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Strategic Choices in Produce Marketing: Issues of Compatible Use and Exclusion Costs

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Fresh produce suppliers in Europe and the United States use a mix of price and non-price marketing strategies. This paper shows that these strategies create, using Mancur Olson's terms, two collective goods: overall consumer confidence in the market's ability to deliver credence attributes, and overall consumer satisfaction with the experience attributes of fresh produce. The characteristics of these two collective goods, i.e., their compatible use and high costs of exclusion, influence the costs, effectiveness, and nature of the marketing strategies of firms. This paper presents examples from the fresh produce industries of Europe and the U.S. to show how compatible-use and high-exclusion costs influence firm strategies. It concludes that there are unavoidable interdependencies that create a need for collective action—a need that will increase as consumer and retailer demand for quality attributes in fresh produce increases.

Suppliers for the fresh produce markets of Europe and the United States use a mix of price and non-price marketing strategies. These strategies highlight fresh produce attributes, some of which the consumer can observe at the time of purchase (such as price) and some of which the consumer can only observe at the time of consumption (taste); others are not readily discernable by the consumer (such as production origin). These are referred to as search, experience, and credence attributes (Nelson 1970; Darby and Karni 1973; Tirole 1988).[1]

Non-price marketing strategies influence consumer perceptions and attitudes. Strategies that highlight experience attributes will influence the consumer's *satisfaction* with fresh produce, and those that highlight credence attributes will influence the *confidence* of the consumer in the credibility of the safety claims made about fresh produce. Consumer confidence is trust that desired credence attributes are present in their produce—e.g., if a label on an apple says "produced in France" or "green," that the product is indeed from France or is "environmentally friendly" and that the systems for creating and monitoring country-of-origin labels and eco-labels are effective. Consumer satisfaction comprises the perceptions and expectations of a consumer for experience attributes such as taste, juiciness, texture, and "eating pleasure." When we write "overall level" of, for instance, satisfaction, we mean the distribution of a given perception over consumers in a given market.

Most research on non-price product attributes and their influence on consumer perceptions has focused on how specific strategies can be implemented by businesses or government. For example, Baker (1998) notes that to build consumer confidence in produce safety (a credence attribute) governments can use production standards, regulatory monitoring, and government-defined labels and industry can use grower, retailer, and third-party labels. Other research has examined the complementarity of industry and government strategies. Several studies analyzed the effectiveness of government monitoring to assure credibility and consumer confidence in industry signals for credence attributes, in particular food safety and environment (Baines and Davis 1997; Northern and Henson 1999; Unnevehr, Miller, and Gòmez 1999; Valceschini 1999).

Most of the latter studies on the optimal choice of quality signals do not treat the interdependencies that can exist between individual quality signals and the collective goods that are affected by individual signals, such as overall consumer confidence (in produce safety, particularly) and overall consumer satisfaction (from organoleptic quality).

The problem of overall consumer confidence in produce safety, independent of any particular signal of quality, is a real problem that is measured in several industry "barometers" such as the Euro-

[1] Other search attributes for fresh produce are related to the external "quality" such as firmness, size, shape, color, scent/smell, and blemishes. Other experience attributes include crispness, moisture content, and internal condition. Other credence attributes include sanitary (e.g., pesticide residue or presence of harmful pathogens), health (e.g., vitamin content), environmental (e.g., "green" growing techniques/conditions), and social (e.g., labor standards, ethical and fair trade).

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barometer[2] as well as continual surveys of consumers, for example by *The Packer*[3]. In the literature, this problem is generally approached as an issue of enforcement of standards by governments—applying standards that are already "givens," standards supposedly already accepted by suppliers and consumers. In the context of globalization and the development of private standards, the issue of assuring the consumer of produce safety becomes more complex; standards can no longer be assumed to be "givens" and must be considered as endogenous in the analysis. Problems of enforcement as well as definition have to be considered simultaneously. The problem of assuring the confidence of the consumer can be posed as a problem of collective action for the definition of as well as the enforcement of standards, for the production of a collective good called "overall consumer confidence."

