Collaborative product innovation in the food service industry. Do too many cooks really spoil the broth?

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Abstract: Collaborative Product Innovation (CPI) is a form of open innovation highly suited to tap customers for innovative concepts, support technology development and create value networks for new product launch. This chapter presents a case study describing how the CPI initiatives of manufacturing companies and haute cuisine chefs shaped the diffusion path of sous vide technology in the US. The case illustrates how collaborating with expert technology users can create value to companies by generating new product ideas and supporting internal R&D. Importantly, it shows how CPI can accelerate the adoption of novel foods by increasing technology acceptance in target markets.

Key words: foodservice, collaborative product innovation, sous vide cooking, innovation diffusion, haute cuisine chefs.

9.1 Introduction

The human capital inputs of innovation processes, i.e., the individual skills and knowledge employed in research and development (R&D) and commercialization activities (Romer, 1990), can be sourced both inside and outside corporate boundaries. Innovation processes in which human capital inputs are sourced mainly within a company’s boundaries have been broadly designated as ‘closed innovation’, as opposed to innovation processes in which such inputs are, to a large extent, purposively sourced outside the company, a business strategy commonly known as ‘open innovation’ (Chesbrough, 2003). The latter is about harnessing the
inbound and outbound flows of ideas, technology and skills across a company’s boundaries (which are channelled through its multiple interorganizational links), with the intent of accelerating internal innovation processes and establishing additional, external paths for the commercialization of their outcomes (Chesbrough, 2003; Simard and West, 2006). The establishment and management of interorganizational relationships with customers, competitors, suppliers, public and private research institutions or even seemingly unrelated businesses, with the aim of acquiring additional knowledge and skills for innovation processes, is increasingly seen as an important way for companies to augment their innovation capability (Gatignon et al., 2002; OECD and Eurostat, 2005).

To date, open innovation has been commonly associated with fast-growing, technology-intensive industries (e.g., information and communication technology and pharmaceuticals). There is, however, increasing evidence that this concept and associated strategies may also prevail in more traditional and mature industries (Huston and Sakkab, 2006), particularly when certain sets of circumstances arise. Among such circumstances is a high dependence on other entities, such as other companies, public research institutions and end-user communities, for the supply, development and/or commercialization of new technologies (Chesbrough and Crowther, 2006; Maula et al., 2006; Vanhaverbeke and Cloodt, 2006). Cross-boundary product innovation management should thus be a widespread practice in food supply chains and networks, mainly owing to the number of actors in different areas involved in food supply and their difficulties to single-handedly meet all the heterogeneous (and often contradictory) requirements of intermediate customers, end-users and legislators (Costa and Jongen, 2006; Grunert et al., 2005; Mikkelsen et al., 2005). Empirical evidence of food manufacturing and foodservice companies engaging in open-innovation strategies (Knudsen, 2007) is, however, scarce. Most importantly, a detailed analysis of such activities, their rationale and market outcome is, with the exception of a few case studies (Huston and Sakkab, 2006; Thomke and von Hippel, 2002; Vanhaverbeke and Cloodt, 2006), equally absent from both academic and practice-oriented literature.

Consequently, the main aims of this chapter are:

- to provide a better understanding of the open-innovation practices taking place in mature industries, namely within the food area, as well as of their main antecedents and consequences; and
- to analyse the effects of collaborative product-innovation activities on the innovation capabilities and market outcomes of food manufacturers and foodservice operators.

The chapter is structured as follows. In the section 9.2, a critical review of studies on the prevalence of open-innovation strategies in the food area is presented. In section 9.3, the main findings of a case study (Yin, 2003) analysing the collaborative product innovation activities of three manufacturers of sous vide meals for the US foodservice industry are presented and discussed. These highlight the impact of the open-innovation strategies employed by these companies on their innovation capabilities and market outcomes. In section 9.4, the main conclusions
9.2 A review of open-innovation practices in the food industry

Practices for open innovation in the food industry are examined in the following subsections, including drivers, collaborative innovation and examples.

9.2.1 Drivers of open innovation in the food industry

The food industry is typically described as a relatively mature and slow-growing area of business, which displays a relatively low level of R&D investment and is quite conservative in the type of innovations it introduces to the market (Costa and Jongen, 2006). This sector perceives its end-customers to be, to a large extent, wary of radically new products and changes in consumption patterns. Such perceived wariness, together with the necessary stringency of legal requirements related to safety, transforms food product and process innovation in a highly complex, time-consuming and risky endeavour, and hence one not to be lightly undertaken. However, recent important changes in the nature of both food demand and supply, coupled with a high level of competitiveness, have rendered innovation not only an unavoidable corporate activity, but also one that is increasingly vital for overall agri-business profitability.

