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RAMA (Ruth), « L'innovation et les stratégies des entreprises multinationales agroalimentaires. Sondage »

RÉSUMÉ – Cet article synthétise les idées et résultats de recherche de l'auteur sur le rôle de l'innovation dans les stratégies des firmes agroalimentaires multinationales. La discussion s'inscrit dans le cadre des débats théoriques et du contexte empirique relatifs à ce thème. Le rôle de l'innovation est mis en évidence dans la croissance, l'internationalisation, la concurrence, l'accès aux matières premières de ces firmes. Plusieurs préconisations managériales sont proposées.

MOTS-CLÉS – Industrie alimentaire, firme multinationale, innovation, stratégie

RAMA (Ruth), « Innovation and the strategies of food and beverage multinational enterprises. A survey »

ABSTRACT – This article synthesizes our ideas and research results on the role of innovation in the strategies of multinational food firms. The discussion comes within the framework of relevant debates, issues and contextual empirical findings on this topic. We summarize dealing with the influence of innovation in the strategies of growth, internationalization, competition, and the procurement of raw material in these companies. Several recommendations for managers and policy-makers are proposed.

KEYWORDS – Food industry, multinational firm, innovation, strategy

INNOVATION AND THE STRATEGIES OF FOOD AND BEVERAGE MULTINATIONAL ENTERPRISES

A survey¹

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INTRODUCTION

In the food and beverage industry, continual innovation even in minor and unpatented improvements may have a positive effect on performance (Connor, 1981). Indeed, competition in industrial countries is currently conducted more in terms of quality, variety, diversification and safety of processed foodstuffs than in terms of price. These desirable characteristics are largely the result of efforts in design and technical innovation. Not surprisingly, in addition to advertisement and product differentiation, innovation strategy plays a substantial role in competition among food and beverage firms (Galizzi and Venturini, 1996). Food and beverage multinationals (hereinafter, MNEs) are no exception.

These companies produce a substantial portion of the technology available to the food and beverage industry worldwide. In 2007, the

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share of foreign affiliates in R&D into food, beverages and tobacco stood at over 40% of the national total in the industries of countries such as Germany, Portugal, Sweden, the United Kingdom and, especially, several Eastern European countries. The world's 100 largest food and beverage MNEs (hereinafter, the Top Group)² produced around 51.3% of the world's patented innovation in food and beverages from the period 1977 to 1994 (Alfranca et al., 2002). Their share in the world's patented food and food-related innovation was, therefore, well above their 38% of the value of the world's production of processed food and drinks (Rastoin et al., 1998). As shown by patent analysis, research and development (hereinafter, R&D) is performed all over the world (Rama and Martínez, 2013) but the Top Group retains tasks within the Triad that involve the coordination and management of global R&D (Filippaios et al., 2009). Innovation plays a significant role in the strategies of food and beverage MNEs. This article analyses the influence of innovation on the strategies deployed by these companies to expand, internationalise, compete with other companies, and obtain raw materials. In doing so, this article brings together the results of our own research on this topic. Our results are discussed in the framework of relevant issues, theories and contextual empirical findings, although no attempt has been made to review all the research that has been conducted on this question. Methodologically, most of our own studies combine information on the Top Group and patent data obtained from sources such as the United States Patent and Trademark Office (USPTO) and the European Patent Office (EPO). In other cases, information provided by AGRODATA on the diversification of the Top Group into high-tech activities is used (see note 3).

Sections 2, 3, 4 and 5 analyse the role played by innovation concerning, respectively, strategies of growth, internationalisation, competition, and the procurement of raw material. The last section presents the conclusions.

2 The source of information for the Top Group and their nearly 8,000 affiliates is AGRODATA, a database compiled by the Institut Agronomique Méditerranéen de Montpellier (France). For analyses of the Top Group, see Rastoin et al. (1998) and Tozanli (2005).

