the other (March, 1991). Moreover, the activities involved in the deployment
293 of each innovation strategy are inherently self-reinforcing, causing a “success trap”, when success at
294 exploitation creates resistance to exploration of new alternatives, or a “failure trap”, when exploration
295 drives out exploitation in a sequence of exploratory innovations that fail and are substituted by other
296 exploratory ideas (Levinthal and March, 1993). Finally, each innovation strategy involves different routines
297 and cognitive schemes that, once implemented, present resistance to change and adaptation (Levinthal and
298 March, 1993). According to this, once the effects of learning in interfirm relationships with distributors
299 have been considered, we expect a negative intercorrelation between both innovation strategies:

300 **H₅:** *Once the effects of knowledge acquired from distributors and learning to collaborate with distributors*
301 *on exploitation and exploration-based innovations have been taken into account, exploitation- and*
302 *exploration-based innovations are inversely related.*

303 2.3. The effects on performance.

304 Organisational performance is defined as the firm’s degree of attainment of its organisational goals.
305 Because goals can be heterogeneous and conflicting, the firm must try to get a reasonable level of
306 achievement of every goal without hampering the accomplishment of the others (Quinn and Rohrbaugh,
307 1983). In this study, we use Quinn and Rohrbaugh’s (1983) criteria of organisational effectiveness to
308 consider two separate dimensions of performance. *Open system performance* is the degree to which the

309 manufacturer gains external acceptance and adaptation to the changing market conditions. On the other
310 hand, *rational goal performance* is the degree to which the manufacturer gets previously established
311 benchmarks on such issues as productivity and efficiency or, stated alternatively, maximising outputs
312 relative to pertinent conditions such as obstacles and costs (Quinn and Rohrbaugh, 1983). Some studies
313 have approached these objectives with such indicators as profits, sales, or market share (e.g., Kumar et al.,
314 1992).

315 Innovation capability ranks among the top determinants of firms' performance, and many empirical
316 studies have found this relationship to be significant (e.g., Calantone et al., 2002). March (1991) proposes
317 exploration and exploitation as major components of any effort to improve organisational performance and
318 strengthen competitive advantage, and organisational theorists believe that both strategies are crucial to
319 understanding the adaptation and evolution of organisations (Levinthal and March, 1981). In line with this,
320 Lewin et al. (1999) applied the concept of co-evolution to explain organisational adaptation with and within
321 its environment, based on the combination of exploitation and exploration activities. More recently, He and
322 Wong (2004) have found that performance is sustained by continuous exploitation- and exploration-based
323 innovations. Therefore, we propose the following:

324 **H₆:** *Exploitation-based innovations have a positive effect on:*

- 325 a. *open system performance*
- 326 b. *rational goals performance*

327 **H₇:** *Exploration-based innovations have a positive effect on:*

- 328 a. *open system performance*
- 329 b. *rational goals performance*

330 However, the distinction between the 'exploration of new possibilities' and the 'exploitation of old
331 certainties' captures a number of fundamental differences in a firm's behaviours and strategies (March,
332 1991) that may have different consequences on performance (He and Wong, 2004). Because innovation
333 and organisational capabilities co-evolve (Helfat and Raubitschek, 2000) the innovation strategy pursued
334 by a firm can serve as a vehicle for the renewal and accumulation of its competences (Danneels, 2002).
335 Compared to exploitation-based innovation strategy, exploration-based innovation strategy is a second-
336 order competence, described as "the ability to identify, evaluate, and incorporate new technological and/or
337 customer competences into the firm" (Danneels, 2002; p. 1097). According to this, we expect that the effects
338 on the performance of exploration-based innovations are higher than those derived from exploitation-based
339 innovations:

340

341 **H₈**: *The effect of exploration-based innovations is higher than the effects of exploitation-based innovations*
342 *for:*
343 *a. open system performance*
344 *b. rational goals performance*

345 Finally, we propose that manufacturers' knowledge in inter-firm relationships with distributors
346 impacts their performance as far as it is applied to sustain new and improved products or processes, that is,
347 to sustain innovation. Zahra and George (2002) differentiate between potential absorptive capacity (the
348 acquisition and assimilation of knowledge) and realised absorptive capacity or the ability to transform and
349 exploit knowledge. The latter dimension is of vital importance, as it explains the manufacturer's use of
350 knowledge for commercial ends. That is, successful inter-firm knowledge results in the manufacturers
351 accessing knowledge new to them and applying it to sustain innovations (Yeoh, 2009).

352 According to this, we adhere to the idea that the effect of external knowledge on performance is
353 mediated by the way and extent to which this knowledge is integrated in the firm's strategies and activities
354 (Kraaijenbrink and Wijnhoven, 2008). This suggests that manufacturers' learning from their distributors
355 influences performance but that this influence is transmitted by the knowledge actually applied to both
356 exploitation- and exploration-based innovations. The logic is that while learning abilities are important, it
357 is the outcome of its application to innovating that really matters for performance. This leads us to propose
358 the following:

359 **H₉**: *The manufacturers' exploitation- and exploration-based innovations mediate the relationship between*
360 *knowledge in the relationship with distributors and performance*

361 **3. Methodology and results**

362 3.1. Data collection, sample and measures.