Contemporary consumers demand unique flavours and singular foods, guilt-free convenience in cooking and eating, and an increasingly health-promoting diet closely tailored to their individual needs and preferences (Costa et al., 2001, 2007). Such demand requires a type of product development that necessarily entails creating, or at the very least adopting, innovative technological solutions and new business models. On the other hand, recent general advances in areas such as biotechnology, nanotechnology and preservation technology offer an unprecedented number of opportunities for added-value applications in the food industry, many of which have the potential to adequately meet modern consumer demand (Juriaanse, 2006).

Unavoidable as it may, innovation remains a highly challenging and complex process for the food processing industry to manage. The number of actors of different sectors involved in food production, together with their difficulty in single-handedly meeting all the heterogeneous (and often contradictory) requirements of intermediate customers, end-users and legislators, determines that innovation activities must be carefully co-ordinated. This, in turn, compels innovation processes to be managed both within and across organizational boundaries along the value chain (Costa and Jongen, 2006; Grunert et al., 2005; Mikkelsen et al., 2005). Moreover, many of the emerging technologies that can potentially sustain (or complement) a wave of successful new food applications (e.g. nanotechnology) are being developed outside the processing industry. In order to
leverage these on-going innovation processes, food industry actors must therefore enter into more or less formal arrangements with other entities in the innovation system. Formal agreements are likewise required for the adoption of externally-developed novel technologies (Maula et al., 2006). Last but not least, the establishment of close relationships with regulatory bodies, intermediate and end-users throughout the innovation process is essential to improve public acceptance of emerging food technologies and the commercial success of the products thereof (De Jong et al., 2006; Vanhaverbeke and Cloodt, 2006).

All of the above implies that innovation in the food industry is likely to increasingly rely upon the decisions and activities of other entities in the innovation system. As such, the sector should exhibit a significant number of open-innovation strategies, the purpose of which could range from merely securing access to external sources of human capital to actively taking part in the creation of interorganizational knowledge and skills.

9.2.2 Collaborative product innovation (CPI)

As globalization moves forward, markets and technologies converge, product lifecycles shorten and the rate of technological innovation increases. This creates mounting pressure upon companies to produce more innovative products in shorter periods and to commercialize them simultaneously in a higher number of geographic markets. In view of this, open-innovation initiatives in the area of new product development have often been singled out as a means to overcome some of the shortcomings associated to operating in global consumer markets (Costa and Jongen, 2006; Emden et al, 2006; Littler et al., 1995; Sarkar and Costa, 2008).

Collaborative product innovation (CPI) has been conceptualized in a number of ways (see Emden et al., 2006, for a more recent definition), but as with other open-innovation initiatives, there is yet little agreement on how to best define and characterize it. For the purpose of this chapter, and based on a previously developed characterization of open-innovation strategies (Sarkar and Costa, 2008), CPI is understood ‘as a collaborative relationship between an innovating company and an external partner, established with the purpose of sustaining the development and/or commercialization of an innovative product or product line’.

Collaborative relationships are here defined as cross-boundary, information-exchange linkages that are characterized by high levels of relational and structural embeddedness, i.e., high levels of interaction, integration, transparency, mindfulness and synergy, as well as highly similar actionable knowledge bases, and in which each party contributes actively and significantly to the common goal or end solution (Emden et al., 2006; Rindfleisch and Moorman, 2001). In this setting, the innovating company may collaborate with independent external organizations, communities or individuals located at various stages of the value chain (customers, competitors, suppliers) or even in the surrounding innovation system (user communities, private and public research organizations). The collaboration projects may take several, nonequity-based forms and have a varied time span, but they are likely to be relatively structured and focused (at least
initially), and to involve some type of contract or written agreement (Dittrich and Duysters, 2007; Littler et al., 1995).