1. INNOVATION AND GROWTH

Before we summarise our research results, we briefly present a synthesis of a few theories of innovation that are particularly relevant to our objectives. Following an argument dating back to Karl Marx, Schumpeter (1939) maintained that competition through innovation provides the driving force of economic development. A firm that introduces a major innovation is rewarded by higher profits. However, the advantages of the first mover do not last forever and are rapidly eroded by the entry of imitators into the market. Schumpeter added that imitators could improve the original innovation and become innovators themselves. The question addressed here concerns the technological competition specifically within the Top Group. Following the Schumpeterian model, one major line of research has focused on the impact on innovation of the size of the firm. Schumpeter believed that large firms with monopolistic market power would be more likely to innovate than would smaller companies. However, Galizzi and Venturini (1996) argued that industries differ in this respect. They maintained that the food industry “is one of the most Schumpeterian industries in the sense that large firms seem clearly more conducive to innovative activity” (p. 139), while in many non-food sectors the innovative intensity of smaller firms is higher than that of larger companies. According to the aforementioned authors, the problem is not the insufficient R&D resources available to smaller food companies, but rather the heavy complementary investments required in marketing and advertising to promote new foodstuffs. Such a theory would entail that, as compared to smaller rivals, large food and beverage MNEs display strong competitive advantages from the onset; and that their advantages are rooted in both product and process innovation, and in marketing-related innovation. We return to this question in a later section.

Following the publication of Pavitt’s (1984) taxonomy, one major line of research within innovation studies consists of the analysis of differences across sectors: a significant result was that the factors that influence innovation differ across sectors (Fagerberg, 2005). Most scholars in this field, however, have concentrated their attention exclusively on high-tech industries. Little work has been performed on low-tech industries,

although there are exceptions (for a review of studies dealing with the specificity of innovation in the food and beverage industry, see Rama & von Tunzelmann, 2008). Our findings are compared below concerning the temporal dynamics of innovation in the global food and drink industry against those in other industries. Fagerberg (2005, p. 20) observes that “a central finding in the innovation literature is that a firm does not innovate in isolation, but depends on extensive interaction with its environment”. The concepts of national innovation systems (Lundvall, 1988) and sectoral innovation systems (Malerba, 2005) refer to the systemic nature of innovation and deal with the fact that the innovative activities of the firm heavily depend on external sources. Consequently, by the end of the 1980s, theories of proximity began to contest the traditional view of technology as a resource available to the firm whatever its location (Lundvall, 1988). The present survey explores several of these questions in the specific context of the global food and beverage industry.

Food and beverage MNEs have often striven to achieve rapid growth (Tozanli, 2005). Size constitutes an important issue for food and beverage MNEs since economies of scale and scope are essential in this industry. A large size enables the company to enter highly profitable markets (e.g. nutraceuticals, sauces, pre-cooked foods), while keeping oligopolistic control over less profitable markets for basic food, such as flour (Anastassopoulos and Rama, 2005). Small companies often lack this possibility since, unlike large firms, they cannot match the thin margins obtained from sales of basic products with enormous production volumes.

Innovation constitutes a significant tool in the battle to obtain a large international size. Cross-sectional empirical studies indeed prove that the ability to replicate superior technology abroad is a key issue to the growth of MNEs (Cantwell and Sanna-Randaccio, 1993). These research results are confirmed by long-term studies for the food and beverage industry, an industry usually considered low-tech. On analysing a sample of 64 very large food and beverage MNEs, we found that the ownership of specialised, knowledge-creating subsidiaries³ is associated to rapid growth of the company, as measured by the long – term

3 R&D affiliates or knowledge-creating subsidiaries are defined here as those which, according to the AGRODATA database, specialise in biotechnology, engineering, industrial research laboratories, research centres, medical and veterinary services, etc. (Rama, 1996b; Fillipaïos et al., 2009).

expansion of global sales (size, age, and other variables are controlled in the econometric model) (Rama, 1998). Focusing on the Top Group, we corroborated that diversification into high-tech activities (note 3) is associated with an accelerated growth of the company (again, size and other relevant variables are controlled) (Anastassopoulos and Rama, 2005). It may well be that smaller MNEs use diversification into high-tech activities to enter into long-term competition within international markets dominated by incumbents: according to the aforementioned study, over various phases of the business cycle, those food and beverage MNEs of the fastest growth are relatively small companies that had previously spread into food-related technological activities.