363 We collected the data for the study from a sample of companies in the Spanish food-and-beverages
364 industry. The Spanish agrofood industry ranks fifth in the European Union, just behind Germany, France,
365 United Kingdom, and Italy, representing 13.3% of the Spanish industrial production, with more than
366 380,000 employees (MITYC, 2010). Although small- to medium-sized firms are the majority in the industry,
367 there are firms that are market leaders and have the size and competencies that allow them to continuously
368 redefine their offers to the market (AECOC, 2007). Because of their strategic importance in the sector and
369 the fact that they are the most innovative firms, these firms represent the target of our data collection.

370 A total of 591 manufacturers were identified using the SABI database provided by the national market
371 information leader INFORMA D&B. They were asked to participate in the study by a letter directed to the

372 firm's CEO. After a follow-up telephone call, 201 (for a participation rate of 34.01%) firms did agree to
373 participate and offered the name of the senior manager with most knowledge about strategic behaviour,
374 business strategy, and overall firm performance (the key informant) (Huber and Power, 1985). The response
375 rate is within the typical range for this type of study (e.g., Gatignon and Xuereb, 1997; Olson et al., 2005).

376 Standardised personal interviews were conducted by scheduled appointments with the key informant
377 of each firm. We used this data collection method to ensure that the actual respondent is a person with
378 effective knowledge about the matter, that the questionnaires are fully completed, and that we obtain an
379 acceptable number of respondents representing the most important manufacturers of food and beverages in
380 Spain. To ensure the proper implementation of the procedure, first, the authors pre-tested the questionnaire
381 with face-to-face interview with five executives of the industry. Second, we used a specialised market
382 research firm with trained interviewers who had experience in face-to-face interviews. The authors
383 personally met and trained the team of interviewers (11) about the meaning of the items used in case the
384 respondent had any question. Finally, two assistants of the authors (doctoral students) made the follow-up
385 of the interviews by auditing 25% of the questionnaires randomly selected. In particular, we assessed
386 whether the person interviewed was actually the one indicated in the questionnaire by his position in the
387 firm and we repeated the last question about the experience of the interviewee. The 201 questionnaires
388 finally used in this research comply with the three conditions. Only two questionnaires were not used
389 because of uncertainty about its adequate completion due to differences in the experience items. Because
390 the two questionnaires belonged to the same interviewer, we further audited the rest of his questionnaires
391 and did not find any additional incoherence. Face-to-face data collection methods may suffer from
392 subjectivity or biases induced by the presence of the interviewer; consequently, we performed ANOVA to
393 assess whether systematic bias exists among interviewers. Of the 32 items considered, we found only 3 with
394 values significantly different among interviewers at $p < .10$ (none at $p < .05$). This indicates the absence of any
395 systematic influence of the interviewers on the respondents' answers.

396 The distribution of the key informants' positions is the following: marketing managers 35.8%, vice-
397 CEOs (chief executive officers) 28.9%, CEOs 23.4%, and Production or R&D managers 11.9%. We used
398 ANOVA to analyse whether the organisational position of the respondent influences his response. Only 4
399 of the 32 items present a significantly different response ($p < .10$), showing that this bias is not a problem in
400 our data. The informants had a significant experience (the average experience in the sector was 18.9 years,
401 with 15.3 years of experience in the firm). They also self-assessed their knowledge of the issues treated in
402 the questionnaire from 0 (no knowledge at all) to 10 (absolute knowledge). The average of this item is 7.9,
403 and none of the cases received less than 5 in the scale.

404 Due to on-site data collection, a test for response bias is not appropriate (Atuahene-Gima, 2005).
405 Instead, we compared participating and non-participating firms. We used firm size, measured by the number
406 of employees, to control for the greater complexity in decision making in larger firms (Atuahene-Gima and
407 Murray, 2004). The analysis of variance test was not significant for the number of employees ($F = .815$;
408 $p > 0.1$) or for revenues ($F = 0.0$; $p > 0.1$).

409 Table 1 presents the set of items measuring the theoretical concepts and their bibliographical sources.
410 The values 0 (strongly disagree) to 10 (strongly agree) were the anchors used for all of the scales except the
411 measures of performance. In Spain, educational assessment is made on this scale, with 5 representing the
412 minimum value indicating success in the assessment. Because of this, people understand this range more
413 easily than any other, such as the 5- and 7-point scales commonly used in research conducted in English-
414 speaking countries. In the case of the dependent variables, rational goal performance and open system
415 performance, we switched to a 5-point scale, with 1 signifying “not at all” and 5 signifying “completely” to
416 introduce variations in the potential dynamics of the interviewee that could lead to common-method bias
417 (Podsakoff et al., 2003).

418 Our measure of knowledge acquisition from distributors deserves one specific explanation. In
419 accordance to the definition of the concept, which adopts the view of organisational learning process, we
420 used items inspired by the measures of “learning from alliances” by Kale et al. (2000) and “relationally
421 focused learning” by Weerawardena et al. (2006). Kale et al.’s measure is primarily focused on the
422 importance of knowledge acquired in one alliance for the firm’s improvement of its own set of competencies
423 and skills. Weerawardena et al.’s measure is about the firm’s orientation with regard to the acquisition and
424 internalisation of knowledge proceeding from inter-firm relationships. It includes such actions as sharing
425 knowledge acquired from inter-firm relationships within the firm and planning explicitly such a type of
426 knowledge acquisition.