9.2.3 Empirical evidence of CPI initiatives in the food industry

Knudsen (2007) analyzed the results of a survey on the employment of interorganizational relationships in product innovation by EU manufacturing and service companies active in the food and beverages sector. She observed that all surveyed companies (n=132) had partnered, on average, with at least one other organization for the development of their last important product innovation. Additionally, survey results indicated that these companies would rather cooperate with customers, suppliers and competitors than with private/public research organizations or consultants, and preferably at the initial research stage rather than during technical development. Finally, she also led to conclude that food companies preferably formed alliances with organizations in their own sector, probably because of the high degree of overlapping between their knowledge bases, and, it was believed, to facilitate interorganizational interactions and thereby increase the chances of innovation success.

Huston and Sakkab (2006) described the successful development and launch of a new type of Pringles’ potato crisps (printed with words and images), driven by the application of the open-innovation concept. The authors reported on how Procter & Gamble (P&G) was able to lower product development costs and time-to-market for the new line through the in-sourcing of a technology for printing edible images on cakes and cookies. This technology had been primarily developed by a baker in Italy and was discovered through the global network of potential sources of ideas and know-how that Procter and Gamble maintained as a part of its open-innovation programme.

Alternatively, Thomke and von Hippel (2002) revealed how International Flavors and Fragrances (IFF), a company supplying flavours to the food industry, managed to outsource part of its new product design to customers. IFF developed a customer innovation toolkit, consisting of an interactive, internet-based application with a large database of flavour profiles, with which it equipped its clients in the food processing industry. This tool allowed customers to design and alter flavour samples at will, enabling IFF to bypass costly market research activities and accelerate the trial-and-error cycles that inevitably accompany product innovation. By putting customer expertise to use, IFF was also able to expand its knowledge base and increase the level of customization of its product offer, while lowering its share of the innovation risk.

Finally, Vanhaverbeke and Cloodt (2006) explained how Calgene, a plant biotechnology R&D company, established a network of interrelationships with seed companies, farmers, packers, consumers and legislators to support the launch of a new, genetically modified tomato for the fresh market. Calgene was forced to co-operate with other companies and organizations in the innovation system in view of the uncertainties inherent to the development and commercialization of foods derived from gene technology. Such uncertainties compromised its ability to
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reap value from the commercial applications of the novel technologies it pioneered. The resulting value network allowed Calgene to cope better with the high levels of product innovativeness introduced by its gene-modification technology and the consequent low initial levels of public acceptance and consumer adoption (Ram, 1989).

Table 9.1 summarizes the main characteristics of the open-innovation strategies reported to have been employed in the food industry so far, based on previously developed innovation categorization schemes (Garcia and Calantone, 2002; OECD and Eurostat, 2005; Sarkar and Costa, 2008). Although IFF and Procter & Gamble’s open-innovation activities are clearly cases of technological process innovations, introduced to increase the efficiency of product innovation and sustain new marketing strategies for existing products, the case of Calgene is substantially different. In the latter, a new marketing strategy is implemented,

Table 9.1  Main characteristics of open innovation strategies in the food industry

<table>
<thead>
<tr>
<th>Case study</th>
<th>Innovating company</th>
<th>External partner</th>
<th>Type of relationship</th>
<th>Stage</th>
<th>Strategy</th>
<th>Goal</th>
<th>Supporting technology</th>
<th>Newness to company</th>
<th>End product</th>
<th>Newness to market</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Pringles’ potato (Huston and Sakkab, 2006)</td>
<td>Procter &amp; Gamble International Flavors and Fragrances</td>
<td>Technology supplier</td>
<td>Dyad at non-arm’s length</td>
<td>Process development</td>
<td>Technology in-sourcing</td>
<td>Reduce NPD costs and time-to-market</td>
<td>New printing technology for food</td>
<td>Really new</td>
<td>Printed potato crisps for consumer markets</td>
<td>Incremental</td>
</tr>
<tr>
<td>Design of new food flavours (Thomke and von Hippel, 2002)</td>
<td>International Flavors and Fragrances</td>
<td>Customers in the food industry (e.g. Nestlé)</td>
<td>Vertically integrated dyad</td>
<td>Product design</td>
<td>NPD out-sourcing</td>
<td>Reduce NPD costs and time-to-market</td>
<td>New tool kit for flavour design</td>
<td>Really new</td>
<td>Custom flavours for the food industry</td>
<td>Incremental</td>
</tr>
<tr>
<td>Launch of GM tomato (Vanhaeberbe and Cloodt, 2006)</td>
<td>Calgene</td>
<td>Seed producers, farmers, packers, retailers, consumers, legislators</td>
<td>Network across innovation system</td>
<td>Commercialization</td>
<td>Creation of value network to sustain market launch</td>
<td>Ensure acceptance and market success of novel technology</td>
<td>Plant biotechnology</td>
<td>Incremental</td>
<td>New tomato for the fresh market</td>
<td>Radical</td>
</tr>
</tbody>
</table>
involving the development of new sales channels and promotion tactics, to sustain
the successful creation of an entirely new market for a radical product innovation.
Although the commercialization of a tomato with enhanced flavour might have
been a novel initiative to Calgene and its partners, the basic knowledge of plant
biotechnology employed in the process was, nonetheless, not new to them.