2. INNOVATION AND INTERNATIONALISATION

The International Business (hereinafter, IB) theory proposes that a high-technological level acts as a predictor of the development of foreign value-added activity (Dunning, 1993). The empirical literature proves that innovation is, in fact, a driver of internationalisation in food and beverage companies. On analysing 194 food and beverage MNEs, Wendt and Pedersen (2006) found that the propensity to invest abroad was positively associated to the possession of intangible assets (for instance, patents) and to high R&D expenditures per dollar of sales (size and other variables are controlled in the model). Based on an analysis of OECD statistics on globalisation, we claimed that innovation-related advantages are behind the rapid rise of the outward food and beverage FDI of Japan and of certain small European countries from the period 1988 to 2008 (Rama and Martínez, 2013). This question is related to an issue still hotly debated in the IB literature: why do firms based in certain countries internationalise, while firms based in others do not? Since the end of the 1980s, this literature asked whether technological externalities played a role in promoting the internationalisation of companies based in certain countries. Analysing patent data, cross-sectional analysis found that the early international performance of an MNE may be shaped by its proximate technological environment in the home country (Cantwell,

1989). As an example, the aforementioned study correlated the world performance of British food processing companies to the technological advantage of the British food and beverage industry.

Other authors went a step further and claimed that, in agri-food industries, connections with upstream national *industries* and *research centres* may also, indirectly foster good international performance. As shown below, the presence of externalities at the national level may enhance the competitive advantages of companies. A brief clarification is needed here. By the end of the 1980s, evolutionary economists and geographers started to question the conventional view that technology is a resource freely available to all firms, independent of location. Theories of proximity, and notably the user and producer theory, instead maintained that common language and culture, physical proximity, and formal as well as informal organisations may facilitate cooperation at the national level for innovation between users of technology (firms) and producers of technology, such as auxiliary industries and public research centres (Andersen and Lundvall, 1988; Lundvall, 1988). The user and producer theory was first developed in Denmark, an important exporter of both agri-food products and agri-food equity capital. Andersen and Lundvall (1988) convincingly proved that the long-standing competitiveness of Danish food firms in international markets was associated with strong Danish positions in related areas, such as milking and food-processing machinery.

The aforementioned studies aroused our curiosity and we decided to put to test the hypothesis that the international position of a food and beverage MNE, measured in terms of global profits made both on exports and on world productive activities, is positively influenced by the technological strength of the national food chain (Rama, 1999). The national food chain includes agriculture, food and beverage processing, and auxiliary industries; and its technological strength is measured, in the aforementioned study, by the food and food-related patenting activities of national inventors. The behaviour of a sample of food and beverage MNEs pertaining to the Top Group is used as evidence. Within-group differences were found. Firstly, both smaller and latecomer food and beverage MNEs that achieve good international performance are likely to be based in countries where the food chain is technologically intensive. We concluded that these MNEs benefit from the skills created in the home country to establish a position worldwide, while smaller

food and beverage MNEs and latecomers without a rich technological background at home are bound to perform to a lesser degree in the international arena. In contrast, whether or not the firm was based in a country where the food chain is technologically intensive made no difference in the subsample of large and well-established food and beverage MNEs. International performance, in this subsample, did not depend on an innovative national background. The explanation offered is that these firms, due to their large size or their long international experience, have largely internationalised their R&D activities and hence may obtain the technology they need from a variety of geographic sources; knowledge produced by the national food-chain is therefore less crucial for these firms.

3. INNOVATION AND COMPETITION

As stated, innovation is a key factor in the competitive strategies of large food and beverage companies, even though this industry is usually considered low-tech. In host countries, foreign subsidiaries are often the most important producers of technology (see Introduction), a circumstance providing such companies with substantial competitive advantages over domestic firms. Moreover, the ownership of R&D subsidiaries is associated with the capacity of the food and beverage MNEs to diversify their production (size, nationality and other variables are controlled) (Hashai et al., 2011). In turn, product diversification certainly provides an important competitive tool for large companies that operate in markets for food and beverages; smaller companies often lack the opportunity to diversify.

This section focuses on three aspects of the relationship between innovation and competition in food and beverage MNEs.

3.1. TECHNOLOGICAL COMPETITION

Competition between food and beverage MNEs starts in the technological field itself. Using long-term longitudinal data, we proved that the companies pertaining to the Top Group build chiefly on their own

past innovation and their design experience, but that they also react, within a short time-lag, to the innovative activities of other food and beverage MNEs in the same subsector, that is, to innovation performed by their potential rivals (Alfranca et al., 2003a). This long-term trend was confirmed in three subsectors: agribusiness and basic food, processed food, and beverages. Moreover, according to the aforementioned study, the same mechanism functions in technological races for substantial innovation and in technological races for innovation in the aesthetics of packaging. The utility patents and the design patents granted to the sample firms measure these two types of innovations, respectively. We included design patents in the analysis since innovation in packaging is essential for food and beverage firms due to their need to transform undifferentiated, low-profit commodities into differentiated, branded, high-value, profitable food products. Many foodstuffs are, in fact, 'bought with the eye' and good design certainly contributes towards successful merchandising. One reason why these MNEs attempt to stay technologically ahead of potential rivals is that continuous innovation plays a key role in competition for market share.