Treatment in the literature of consumer taste satisfaction for a generic produce item is quite specific to produce categories with weak branding. In the categories with strong branding, in clearly segmented markets, the problem of consumer satisfaction is the responsibility of suppliers and retailers marketing the private brands (Klein and Leffler 1981; Tirole 1988; Kapferer and Thoenig 1989; Aacker and Joachimsthaler 2002). In the weakly branded categories, by contrast, there is a need for signals other than private brands, as the latter are very weak or non-existent. It is in those categories, with a lack of clear and strong quality signals, that the taste reputation of the generic produce item continues to play a major role. In these categories, two collective goods are relevant: overall satisfaction (the taste reputation of the generic product) and overall confidence (the safety reputation of the generic product).

Two categories of produce experience difficulties in establishing private brands with a high degree of visibility for the consumer: location-specific products that have many private brands but which brands are weak and with low-visibility for the consumer (wines, local artisan cheeses, artisan sausage, etc.)[4] and fresh products with very little or no branding (fruits and vegetables, beef, pork, fresh fish, etc.). Among these, fresh fruits and vegetables (FFV) are without doubt the category that most suffers from the dual problem of production of collective goods (of confidence and satisfaction). FFV are characterized by the near absence of brands[5,6] visible to the consumer (Codron, Giraud-Heraud, and Soler 2003), by the centrality of taste-quality and safety (pesticide residuals) in consumer choice, and by a large number of individual-firm quality strategies, relatively lightly regulated by government (Codron et al. 2003).

The case of FFV thus allows us to examine issues related to joint management of the two collective goods discussed above (confidence and satisfaction) and to address several questions rarely addressed in the literature.

First, the literature has rarely examined the effects of the "aggregate" of consumer attitudes toward the produce market on strategies of particular firms, yet one would expect such widely held attitudes to be fundamental conditioners of such strategies.

Second, the literature has rarely examined how the marketing strategies of individual firms affect overall levels of consumer confidence and satisfaction in the produce market. This is potentially

[2] The European Commission sponsors consumer studies that measure overall consumer feelings (e.g., Eurobarometre 49) across products and across institutions for each EU country. Products with least consumer confidence, listed from least to most confidence, are meat, fish, eggs, vegetables, fruit, milk, cheeses, and bread. Consumers in different countries have different levels of confidence in the assurance of food safety by government, retailers, or producers.

[3] *The Packer* sponsors an annual consumer survey and sometimes reports on general levels of consumer feelings (e.g., both *Fresh Trends* 2002 and 1998 discuss the effects of food-safety concerns on consumer confidence in produce markets).

[4] Gergaud and Vignes (2000) and Lange et al. (2002) examine the relationships among price, quality, and reputation. They find that "objective" quality is appreciated only by "experts" and that average consumers (with little specific education concerning quality appreciation for the product in question) tend to base their purchasing behavior on reputation rather than on some objective quality characteristics.

[5] The reason the fresh produce market lacks (in general, with some differences over countries) dominant brands is because fresh produce's natural variability and perishability make difficult the consistent delivery of a set of search and experience attributes, and without consistency a brand loses its marketing effectiveness. The same difficulty is faced by countries or regions, given the great variability of produce quality across farms in the country or region.

[6] However, there tends to be a relatively greater presence of these labels in the U.S. as compared to France (with the presence of labels of large firms such as Dole and Sunkist appearing on a subset of the fruit of the typical supermarket).

important in the produce market because there is evidence from other markets—such as for cattle feed—that negligence by a particular firm has spoiled overall consumer confidence in the meat market.

Third, the literature has rarely examined the relationship between the two efforts of collective action to produce the two collective goods (satisfaction and confidence)—or that those two objectives can potentially conflict.

Given the above gaps, we address via the presentation of a conceptual analysis with empirical illustrations the following questions: (1) How can overall consumer confidence and satisfaction influence the nature, effectiveness, and cost of a particular produce firm's marketing strategies? (2) What is the relationship between overall consumer confidence and overall consumer satisfaction in produce markets?

This paper first specifies the characteristics of consumer confidence and satisfaction and poses two research questions. Next, a set of definitions is provided to clearly delineate proposed relationships, and examples are drawn from European and U.S. fresh produce markets. Finally, the paper examines the challenges that the interdependencies between "consumer satisfaction" and "consumer confidence," have for marketing strategies.