As already seen in section 9.2, empirical evidence of food companies engaging
in open-innovation practices is scarce, and, in particular, in respect of specific
cases of CPI initiatives. Most importantly, a detailed analysis of such strategies,
their rationale and market outcome is, with the exception of the few case studies
reviewed here, virtually absent from both academic and practice-oriented studies.
This gap in academic research concerning the study of open innovation in general,
and CPI in particular, is by no means exclusive to the food area, a fact that has been
often pointed out by many other innovation-management scholars (Chesbrough et
al., 2006; Emden et al., 2006; Littler et al., 1995). In view of this, the following
section presents the results of a case study research project (Yin, 2008), undertaken
with the aim of better understanding why and how CPI takes place in mature
sectors, namely in the food manufacturing and foodservice areas.

9.3 Collaborative product innovation (CPI) in the food-service industry: sous vide technology in the US

For a detailed understanding of sous vide, some details of its use and methodology
are now described and the results of case studies are presented.

9.3.1 Background

The foodservice industry encompasses all commercial and noncommercial/institutional organizations supplying consumers with meals prepared outside their
homes (Ottenbacher and Harrington, 2008). In the USA, as in most developed
economies, this is a very broad sector with substantial variation in price, quality
and service level of the offers, which range from educational, health, military and
corporate catering to travel and tourism businesses, foodservice areas in retail
stores, takeaway and home-delivery outlets, fast food and other limited service
formats, casual dining establishments and upscale restaurants. According to the
National Restaurant Association (NRA, 2011), sales in the USA restaurant indus-
try, i.e., noncommercial, limited (cafeterias, buffets and quick service operations)
and full (midscale, casual dining, upscale casual and fine dining) service restaur-
ants, reached US$604 billion in 2011. In the same year, the industry employed
12.8 million people in 960 000 venues, being one of the largest private sector
employers in the country, and accounted for a 49% share of the food dollar.
Overall, foodservice activities have a great economic and social relevance in this
country: their overall impact in the economy totals US$1.7 trillion and they employ
almost 10% of its workforce, a large proportion of which are female and minority
entrepreneurs and managers who own and/or run micro and small enterprises.
Sous vide cooking (or cooking under vacuum) is based on advanced food-packaging and food-processing technologies (Haas, 2006). It consists of a series of relatively complex and sophisticated food preparation steps carried out sequentially in purposely developed equipment, as shown in Fig. 9.1. This technique involves packaging raw, minimally processed or precooked foods under vacuum in sealed, laminated plastic pouches or containers, and cooking them during a precisely controlled heat treatment process in a water bath or a convection steam oven.
The essence of sous vide cooking resides in establishing, achieving and controlling the desirable core temperature of foods, in order to achieve their optimal palatability at acceptable safety levels (Baldwin, 2012).

Sous vide technology is used in the production of meals and meal components for a wide variety of customers by food manufacturers and foodservice operators alike (Tiampo, 2006), as depicted in Fig. 9.2. Different levels of heat treatment are used to cook foods under vacuum, depending on the safety standards required by regulatory authorities (Creed and Reeve, 1998; Lingle, 1991), the characteristics of the production, storage and distribution operations involved (Lingle, 1991; Creed, 2001a; Tiampo, 2006), and the degree of organoleptic quality and convenience in preparation demanded by each type of customer (Lingle, 1991; Costa et al., 2001; Creed, 2001b).

Sous vide cooking methods are believed to present four main advantages over traditional interrupted catering systems:

1. to reduce the degree of oxidation of food components, such as vitamins and other antioxidants, by packing, cooking and storing under vacuum;
2. to prevent recontamination and reduce the loss of important food components (water, vitamins, flavour and odour volatiles normally lost in open container cooking), by using laminated plastic packaging resistant to high temperatures;
3. to reduce the breakdown of vitamins and flavour and odour volatiles by cooking at low temperatures during relatively long periods of time; and

Fig. 9.2 The supply chain of sous-vide foods.
4. to reduce the need for using salt, chemical and/or other artificial compounds to
preserve foods for a longer time (Creed, 2001a).