3.2. THE PERSISTENCE OF INNOVATION

The end of the 1980s concerned the work of the majority of agricultural economists who published in English concerned with structural characteristics of industries involved in the food system. Aspects of market organisation, seller market concentration, and their relationship with several dimensions of the performance of firms were tackled but the role assigned to innovation in competition was largely ignored. By the mid 1990s, a new approach came from the management literature. A ground-breaking study suggested that the temporal dynamics of innovation and the nature of innovators (old or new) prevailing in an industry may contribute towards determining various patterns of competition (Utterback and Suárez, 1993). Industries explored in the aforementioned study include those for the production of typewriters, automobiles, and several electronics industries. Later research works in the field of economics of technological change tended to show that innovative behaviour is sector specific (Cefis and Orsenigo, 2001; Malerba, 2005). Irrespective of the country where companies are based, the same sectors are characterised by similar temporal patterns of innovation. In most sectors, it was found

that innovative activities display a high level of turbulence, with the population of innovators changing significantly over time. Consequently, it is argued, new entrants into the markets controlled by well-established firms may compete armed with new engineering designs.

Despite the fact that a number of the aforementioned cross-sectional studies include the food sector their results are inconclusive regarding the particularities of the sector. This circumstance stimulated our interest on this topic. Our analysis of an extended time-series of patents revealed a starkly different panorama to that prevailing in other sectors: global food and beverage firms display a *stable* pattern of technological accumulation in which “success breeds success” (Alfranca et al., 2002). In the Top Group, “old” innovators are those who foster both substantial changes in products and processes, and new packaging. Among the world’s largest food and beverage MNEs, we also found that a relatively small core of *persistent innovators* directs technological change. We were able to establish that persistent innovators are not necessarily the largest companies of the Top Group. Another finding was that this industry displays a stream of small inventions over time (Alfranca et al., 2002), while the high-tech industries studied by previous authors are more likely to produce radical inventions that may rapidly change the whole face of the industry as well as its patterns of competition. Galizzi and Venturini (1996) suggest that the incremental nature of innovation in food and beverages contributes towards explaining the “puzzle” of a low R&D effort coupled to the major performance of this industry in terms of new products. Indeed, very few radical product innovations are well received by food and beverage consumers⁴ and, consequently, the prevailing pattern of innovation in this industry is clearly accumulative, rather than disruptive. Given these long-term trends, we concluded that in comparison with sporadic innovators, persistent innovators are better able to use innovation in products, processes, and branding as barriers to entry or mobility among different segments of this international industry (Alfranca et al., 2004b). Consequently, increasing returns associated with technological accumulation are likely to strengthen the features of an imperfectly competitive market, by limiting the entry of companies and even by limiting their mobility across subsectors.

⁴ Examples include artificial sweeteners and nutraceuticals. In these few cases, new entrants have eventually contested the markets of incumbents, by creating new niche markets.

3.3. COMBINING DIFFERENT SECTORAL AND GEOGRAPHIC SOURCES OF INNOVATION

As shown below, the broad technological mix of certain food and beverage MNEs is likely to contribute towards their enhanced competitiveness. Although the food and beverage industry is usually considered a low-tech industry, certain authors are beginning to question this perception, largely due to this industry's current position at the forefront of industries in the *application* of a breadth of different scientific advances (Christensen et al. 1996). The modern food and beverage industry uses technology provided by many other manufacturing industries (Rama, 1996a).