427 We employed a time framework for measuring innovation strategy (exploitation- and exploration-
428 based innovations) and performance (open system and rational goals performance). Atuahene-Gima (2005)
429 measures exploitation- and exploration-based innovation in a period of three years to gauge the firm’s
430 commitment to innovation avoiding circumstantial actions and benefits that may take place in the particular
431 moment of data collection. Pre-test interviews with executives of the industry suggested that a four-year
432 period would be a better alternative. On the other part, Atuahene-Gima (2005) does not consider an explicit
433 number of years when measuring actions related to customer orientation, competitor orientation and
434 interfunctional coordination. They represent a cultural orientation of the firm, and, as such, they involve the
435 history of the firm without making one explicit reference to a time framework. The same occurs with
436 learning. As Crossan and Henry (1999) state, learning occurs over time and across levels and it is built over

437 time by accumulating more experience (Anand and Khanna, 2000; Kale et al., 2000). To clarify this
438 perspective of a cultural orientation of the firm with regard to the relationship maintained with its
439 distributors, we introduced the items measuring knowledge acquisition, learning to collaborate, and
440 knowledge about managing distributors with the following description: “Please rate from 0 (strongly
441 disagree) to 10 (strongly agree) the following statements as descriptors of the typical way your firm deals
442 with the following knowledge-related issues in its relationships with its distributors”.

443 We used structural equation modelling with conventional maximum likelihood estimation techniques
444 to test the model with LISREL 8.8 (Jöreskog and Sörbom, 1996). With (i) a sample size of 201, which
445 exceeds the threshold level of 100 to 150 cases, (ii) almost three cases per free parameter, and (iii) with
446 more than three indicators for measuring each construct, we comply with all the conditions suggested by
447 Bollen (1989) to gain proper parameter estimates with this methodology.

448 To assess unidimensionality, we conducted a confirmatory factor analysis (Anderson and Gerbing,
449 1988), which shows a reasonable fit to the data (Table 1). All of the measures show adequate reliability with
450 composite reliability indices higher than 0.6 (Bagozzi and Yi, 1988) and average variance extracted (Fornell
451 and Larcker, 1981) higher than 0.5. Furthermore, all of the items load on their hypothesised factors (see
452 Table 1), and the estimates are very significant (the lowest t-value is 9.67), which provides evidence of
453 convergent validity (Bagozzi and Yi, 1988). Discriminant validity was assessed by calculating the 99%
454 confidence interval for each pair of constructs’ correlations. None of them included one, confirming
455 discriminant validity (Anderson and Gerbing, 1988). Table 2 presents the constructs’ means, standard
456 deviations and intercorrelations.

457 Because the data were collected from one single respondent, common-method variance is a
458 potentially serious threat of bias that can artificially inflate the parameter estimations of the relationships
459 between the different concepts (Podsakoff et al., 2003). To test for such a bias, we used Harman’s one-factor
460 test. Common-method variance is not present, as the unrotated factor solution showed the presence of
461 multiple factors and no one accounted for the majority of covariance. A more sophisticated test uses
462 confirmatory factor analysis with a one-factor model in which all of the observable variables used in this
463 research load on the same factor. This model yielded a $\chi^2= 2204.7$ with 299 degrees of freedom (compared
464 with the $\chi^2= 575.43$ with 278 degrees of freedom for the measurement model –see Table 1). A chi-squared
465 difference test (Anderson and Gerbing, 1988) suggests a considerably worse fit for the unidimensional
466 model than for the measurement model. The results of these tests confirmed that common-method bias is
467 not a serious threat in this study.

468

469

470 **Table 1**
 471 Constructs measurements summary: Confirmatory factor analysis and scale reliability