The initial basis for the development of sous vide technology in the late 1960s
was the ‘industrialization’ of foodservice operations through the adoption of food
manufacturing processes such as centralized production, large-scale equipment,
consistent safety and quality, and sophisticated packaging systems. The viability
and success of these processes depended largely on the incorporation of a ‘time
buffer’, a stage during which food could be safely and conveniently stabilized by
storage at low temperatures, which interrupted the necessarily continuous flow of
food through the traditional ‘cook and serve’ catering system. However, the
efficacy of such a time buffer in terms of preserving the necessary levels of food
safety was most often achieved at the expense of the sensory and nutritional quality
of the reheated meal or meal component. That is, given the standing food safety
requirements, the desired operational benefits came at the cost of poor perceived
quality and low consumer acceptance. Consequently, the initial stages of develop-
ment, commercialization and adoption of sous vide technology in the food area
were largely driven by the promise it held of providing, for the first time, a highly
positive balance between safety requirements, operational benefits and end-
product quality.

A second reason for the development of sous vide technology was a growing
consumer demand for convenience in meal preparation. Most of the active
population increasingly felt that, at the end of the day, there was not much time left
to eat, let alone to shop and cook. This translated itself into high growth rates of
ready meals and other convenience and foodservice markets in the EU and USA all
through the eighties and nineties, up until today (Costa et al., 2001; Datamonitor,
2006). Given the operational benefits and the superior product quality provided by
the technological sophistication of sous vide cooking, manufacturers and caterers
worldwide turned to sous vide meals as the preferred means of satisfying the
growing consumer demand for convenience (Otto, 1989). However, initial market
acceptance of sous vide meals and the underlying technology was surprisingly
low, with sales never really taking off and companies closing down their sous vide
cooking operations only a few years, or even months, after start-up (Carlino,
1991). Both public and consumer organizations, especially in the USA, voiced
concerns about the potential public health hazards involved in storing foods under
anaerobic conditions, as well as doubts regarding the level of safety of sous vide
meals (Martin, 1999). Moreover, foodservice customers were rightfully afraid of
the markets’ negative perception of the nutritional and sensory quality of sous vide
meals. It was felt that, without a sufficiently intensive, informative and persuasive
marketing strategy, consumers were simply not ready to come to terms with the
notion of eating their dinner out of a vacuumized plastic pouch (Allen, 1991).

Last but not least, the development and widespread adoption of sous vide
technology was significantly fuelled by the emergence of the highly popular, new
millennium ‘science of deliciousness’, otherwise known as ‘New Cookery’ (Adriá
et al., 2006), ‘Molecular Gastronomy’ (This, 2005) or ‘Hypermodern Cuisine’
Hypermodern Cuisine is aggressively technological, as it borrows the latest developments in the food science area (as well as its industrial applications), and turns them into 'haute-cuisine'. Sous vide cooking is considered to be its most remarkable, spectacular and well-known innovation, one that nowadays takes centre-stage in the kitchens of the best and most reputed restaurants in the world. World-renowned chefs such as Heston Blumenthal, Ferran Adrià or Thomas Keller have picked a boring and fear-inspiring industrial cooking method and taken it to a new level by adding their creativity and art, a never-ending variety of applications and recipes, and much needed flair. Thanks to this, eating dinner out of a plastic pouch is no longer sad, lonely and suspicious, but a sign of sophistication and superior culinary craftsmanship. Most importantly, sous vide cooking currently epitomizes the ‘slow food’ trend in high-end cookery and is gradually spilling-over the technology and equipment to ordinary kitchens, as well as boosting sales of refrigerated, prepared meals in all distribution channels (Hesser, 2005; Newman, 2003).