Moreover, by analysing patents, we found that certain very large food and beverage MNEs generate intramural non-food inventions used in the production of foodstuffs and agricultural products (Alfranca et al., 2003b; Alfranca et al., 2004a). Several of these companies innovate in non-food because they are conglomerates with a multiplicity of non-food business, in addition to agri-food (Anastassopoulos and Rama, 2005). It has been argued that food and beverage MNEs encompass a series of disconnected techniques, related only by demand-side considerations. This reasoning argues that such techniques coexist within these firms chiefly because the company produces products embodying these techniques (for instance, food, drugs, and textiles), and not due to the functional integration of different capabilities. Contrasting with most received views, we analysed 18,611 patents granted to 90 leading food and beverage MNEs and hypothesised that a substantial part of these non-food inventions are in fact related to the food chain (Alfranca et al., 2003b). We proved that food and beverage MNEs, even those that are core-centred, that is non-diversified, innovate in non-food fields. This result confirms that food and beverage MNEs patent non-food inventions for *functional reasons*. Moreover, we identified recurrent associations between the patenting activities of these companies in food and non-food. Therefore, these MNEs enjoy the advantages of integrating complementary capacities, even if each is on a modest scale. Such broad diffusion of non-food technical knowledge across this multinational industry also suggests that many MNEs could research solely to remain up-to-date with food-related technological developments and interact successfully with suppliers of technology.

The possibility of *combining*, 'in house', different types of knowledge and of actively interacting with suppliers could positively affect the

positioning of large food and beverage MNEs. One-nation food and beverage companies or smaller multinationals are less likely to enjoy such advantages.

Another advantage of large food and beverage MNEs as compared to their domestic rivals is the possibility of combining innovations coming from many different *geographic sources*. As stated, nowadays these firms perform R&D in many countries (Filippaios et al., 2009; Rama and Martínez, 2013). As shown by our study on their patterns of local R&D cooperation in Spain, foreign food and beverage subsidiaries are likely to combine knowledge obtained from the host-country and knowledge generated in the multinational network (García Sánchez et al., 2016).

As summarised by Tozanli (2005, p. 26), within the Top 100 Group, *“the most dynamic and innovative MNEs won over those that placed their competitive advantages merely on raw material procurement”*. As can be observed below, even advantages related to raw material procurement are often also largely determined by the ability of the food and beverage MNEs to implement both organisational and technical innovation.

4. INNOVATION AND PROCUREMENT STRATEGIES

Innovation plays a key role concerning the procurement strategies used by major food and beverage MNEs to obtain agricultural products in developing host-countries. Both technical and organisational innovation have enabled many of these firms to shift from land ownership to contract farming, which entails less political and economic risk. Although contract farming is a phenomenon difficult to quantify, it has been well-documented worldwide by case studies (see, for instance, UNCTAD, 2009; Oman et al., 1989). Agri-food MNEs produce a variety of products under contract, including fruit, milk, and poultry.

This aforementioned shift is largely attributable to institutional and political changes. During the period 1960–1976, agriculture stood in second place, after banking and insurance, among the businesses most affected by the nationalisation of foreign companies (UNCTAD, 2009). Foreign direct investment in agriculture declined considerably, while

conflict and political risk triggered new procurement strategies in Western agri-food MNEs. Moreover, plantations were often seen as risk investments by the capital market due to their persistent conflicts with local peasants, plantation workers and previous settlers (Bucheli, 2008). In the 1960s-1970s, the majority of these companies adopted contract farming as a defensive reaction to the dangers of the nationalisation of plantations in developing countries (Oman et al., 1989). In other words, agri-food MNEs based in the West divested from land. This shift in procurement strategies is in line with the view of Cantwell et al. (2010), which argues that MNEs may react to changes in the institutional environment by shifting towards network business structures that provide more flexibility. However, we maintain that not all agri-food MNEs are able to adopt the networked form of procurement (Rama, 2017).

The aforementioned study claims that innovation has played a crucial role in the shift towards networked forms of organisation. Oman et al. (1989) describe contract farming as a new form of international investment (rather than of FDI), since MNEs that outsource agricultural production are often involved in financial, organisational and technological aspects of local agricultural production, but not in land ownership. In most developing countries, it is argued, these investors often have considerably more financial strength than other processors and this enables them to finance agricultural production. They often enjoy remarkable managerial capabilities that enable them to manage and coordinate agricultural production from a network of suppliers involving sometimes hundreds and even thousands of local farmers. Most importantly for our explanation, they are often clearly more innovative than other buyers of raw materials concerning agricultural and veterinarian technology. As stated, several MNEs pertaining to the Top Group produce inputs used in farming, such as seeds and agri-chemicals, while others display a unique technological interface with providers of inputs since many of them are, in their own right, patentees of inventions in agriculture, chemistry, biotechnology, and veterinarian drugs (Alfranca et al., 2004a). In developing countries, these linkages with auxiliary industries provide major agri-food MNEs from the West with considerable monopsonic power in their relationships with local agricultural producers: in a specific region of production, they may be the sole buyers that are able to provide state-of-the art agricultural inputs,

often at cost price. Furthermore, a number of their subsidiaries specialise in technical services to farms (Filippaios et al., 2009). Faced with other buyers of raw materials, these constitute formidable competitive advantages for Western agri-food MNEs in developing countries.