Item description	Standardised loading	T-value	Reliability (SCR ^a , AVE ^b)
Knowledge acquisition from distributors (Adapted from Weerawardena et al., 2006 and Kale et al., 2000) ^c			SCR=0.90 AVE=0.69
1. Relationships with distributors are important sources of knowledge for your firm	0.82	13.90	
2. Shares knowledge acquired from distributors within the firm	0.92	16.88	
3. Knowledge acquired from distributors is key in developing innovations (*)	---		
4. The knowledge acquired from your distributors have contributed to improve the firm's capacity to compete	0.87	15.28	
5. Knowledge acquisition from distributors is an activity explicitly planned in your firm	0.68	10.70	
Learning to collaborate with distributors (Inspired by Doz, 1996). Your firm makes a great deal of effort to... ^c			SCR=0.94 AVE=0.79
1. ...get to know the distributor's external environment	0.93	17.16	
2. ... get to know the corporate and strategic situation of the distributor	0.92	17.04	
3. ...study how to improve the specific tasks performed with each distributor	0.86	15.09	
4. ...refine the interaction with each distributor to improve coordination	0.85	14.78	
5. ...figure out what can be learned from each distributor (*)	---		
6. ...uncover the distributor's goals about your firm's category of products (*)	---		
Knowledge about managing distributors (Adapted from Draulans et al., 2003) ^c			SCR=0.86 AVE=0.62
1. Your firm has a long tradition of treating distributors as strategic partners	0.76	12.35	
2. Your firm has many distributors considered as strategic partners (*)	---		
3. Your firm's personnel dedicated to the relationship with the distributors are experts in managing relationships with the channel	0.87	15.08	
4. Your firm has procedures to transfer between teams dedicated to key distributors account the information obtained from each distributor	0.72	11.44	
5. Your firm conducts periodic reviews of the key distributors to understand what is being done right and what is being done wrong	0.78	12.75	
Exploitation-based innovation (Adapted from Atuahene-Gima, 2005). In the past four years, your firm... ^c			SCR=0.86 AVE=0.60
1. ...has based its strategy on knowledge and abilities your firm was already familiar with (*)	---		
2. ...has invested mainly in enhancing skills in exploiting mature technologies	0.75	11.84	
3. ... has searched for solutions to customer problems that were near to existing solutions rather than to completely new solutions.	0.83	13.56	
4. ...has upgraded skills in product development processes in which the firm already possesses significant experience	0.79	12.75	
5. ...has targeted the effort to improve the efficiency of the innovation processes rather than to initiate new adventures radically different from what the firm were familiar with	0.72	11.08	
Exploration-based innovation (Adapted from Atuahene-Gima, 2005). In the past four years, your firm... ^c			SCR=0.92 AVE=0.75
1. ...has acquired manufacturing technologies and skills entirely new to the firm	0.82	13.96	
2. ...has learned product development skills and processes (such as product design, prototyping new products, timing of new product introductions, and customising products for local markets) that are entirely new	0.88	15.56	
3. ...has acquired entirely new managerial and organisational skills that are important for innovation (such as forecasting technological and customer trends, identifying emerging markets and technologies, coordinating and integrating R&D, marketing, manufacturing, and other functions or managing the product development process	0.88	15.57	
4. ...has learned new skills in areas such as funding new technology, staffing R&D, training and development of R&D, and engineering personnel for the first time (*)	---		
5. ...has strengthened innovation skills in areas where it had no prior experience	0.86	15.03	
Open system performance (Adapted from Kumar et al., 1992 and Quinn and Rohrbaugh, 1983). To what extent in the past four years has your firm... ^d			SCR=0.76 AVE=0.52
1. ... improved the quality of its products	0.67	9.85	
2. ... increased its ability to adapt to the changing needs of the markets	0.66	9.71	
3. ... improved the image of the firm and its products	0.82	12.51	
Rational goals performance (Kandemir et al., 2006, Kumar et al., 1992 and Quinn and Rohrbaugh, 1983). To what extent in the past four years has your firm... ^d			SCR=0.81 AVE=0.77
1. ... increased sales	0.92	16.64	
2. ... increased market share	0.93	16.98	
3. ... increased profitability	0.77	12.64	

472 Fit statistics for measurement model of 26 indicators for 7 constructs: $\chi^2_{(278)}=575.43$; GFI= 0.82; RMSEA= 0.074; SRMR= 0.064;
 473 CFI=0.97; TLI (NNFI)= 0.96. ^a Scale composite reliability ($\rho_c=(\sum\lambda_i)^2 \text{ var}(\xi)/[(\sum\lambda_i)^2 \text{ var}(\xi) + \sum\theta_{ii}]$; (Bagozzi and Yi, 1988)). ^b
 474 Average variance extracted ($\rho_c=(\sum\lambda_i^2 \text{ var}(\xi))/[\sum\lambda_i^2 \text{ var}(\xi) + \sum\theta_{ii}]$; (Fornell and Larcker, 1981). ^c anchors: 0= strongly disagree; 10=
 475 strongly agree. ^d 1= anchors: in no extent at all; 5= completely (*) Item deleted during the scale-validation process
 476

477 **Table 2**
478 Constructs' statistics

Construct	Mean	S. D.	Correlations (phi estimates and standard errors) *						
			1	2	3	4	5	6	7
1. Knowledge acquisition from distributors	5.92	1.90		.03	.04	.07	.07	.07	.08
2. Learning to collaborate with distributors	6.20	1.93	.79		.02	.06	.07	.07	.07
3. Knowledge about managing distributors	6.01	1.94	.78	.88		.07	.06	.07	.08
4. Exploitation innovation strategy	6.58	1.63	.43	.44	.43		.08	.08	.08
5. Exploration innovation strategy	5.09	2.62	.31	.39	.48	.07		.07	.07
6. Open system performance	6.98	1.45	.43	.40	.45	.40	.51		.06
7. Rational goals performance	6.14	2.00	.07	.21	.20	-.09	.37	.56	

479 *Correlations between any two constructs (phi) are presented below the diagonal. Standard errors of phi estimates
480 between any two constructs are presented above the diagonal.

481 3.2. Results

482 Table 3 shows the results of the estimation of the structural model (see Figure1). The fit of the model
483 is satisfactory (Anderson and Gerbing, 1988). H₁ is confirmed, as learning to collaborate with distributors
484 significantly influences knowledge acquisition from distributors ($\beta_{12}= 0.44$, $p < 0.01$). H₂ is also confirmed
485 because knowledge about managing distributors exerts a positive and significant influence on knowledge
486 acquisition from distributors (H_{2a}; $\gamma_{11}= 0.39$, $p < 0.01$) and learning to collaborate with distributors (H_{2b}; $\gamma_{21}=$
487 0.88 , $p < 0.01$). Regarding the learning-related factors that influence the exploitation-based innovations (H₃)
488 we find that both knowledge acquisition (H_{3a}; $\beta_{31}= 0.22$, $p < 0.10$) and learning to collaborate (H_{3b}; $\beta_{32}= 0.28$,
489 $p < 0.05$) positively influence this type of innovation. However, as hypothesised, exploration-based
490 innovations are not significantly influenced by knowledge acquisition (H_{4a}; $\beta_{41}= 0.01$, $p = n.s.$), whereas a
491 positive and significant influence is present for learning to collaborate with distributors (H_{4b}; $\beta_{42}= 0.40$, $p <$
492 0.01).