9.3.2 Methodology

Open innovation in the service area remains a poorly understood topic (Tether, and Tajar, 2008), particularly in mature sectors such as the hospitality (Den Hertog et al., 2011) and the foodservice industries (Ottenbacher and Harrington, 2008). In view of this, a primarily exploratory research approach was undertaken. This type of approach is particularly suitable when the researcher intends to establish when, where, how and by whom certain decisions and actions are undertaken, as well as to provide a clearer understanding of the antecedents and consequences of such events (Creswell, 2008). A retrospective, longitudinal, multiple case study design (Yin, 2008) was hence employed to investigate the impact of open product innovation strategies on mature companies’ innovation capabilities and market outcomes. Case study research analyses past or contemporary phenomena within its real-life context in a holistic but systematic manner. Critical or key cases, in particular, are often the subject of scrutiny because of their inherent interest for the understanding of the phenomenon under analysis and their level of embeddedness in the setting where the study takes place.

The study’s subject of inquiry was the path of diffusion of sous vide technology in the USA between 1971 and 2008, while the object was the engagement of three key food manufacturing companies in projects of collaborative innovation with renowned restaurant chefs, with the intent of creating and exploiting an emerging consumer market. Information was collected at four different levels of analysis (individual entrepreneurs, companies, industry and R&D system) to capture both micro and macro perspectives of the phenomenon under study and to identify generative mechanisms at their precise source. Table 9.2 provides an overview of the main actors involved in the case and the relevant elements in their environment, particularly those related to the R&D system. It also depicts the corresponding periods of analysis considered, the type of data collected and the sources of information used.
Data analysis sought to:
1. identify the relevant industry actors and their motives to partake in collaborative innovation;
2. outline their inter-relationships;
3. establish the sequence of key, intertwined decisions, actions and events which triggered the diffusion of a new technology in such context; and
4. analyse the corresponding outcomes.

The information collected was analysed with the aim of identifying the concepts, relationships and events relevant to the case, and subsequently structuring and organizing them into datasets. These datasets described several aspects of the history of the companies investigated, such as market environment, birth, founders, changes in name, key personnel, product function (e.g. the shift from supplying production equipment to manufacturing foods), production technology, assortment, distribution channels and/or markets served, as well as evolution in performance, organizational structure, managerial processes and inter-firm relationships related to R&D and innovation, for instance, outsourcing, informal partnerships, contractual partnerships, equity-based joint ventures, and mergers and acquisitions (Hagedoorn, 2002), and market exit if applicable. The quality of the analysis conducted was assured by:
1. triangulating findings between multiple sources of primary and secondary data, theoretical lenses and sense-making strategies;
2. having key informants checking the accuracy of the narrative and timeline produced; and
3. having academic and industry experts reviewing the case report to assess its face validity and the scientific and practical relevance of its contributions (Yin, 2008).

9.3.3 Case study findings
The first unit of analysis in the case study concerned W. R. Grace, a US company in the area of food-grade materials and vacuum-packaging. In 1968, W. R. Grace started to allocate part of its R&D resources to the aim of developing a method of sealing and pasteurizing ready-to-eat foods on an industrial scale for long storage times (Creed, 2001a). These R&D activities started to bear fruit in 1971, when the company filed a patent for sous vide cooking (as well as for the associated laminated plastic pouch), as a new and improved method of preparing and preserving ready-to-eat foods (Ready, 1971).

By the middle of the 1970s, W. R. Grace started to explore the possibility of diversifying its activities to include the large-scale production of sous vide meals and meal components for the catering industry. To this end, they hired two French consultants with very different backgrounds: Bruno Gossault, a scientist who worked in a food-safety laboratory and who had studied the vacuum-packaging of meat, and George Pralus, a restaurant chef who had developed a method for slow-
Table 9.2  Case information: actors, R&D system, broader environment, period of analysis, type of data collected and sources