Since the 1990s, the liberalisation of land markets and other neo-liberal measures have greatly facilitated the rapid expansion of foreign land deals (Rama, 2017). In fact, in most developing countries and in the countries of the Commonwealth of Independent States (CIS)⁵ there has been an upheaval in policies. Consequently, between 1990 and 2010, outward foreign direct investment (FDI) stock in agriculture, and hunting, forestry and fishing (hereinafter, HFF) increased nearly six-fold (UNCTAD, 2009). At the same time, the composition of agricultural FDI in terms of nationality of the investor has clearly changed. The outward FDI stock from developing countries and CIS countries now stands at more than double that of developed countries (UNCTAD, 2009). The share of developed countries in outward FDI flows fell between 1989–1991 and 2005–2007 from 91% of the total to only 52% in agriculture and HFF, owing to the dynamic expansion of FDI flows originating in developing countries⁶. The share of foreign investors based in emerging economies, such as the Gulf States, China and India, is also substantial in foreign land deals other than that of FDI (e.g. land leasing); for a review of this literature, see Rama (2017).

Western agri-food MNEs have not profited to the same extent as the newcomers from the new favourable institutional and policy frameworks for land deals. Although they had been initially constrained to divesting from agriculture and were instead encouraged to adopt contract farming, over time the majority of these firms considered that this arrangement was clearly the best option since it reduced political and economic risk, and increased flexibility. In contrast, we claim that only a very small number of agri-food MNEs based in developing countries have been able to follow this path and that the key to their success is, again, their technological and organisational competitive advantages (Rama, 2017).

5 The countries of the Commonwealth of Independent States (CIS) include Russia and 11 other post-Soviet Eurasian states.

6 The reduction in their share was moderate (from 98% to 95% of the total) in the food, beverage and tobacco industry.

CONCLUSIONS

This article brings together the results of our own research on the influence of innovation in the strategies of food and beverage MNEs. Innovation plays a substantial role in the growth and internationalisation strategies of these companies. Innovative national food chains also fuel the good performance of food and beverage firms in the early stages of their internationalisation. “Success breeds success”: past innovation strongly influences current innovation, and innovative food and beverage MNEs tend to be “old” innovators displaying a record of past technological performance. This circumstance conditions patterns of competition in food and beverage markets since sporadic innovators are unlikely to successfully compete in markets controlled by persistent innovators. In contrast, in many other manufacturing industries, new innovators are likely to make an incursion into markets dominated by incumbents by launching new engineering designs. Within the multinational network, food and beverage MNEs are able to combine innovation coming from a wide variety of sciences and techniques, and from different geographic sources. These competitive advantages contribute towards granting persistent innovators a strong position amongst their rivals. In developing host countries, the possession of technology has enabled agri-food MNEs based in the West to hold monopsonic advantages and, more importantly, to shift from land ownership to contract farming, which entails less political and economic risk. Replication of this strategy by new foreign investors, such as agri-food MNEs based in developing countries, is complicated due to the lack of such competitive advantages.

Several implications of our results deserve mention. Managers need to be made aware of the positive influence of innovation concerning growth, internationalisation, competitiveness, and relationships with local stakeholders of a less conflictive nature. Policy-makers should take into account that innovation-related mechanism can result in imperfect food and beverage markets; regulation is therefore particularly important in this industry, much more so than in others, since most internal mechanisms leading towards the entry and mobility of new competitors are blocked in this case. Policies towards the internationalisation of

domestic food and beverage firms need to consider the importance of a technologically intensive food chain, and should therefore pay attention to the development of national auxiliary industries and of specialised research centres and University Departments. This consideration gains importance given the current context of cuts in public R&D expenditures. The strengthening of the national food chain is particularly relevant for emerging economies that aim to internationalise their food and beverage companies. Their national auxiliary industries and sources of knowledge are often insufficiently developed, despite the fact that a number of their food and beverage companies may have acquired the sufficient scale required to compete in international markets.

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