493 To assess H₅, which establishes a trade-off between exploitation-based and exploration-based
494 innovation strategy, covariance between their structural errors (ψ_{43}) was set free. Its estimation provided a
495 value that was negative and significant $-.44$ ($p < .10$) confirming that, even though learning in inter-firm
496 relationships with distributors exerts a positive influence on both exploitation and exploration, other factors
497 not explicitly considered in our model might be determining the presence of dynamics of investments in
498 exploitation by constraining exploration (and vice versa).

499 Both exploitation- and exploration-based innovations exert an influence on performance.
500 Specifically, exploitation-based innovations positively affect open system performance (H_{6a} ; $\beta_{53} = 0.38$,
501 $p < 0.01$) but do not significantly influence rational goals performance (H_{6b} ; $\beta_{63} = -0.09$, $p = n.s.$). The effect
502 of exploration on performance is positive and significant for both open system performance (H_{7a} ; $\beta_{54} = 0.51$,
503 $p < 0.01$) and rational goals performance (H_{7b} ; $\beta_{64} = 0.40$, $p < 0.01$).

504 The size of the effects on performance is generally higher for exploration-based innovations than for
505 exploitation-based innovations, in line with the reasoning provided by H_8 . To check whether the effects are
506 significantly different, we performed two successive structural models, setting equal β_{53} (exploitation-based
507 innovation \rightarrow open system performance) and β_{54} (exploration-based innovation \rightarrow open system
508 performance) for open system performance (H_{8a}) and β_{63} (exploitation-based innovation \rightarrow rational goals
509 performance) and β_{64} (exploration-based innovation \rightarrow rational goals performance) for rational goals
510 performance (H_{8b}). A chi-squared comparison (Anderson and Gerbing, 1988) of each of these models with
511 the structural model, whose results are presented in Table 3, yields a non-significant result in the case of the
512 open system performance ($\chi^2_{dof(1)} = 0.21$, $p = n.s.$). Therefore, H_{8a} is not confirmed. A different result is
513 obtained in the case of rational goals performance, confirming H_{8b} regarding the higher impact of
514 exploration-based innovation strategy compared to exploitation-based innovations on rational goals
515 performance ($\chi^2_{dof(1)} = 13.13$, $p < .001$).

516 Finally, to test H_9 , which posits that knowledge in inter-organisational relationships with distributors
517 only affects performance through their application to exploitation- and exploration-based innovations, we
518 follow Baron and Kenny's (1986) test of mediation. The interrelationships between the different dimensions
519 of knowledge make it very difficult to apply this test with a structural modelling methodology. Therefore,
520 we built a second-order construct of knowledge related to distributors (KNOWDIST) composed of three
521 dimensions: knowledge acquisition, learning to collaborate, and knowledge about managing distributors. A
522 confirmatory factor analysis of this second-order configuration showed an acceptable fit ($\chi^2_{(51)} =$
523 168.53 ; $GFI = 0.87$; $SRMR = 0.048$; $CFI = 0.98$; $TLI (NNFI) = 0.97$) and high standardised loadings
524 between knowledge acquisition (0.84; $t = 11.15$), learning to collaborate (0.94; $t = 14.97$), and
525 knowledge about managing distributors (0.93; $t = 11.37$). We estimated a theoretical model (M_T)
526 linking KNOWDIST with exploitation- and exploration-based innovations and of these two innovation
527 strategies with open system and rational goals performance (no direct link between KNOWDIST and
528 performance was established). The results of M_T show that variations in KNOWDIST account for variations in
529 the presumed mediator, that is, the firm's exploitation- ($\gamma_{41} = .48$; $p < .01$) and exploration-based innovations
530 ($\gamma_{42} = .45$; $p < .01$). In the same model, we also observe that the effects of the mediator on performance are
531 mostly significant ($\beta_{\text{exploitation-based innovation} \rightarrow \text{open system performance}} = .37$, $p < .01$; $\beta_{\text{exploitation-based innovation} \rightarrow \text{rational goals}} = -$

532 .09, $p = n.s.$; $\beta_{\text{exploration-based innovation} \rightarrow \text{open system}} = .51, p < .01$; $\beta_{\text{exploration-based innovation} \rightarrow \text{rational goals}} = .40, p < .01$). Lastly,
 533 Baron and Kenny (1986) state that when the independent variable \rightarrow mediator and the mediator \rightarrow
 534 dependent variable paths are controlled, a previously significant relationship between the independent and
 535 dependent variables is no longer significant. To test for this condition, estimation of a model where only
 536 KNOWDIST appears as an antecedent of performance yields a significant effect in the KNOWDIST \rightarrow performance
 537 relationships ($\gamma_{\text{KNOWDIST} \rightarrow \text{open system performance}} = .48, t = 5.36, p < .001$; $\gamma_{\text{KNOWDIST} \rightarrow \text{rational goals performance}} = .19, t = 2.53, p <$
 538 $.01$). We later observed that in an alternative model (M_{ALT}), where the paths between KNOWDIST and the two
 539 dimensions of performance are added to M_{T} , these direct effects becomes non-significant ($\gamma_{\text{KNOWDIST} \rightarrow \text{open system}}$
 540 $\text{performance} = .12, p = n.s.$; $\gamma_{\text{KNOWDIST} \rightarrow \text{rational goals performance}} = .13, p = n.s.$). Furthermore, a chi-squared difference test
 541 to compare M_{T} with M_{ALT} confirms the complete mediatory role of the firm's innovation strategy in our
 542 model ($\chi^2_{\text{dif}(2)} = 2.92, p > .20$). These results corroborate H_9 .