<table>
<thead>
<tr>
<th>Entrepreneurs</th>
<th>Period of analysis</th>
<th>Type of data</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Electronic archives of companies, educational/training organizations, industry/trade magazines and press</td>
</tr>
<tr>
<td>Bruno Gossault: French food scientist and economist, consultant, head of a consultancy firm, Chief Scientist at Cuisine Solutions Inc., former consultant at W. R. Grace, developer of sous vide cooking</td>
<td>1974–2009</td>
<td></td>
<td>• Media appearances and personal accounts (audio/video interviews, websites, blogs, social networks)</td>
</tr>
<tr>
<td>Thomas Keller: world-renown American chef and restaurateur, consultant, cookbook writer, theorizer of the New Cookery, lead-user of sous vide cooking, partner of Cuisine Solutions’s Five Leaf Program</td>
<td>1994–2009</td>
<td></td>
<td>• Electronic archives of peer-reviewed, scientific publications and research reports</td>
</tr>
<tr>
<td>Companies</td>
<td>Period of analysis</td>
<td>Type of data</td>
<td>Sources</td>
</tr>
<tr>
<td>W. R. Grace (Columbia, MD): speciality chemicals and materials manufacturer, owner of Cryovac division (manufacturer of food packaging materials/equipment) and Grace Culinary Systems (subsidiary manufacturer/distributor of sous vide products)</td>
<td>1968–1996</td>
<td>Primary qualitative</td>
<td>General:</td>
</tr>
<tr>
<td>Culinary Brands (Sausalito, CA): producer/distributor of sous vide foods</td>
<td>1986–1991</td>
<td>Secondary qualitative</td>
<td>• Telephone and e-mail interviews with key company and industry informants and former collaborators</td>
</tr>
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<td>• Reports for the US Securities and Exchange Commission</td>
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<td>• Reports for the US Securities and Exchange Commission</td>
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<td>• Industry reports of market research and consultancy firms</td>
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</tbody>
</table>
Industry
Foodservice in the US 1990–2011 Secondary quantitative
R&D system
Food science and technology research 1990–2011 Primary qualitative
Culinary arts

Broader Environment
Investors, media and public opinion
Customers, competitors and consumer markets
Regulatory, standards and certification bodies, external evaluators
Education, training and consultancy

• General
• Website of the National Restaurant Association
• Industry reports of market research and consultancy firms
• Visits to R&D, consultants and manufacturers active in the European foodservice supply chain
• Interviews with key company and industry informants
• Participation in international symposia on sous vide and the home meal replacement (HMR) sector
• Participation in applied research projects with European universities, research centres, R&D and manufacturing companies on product innovation for the HMR sector
cooking foie gras with a reduced weight loss. The latter was hired to improve the
sous vide cooking method from the culinary viewpoint (operational costs, sensory
quality, presentation and the development of new recipes), whereas the former was
required to optimize the time–temperature cooking combinations in order to
comply with the necessary food safety requirements. The two consultants worked
closely together with W. R. Grace’s own specialists and with each other for about
ten years in the optimization of the sous vide cooking method. Their main goal was
to achieve the right combination between plastic pouch composition, level of
vacuum in the pouch, cooking and storage temperatures, and cooking and storage
times that allowed for maximum sensory and nutritional quality within the food
safety limits imposed by legislation (Creed, 2001a; Hesser, 2005). By 1989, W. R.
Grace had opened its own sous vide food production plant and a subsidiary, Grace
Culinary Systems that commercialized sous vide meals for the US market (Lingle,
1991). Both were sold in 1996 and changed activity.

The second unit of analysis in the case study was Culinary Brands, a US
company launched in 1986 to produce and distribute chilled sous vide meals and
meal components in California. Two former executives at a major foodservice
company had come across the technique in France and managed to convince
several venture capital companies in the USA to back a business based on the
industrial production and distribution of sous vide foods. To that end, they
recruited several French chefs familiar with the sous vide cooking method as
consultants, to help develop the company’s product line. At the time, Culinary
Brands invested about US$10 million in research related to product innovation,
resulting in the production of 65 different chilled food items and 100 000 dinners
and entrees per day for the US foodservice market (Otto, 1989).

However, market diffusion of sous vide foods in the USA remained low
throughout the nineties, mainly because of public concerns with food safety and
and poor consumer acceptance of the underlying technology and its benefits (Allen,
1991; Martin, 1999). This led Culinary Brands to switch from chilled to frozen
storage and distribution of its products, to avoid food safety risks and increase
customer confidence. But this switch came at a heavy cost of the end-product’s
overall sensory quality and convenience features, and the company would eventually
cease its activities in 1992. Given the R&D effort made, such lack of success
was attributed mainly to Culinary Brands’ insufficient market-research efforts and
a poor marketing and distribution strategy (Carlino, 1991).

The third unit of analysis was Cuisine Solutions, a US company founded in
1987 to produce and market frozen sous vide foods in Europe and US. This
company currently operates plants in the USA, South America and Europe and
markets its meals and meal components through channels such as airlines, passen-
ger trains, cruise lines, hotels, retail, military, restaurant chains, and on-line
consumer markets. Figure 9.3 shows the R&D effort and the net sales volume of
Cuisine Solutions between 2004 and 2009 (Cuisine Solutions, 2009). The com-
pany has been listed on the American Stock Exchange since 2005.

Throughout its history, Cuisine Solutions has based its innovation strategy on
a consciously crafted combination of in-house R&D and open-innovation initiatives.
In 1983, while still operating in the bakery area, it started a research collaboration with a related French company to capitalize on their knowledge of frozen bread products and the quick-freezing process. In this way, the company came across the sous vide technology and realized the potential of its application in European and US foodservice markets, leading to sous vide becoming its sole area of business activity in 1987. Since 2002, and partly in reaction to the negative impact brought by the 9/11 events upon the world’s travel and tourism industry, Cuisine Solutions regularly establishes partnerships with high-end retailers for the development of sous vide products for the French and US consumer markets. This gives the company the opportunity to test their products directly with the end-customer and helps increase consumer and public acceptance of the underlying sous vide technology. In 2004, Cuisine Solutions also established a strategic research alliance (Dittrich and Duysters, 2007; Yoshino and Rangan, 1995) with one of its suppliers in South America (an equity agreement where Cuisine Solutions is a minority stockholder), with the aim of developing and producing high quality, valued priced, fish-based sous vide products for the global retail and foodservice markets.

Concerning specific CPI projects, two of Cuisine Solutions’ most recent initiatives stand out as prime examples of partnering between the foodservice industry and the end-user community of restaurant chefs. The first was the Five Leaf Program, which consisted in the development of an on-line sales channel to supply high-end sous vide meals at home to the gourmet customer segment (Thrush, 2007; Wine, 2003). The online order menu is composed by sous vide signature dishes created exclusively for Cuisine Solutions by world-renowned restaurant chefs such as Thomas Keller. The second was the development of their trade-marketed, salmon product developed by a French restaurant chef while he...
was working as a consultant at the company. The chef used custom tools made by a manufacturer of medical equipment in Germany, as well as a high level of expertise in sous vide cooking, to create a ‘shank’ out of the tail end of the salmon (Poris, 2005).

**9.4 Conclusions and future trends**

This chapter started by reviewing applications of the open-innovation concept in the food manufacturing and foodservice industry. The first conclusion to be drawn from this review is that open innovation does take place within the food sector, in spite of it being known as a relatively more traditional and mature industry. Moreover, open-innovation strategies come in a variety of forms and, as such, are also met with a wide variety of outcomes. Consequently, there is a clear need for a better understanding of open innovation in the food sector that should be addressed by the performance of further, and more focused, case studies and empirical research.

Next, the impact of the open-innovation strategies employed so far on the innovation capabilities and market outcomes of food manufacturing and foodservice industries was analysed. Namely, case study research was employed with the aim of understanding why and how CPI takes place in such areas. To this end, the innovation path of sous vide technology in the USA was traced back to the late 1960s and the R&D and commercialization endeavours of several corporations, restaurant chefs, and food scientists located on both sides of the Atlantic Ocean (France and the USA). This highlighted that several actors have collaborated closely on cross-boundary process- and product-innovation projects in the sous vide industry over the last 35 years, thus demonstrating the importance and usefulness of open innovation in mature business areas, such as the food manufacturing and foodservice sectors.

The findings obtained show that open-innovation initiatives frequently take place in food manufacturing and foodservice companies, encompassing both the exploration and exploitation stages of product innovation. In line with earlier studies (Sarkar and Costa, 2008; Knudsen 2007), they also indicate that despite different collaborative strategies being employed, expert user communities, in this case, accomplished, haute cuisine chefs in European and US restaurants (Adriá et al., 2006; Fauchard and von Hippel, 2008), constitute preferred innovation partners. Collaboration with highly innovative chefs created value to manufacturers by aiding technical development, accelerating technology adoption and diffusion among customers (through the development of novel recipes and applications), and increasing technology acceptance and perceived product quality. In return, chefs benefited from efficiency gains, certified cooking methods, improved professional reputation and higher consumer patronage.

Overall, it can be concluded that companies stand a better chance of escaping the law of diminishing returns to innovation efforts if they can improve the effectiveness of both their technological and marketing capabilities in a concerted
manner. This supports the long-standing call for a higher level of integration between R&D and marketing activities within agri-business companies (Costa and Jongen, 2006). Likewise, when effects on technological capabilities and market outcomes are analysed simultaneously within an integrated framework, research into (open) innovation stands a better chance to become more meaningful to academics and practitioners alike.

9.5 References


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