543 **Table 3**
 544 Results of structural model

Linkages in the model		Standardised parameter estimates		
		Parameter	Estimate	t-value
H1. Learning to collaborate	\rightarrow Knowledge acquisition	β_{12}	.44	3.18***
H2. Knowledge about managing distributors	\rightarrow a. Knowledge acquisition	γ_{11}	.39	2.80***
	\rightarrow b. Learning to collaborate	γ_{21}	.88	13.79***
H3. a. Knowledge acquisition \rightarrow b. Learning to collaborate \rightarrow	Exploitation-based innovations	β_{31}	.22	1.69*
		β_{32}	.28	2.16**
H4. a. Knowledge acquisition \rightarrow b. Learning to collaborate \rightarrow	Exploration-based innovations	β_{41}	.01	.09
		β_{42}	.40	3.15***
H6. Exploitation-based innovations	\rightarrow a. Open system performance	β_{53}	.38	4.53***
	\rightarrow b. Rational goals performance	β_{63}	-.09	-1.19
H7. Exploration-based innovations	\rightarrow a. Open system performance	β_{54}	.51	5.88***
	\rightarrow b. Rational goals performance	β_{64}	.40	5.33***

545 * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

546 Fit statistics: $\chi^2_{(287)} = 643.89$; GFI=0.80; RMSEA=0.079; SRMR= 0.08; CFI=0.96; TLI (NNFI)=0.96.

547
 548 We assess nomological validity of the set of relationships established in this study with the use of two
 549 control variables that we believe might influence the dependent variables of the model, that is, the
 550 exploitation- and exploration-based innovations and the two dimensions of performance. They are the
 551 number of employees (one proxy of the size) and the age of the firm (one proxy of accumulated knowledge
 552 and expertise). Regarding the former, it only has a significant and positive influence on the performance
 553 measure of rational goals ($\gamma_{6,2} = .13, p < .10$), whereas the latter is positively related to exploration-based
 554 innovation ($\gamma_{4,3} = .20, p < .01$) and open system performance ($\gamma_{5,3} = .13, p < .10$). However, the value and
 555 significance of the structural parameters of the model presented in Table 3 do not change with the addition

556 of the control variables. This confirms that the set of relationships tested in this research maintains its
557 explanatory power even in presence of the control variables.

558 **4. Conclusions and discussion**

559 This study extends our understanding of the role of external knowledge on innovation decisions,
560 providing empirical proofs of the links in the sequence external knowledge-innovation-performance. In
561 particular, we develop and test a comprehensive model of the influence of knowledge in relationships with
562 distributors on the manufacturers' exploitation- and exploration-based innovations. Previous studies have
563 recognised the role of customers and competitors in guiding the adoption of exploitation and exploration
564 competences for product innovation (e.g., Atuahene-Gima, 2005). This research focuses on distributors as
565 a powerful group that influences manufacturers' innovation decisions, a supply chain vertical relationship
566 that, in spite of its importance for manufacturers' success, has been scarcely studied in the innovation
567 literature (one exception is Song and Zhao, 2004). Moreover, the fact that we perform this research in the
568 food-and-beverages industrial setting contributes to compensating for the important bias in the current
569 research on innovation research: the neglect of so-called low-tech and mature industries in innovation
570 studies (Hauknes, 2001).

571 As a matter of fact, the issue of alliance formation for innovation purposes (i.e., new product
572 development) is well documented in the literature (e.g., Rothaermel and Deeds, 2004). Nevertheless, as the
573 success of innovations depends also on how they are marketed, the value of this research lies in the fact that
574 it constitutes a seminal approach to figuring out how knowledge in inter-firm relationships and innovation
575 strategy are related in the commercialisation phase of the value chain. In this value-chain relationship, the
576 use of knowledge from distributors provides a way to link and leverage the voice of the consumer to the
577 manufacturers' innovation activities. As Danskin et al. (2005) affirm, "while anecdotal evidence suggests
578 that some firms are building knowledge management systems that include both proactive and passive
579 systems to provide feedback loops throughout the value chain, there is no empirical research relating these
580 developments to strategy, value chain position, and firm performance" (p. 96). This study is a first attempt
581 to relate knowledge obtained in supply chains to innovation and performance, and the results allow us to
582 recommend the implementation of inter-firm knowledge management systems to sustain innovations.

583 From a theoretical point of view, our model and results confirm the postulate of the knowledge-based
584 view of the firm concerning competitiveness as the result of the firm's ability to generate, acquire, and
585 integrate both internal and external sources of knowledge (Rosenkopf and Nerkar, 2001). Specifically, we
586 observe the issue of how knowledge in inter-firm relationships with distributors is incorporated into the
587 dynamics of innovation. From a managerial point of view, our results confirm that the external knowledge

588 coming from vertical relationships is relevant for management, as advocated by Grant and Baden-Fuller
589 (2004). Because it is a challenge for managers to turn knowledge into internal competencies for innovation
590 (Kogut and Zander, 1992), by focusing on the link between learning from distributors and innovation, this
591 study meets this challenge and presents a new perspective on the role of learning capabilities in vertical
592 relationships with distributors. To ensure the effective development of innovations, managers should work
593 to improve their firm's internal capacity to absorb external knowledge (Xia and Roper, 2008). Managers are
594 advised to develop the learning structures and processes considered in our three-dimensional construct of
595 knowledge in inter-firm relationships with distributors (knowledge acquisition, learning to collaborate, and
596 knowledge about managing distributors) as an effective mechanism of leveraging market-oriented
597 innovations (Kok and Biemans, 2009). Moreover, the finding of a significant mediating role of exploitation-
598 and exploration-based innovation strategies in the relationship between knowledge related to distributors
599 and performance suggests that only those firms that develop their capacity to learn from distributors to
600 leverage innovation may benefit from learning with distributors. These innovation strategies enable
601 manufacturers to reap the benefits of learning with distributors, a relevant result for managers, who should
602 design their structures and processes of interaction with distributors with the innovation strategy in mind
603 (and vice versa).

604 To the best of our knowledge, this is the first empirical attempt that simultaneously deals with the
605 three types of knowledge-related issues in inter-firm relationships (i.e., knowledge acquisition, learning to
606 collaborate, and knowledge about managing distributors). The study of the relationships among these three
607 dimensions allows us to observe that the stock of knowledge accumulated by manufacturers about how to
608 manage distributors is of the utmost importance to improve collaboration and to internalise knowledge from
609 distributors. This confirms the important role played by the knowledge about managing distributors as an
610 essential precondition to learning, innovation and performance. Regarding this, literature on alliances has
611 exhibited some evidence of the effect of the accumulated firm's stock of knowledge about managing
612 alliances on the firm's stock market (Kale et al., 2002), on a general subjective evaluation of performance
613 of one specific alliance (Kale and Singh, 2007), and on the performance of all the firm's alliances (Draulans
614 et al. 2003). Zollo et al. (2002) consider the effect of alliance capability on subsequent knowledge
615 acquisition from the alliance. They use the firm's satisfaction with the knowledge accumulated from
616 participating in the collaborative agreement, as "alliance research identifies knowledge accumulation as a
617 key organizational outcome of inter-firm collaborations" (p. 706). However, it is just one of the three items
618 used to build a summed scale of performance (the others are "the extent to which the alliance created new
619 opportunities for the firm" and "the degree to which the alliance satisfied the partnering firm's initial
620 objectives"). Compared to that article, we present an original contribution by empirically delving into the
621 *black box* of the effect on a firm's performance of the firm's stock of knowledge about managing

622 relationships. We theoretically justify and empirically confirm that knowledge about managing distributors
623 positively influences the acquisition of substantial knowledge from distributors and the collaboration with
624 them, as learning to collaborate is enhanced. From a managerial point of view, this result suggests that
625 manufacturers' investments in developing this capability pay off in terms of its ability to continue learning
626 from distributors.

627 In general, we observe that learning in relationships with distributors is more influential on
628 exploitation-based innovations than on exploration-based innovations. Koza and Lewin (1998) defend the
629 idea that, because of returns associated with exploitation are more visible, proximal in time, and certain, the
630 application of inter-organisational learning to exploitation strategies is favoured against exploration. In any
631 case, both learning to collaborate and acquiring knowledge from distributors are variables that influence
632 manufacturers' innovations. However, learning to collaborate with distributors is confirmed as a more
633 decisive variable in our model. It not only contributes to the firms' acquisition of distributors' knowledge
634 but also contributes directly to both exploitation- and exploration-based innovations. Therefore, the logical
635 relationship between resources, innovation and performance is supported and better understood by
636 explaining how firms prioritise their resources to exploitation vs. exploration depending on their knowledge
637 in inter-firm relationships with distributors.

638 This study offers new empirical evidence to the literature dealing with the exploitation-exploration
639 dichotomy of innovation strategies. Empirical confirmation of hypotheses H₃ and H₄ indicates that learning
640 from distributors is one issue that simultaneously favours exploitation and exploration, thus contributing to
641 weakening the dynamics of concentration in one at the other's expense. Holmqvist (2009) describes learning
642 from inter-firm relationships as a relatively complicated affair that generates slowness in learning from
643 experience, complicating learning and impeding the prominence of any strategy over the other, as no clear-
644 cut relationship between experience and success can be easily established. Moreover, learning from
645 distributors consists of learning from a portfolio of other firms that are heterogeneous about their own state
646 in the exploitation vs. exploration dichotomy in one specific moment and with variations of their particular
647 states in different moments (Koza and Lewin, 1998). Knowledge acquired from this diverse portfolio of
648 distributors and the adaptation to their demands will favour the simultaneous adoption of exploitation- and
649 exploration-based innovations as a result of the incorporation of learning from distributors into the firm (Im
650 and Rai, 2008).

651 Additionally, our empirical evidence shows a relative imbalance between the effects of each type of
652 innovation on performance, as exploitation is only positively related to open-system performance, while
653 exploration is positively related to both types of performance. This is explained by the fact that the scale
654 used to measure open system performance accounts for innovation's intermediate results, which are

655 independent of the firm's competitive environment (e.g., product quality or adaptation to the market
656 demands). These results can be achieved with incremental innovations that characterise an exploitation-
657 based innovative strategy. However, final results in the market like those considered in the scale of rational
658 goals (e.g., market share, sales or profitability) are very dependent on the firm's competitive environment
659 so that, to achieve these goals, according to our results, only an exploitation strategy will not be enough. In
660 fact, we found that the effects of exploration-based innovations on a firm's rational goals are higher than
661 those obtained with exploitation-based innovations. As exploration-based innovation strategy involves an
662 accumulation of resources and capabilities (Danneels, 2002), it seems more adequate to achieve those goals
663 that are more dependent on the competitive environment.

664 4.1. Limitations and further research

665 As with any other study, the current one has limitations that may open new avenues for research.
666 First, it is limited to one specific type of relationship in the food-and-beverages sector: the manufacturer's
667 relationship with its distributors. Although the importance of the sector and of the role played by distributors
668 is widely recognised, other types of relationships can also influence and interact in different ways in the
669 firm's innovation strategies (Tödtling et al., 2009). Future research could help to explore these interactions
670 from a network-based perspective instead of a dyadic perspective. Moreover, we have used a wide
671 description of the manufacturers' relationships with distributors. In this sense, we have not included a
672 description of the particular governance mechanisms used in the relationship, even though governance has
673 been found as a significant influence on learning in inter-firm relationships (Hernandez-Espallardo et al.,
674 2010). Second, although the results are valid from a channel of distribution perspective, a consideration of
675 the implications of the type of distributor involved, for instance a wholesaler or a retailer, could have interest
676 from a managerial point of view.

677 Future research could also be more exhaustive about the process of knowledge transfer and its effects
678 on innovation in inter-firm relationships; for instance, are the roles played by explicit and tacit knowledge
679 different (Dawson, 2000)? Another question concerns the specific type of knowledge already possessed by
680 each firm and its redundancy considering manufacturer-related factors, customer-related factors, and
681 interface-related factors (Sivakumar and Roy, 2004). In particular, learning to collaborate might be more
682 critical for acquiring tacit knowledge (Wagner, 2003), and the levels of knowledge redundancy between the
683 manufacturer and the distributor might determine whether knowledge is transferred from the distributor
684 and/or created in the collaborative relationship (Sivakumar and Roy, 2004). The latter might be a function
685 of the stage of the relationship (Dwyer et al., 1987). As a result, a positive relationship between learning to
686 collaborate and knowledge acquisition might actually be moderated by these issues, and further research
687 could explore them.

688 We measured innovation strategy and performance across four years to avoid the adverse effects of
689 circumstantial eventualities in any of these variables (Atuahene-Gima, 2005). However we did not do the
690 same with the scales that measure the manufacturers' knowledge in relationships with distributors (i.e.
691 knowledge acquisition from distributors, learning to collaborate with distributors, and knowledge about
692 managing distributors). We followed a general procedure in the literature that does not impose an explicit
693 period of time to questions about the cultural orientation of the firm (e.g., Atuahene-Gima, 2005) such as
694 knowledge-related issues (e.g., Weerawardena et al., 2006). Conversely, by doing so we could expose the
695 research to causality problems if the respondent has answered the questions thinking about the most recent
696 activities and if these are very different from the activities previously performed. Nevertheless, a general
697 consensus does exist in the literature about the success of organisational learning's depending on the firm's
698 absorptive capacity, which is determined by the firm's prior related knowledge (Zahra and George,
699 2002), and therefore developing over time by the accumulation of a relevant base of knowledge (Cohen and
700 Levinthal, 1990). Therefore, it is conceivable to believe that answers to knowledge in inter-firm
701 relationships include the history of knowledge-related issues of the manufacturer in its relationships with
702 the distributors. Our empirical results showing significant relationships between knowledge in relationships
703 with distributors and innovation strategy would have been unfeasible if the questions about knowledge had
704 been interpreted as in the most recent moment (Christmann, 2000). In any case, questions about causality
705 can arise, and it is clear that further research might adopt a longitudinal design to tease out these linkages
706 more clearly (Atuahene-Gima, 2005).

707 A similar concern about causality may be present in the relationship between knowledge about
708 managing distributors as an antecedent of knowledge acquisition and learning to collaborate. We used cross-
709 section data; therefore, we cannot observe the dynamics that might lead from learning to collaborate to
710 knowledge about managing distributors. According to Kale and Singh (2007) a process of articulation,
711 codification, sharing and internalisation of the know-how acquired during the collaboration process might
712 serve to improve manufacturers' knowledge about managing relationships with distributors, which, in a
713 further step, would help to improve learning to collaborate in a continuous process. As we have already said
714 by citing Anand and Khanna (2000), "the ability to learn from a particular alliance is likely to be enhanced
715 by the trials and tribulations of past learning experiences" (p. 298), but path dependence is an issue in
716 learning to learn (Cohen and Levinthal, 1990), so that "firms that have learnt to learn will continue to do so
717 at an increasing rate, while those that have never invested in learning from different experiences will not
718 find optimal to do so" (Anand and Khanna, 2000; p. 298).

719 Finally, data were collected from a single source, which can present a certain bias (Kumar et al.,
720 1993). The goal of interviewing a wide sample of manufacturers made the triangulation of data from other

721 sources for each of the interviewed firms prohibitively expensive. To reduce this risk, we were very
722 thorough about the interviewee selection, searching for the person in each firm with the most knowledge of
723 the topics included in the questionnaire (see the methodology section). However, some bias may be present,
724 and future research with different sources of data could contribute to validating the results obtained in this
725 study.

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