Conceptual Framework and Hypotheses

Overall confidence and satisfaction are "collective goods" in that each has high exclusion costs and is compatible in use—the costs of excluding others from the benefits of the provision of this good are high. If a firm takes an action to raise overall consumer confidence (for example, advertising regarding blueberries' health benefits), that firm would not be able to exclude other firms from also benefiting from the ensuing greater consumer confidence and preference for the product. Moreover, consumer confidence, as a "collective good," is used but not consumed, and thus other firms can "use" the overall level of consumer confidence without reducing the stock available for use by the investing firm.[7] The same explanation can be given for "overall consumer satisfaction."

There are incentives in the produce market for the under-supply of such collective good, and hence our hypothesis is that there is insufficient investment by individual produce suppliers in inducing the development of such goods. The collective, compatible-in-use nature of overall consumer confidence in and satisfaction with produce means firms working individually have little incentive for unilateral investments. The investment in one good might reduce another, hence there are tradeoffs in the supply of these collective goods. For example, stricter pesticide regulations may make an apple consumer feel safer but also less pleased with the insect-damaged fruit.

Insufficient levels of the collective good of consumer confidence and satisfaction in the market do however, have consequences for firms, as that adds costs to and reduces the effectiveness of individual marketing efforts by produce firms.

The above implies that rather than going it alone, produce firms are inter-dependent and have an incentive to collective action to promote overall consumer confidence and satisfaction. However, that incentive is counterbalanced by several costs: the costs of specifying a product attribute, i.e., "definition costs" (for example, the cost of adding a label specifying "vine-ripened" or "brix/sugar level"), and the costs of enforcing the chosen specification, i.e., "enforcement costs." These costs, their relation to overall consumer confidence and satisfaction, and how they affect firms' marketing strategies, are treated in the next two sections.

The Characteristics of Consumer Confidence: Challenges Posed to Marketing Strategies

Consumer Confidence and Definition Costs

Definition costs are significant where suppliers do not agree on a standard for a given attribute of a product. That disagreement is sometimes driven by disagreement among outside experts. This is the case for food safety in various produce items where there is often a lack of consensus regarding various credence attributes such as risk level, as well as how to manage and communicate risk. Even were

[7] Schmid (1987) distinguishes "incompatible use" goods, used in most standard economic models (e.g., if A eats an apple, B cannot eat the same apple—A's consumption of the apple is incompatible with B also consuming it), from "compatible in use" goods, which are used but not consumed (used up). Schmid refers to these as "joint impact" goods and notes that the number of users does not affect the costs of the provision of that good, hence for some range of number of users the marginal cost of adding one more user is zero.

experts to agree, consumers might not agree with the expert consensus—for example, on an acceptable level of pesticide residue on fruit or whether suppliers should communicate to consumers (via labels) whether the fruit has pesticide residues (even when those residues are very slight and considered "safe" by scientific/medical standards).

How do definition costs influence the effectiveness, cost, and nature of individual supplier's marketing strategies? High definition costs are associated with ambiguity and uncertainty in standards, which in turn undermines overall consumer confidence. If no single firm can impose its definition upon the market, and suppliers as a group cannot come to consensus—for example, about what level pesticides is safe—then every firm will be forced to choose a "negligible risk" and communicate it to the consumer. But that variation across firms will undermine consumer confidence (i.e., the provision of that collective good).

The under-provision of a collective good is usually considered a justification for government intervention into the market. When no market-standard definition for a credence attribute exists the government can specify the definition through rules, such as codes of practice or maximum residue levels. This reduces consumers' uncertainty about standards and raises overall consumer confidence. For example, in the past several decades most U.S. consumers assumed that the federal government had taken actions to guarantee a "safe" food supply. Produce suppliers thus did not feel the need to develop and communicate a definition of the "safeness" of their fresh produce. If there were a reduction in U.S. consumer confidence of the degree to which government can guarantee the safety of food, either produce firms would need to collectively negotiate a market consensus of "safe" or each firm would need to develop its own definition. The latter is the case for Carrefour in France, which forbids all post-harvest chemical treatment in its private-label apples.

Another dimension of standard-definition cost is where a firm uses marketing and advertising to differentiate its product from its competitors' by saying that it is higher quality or safer than that of others. That action may differ from industry informal norms of behavior, make consumers aware of an issue they had not recognized before, and cause consumers to have lower confidence in the products of the other suppliers. An illustration is banana and pineapple plantation labor conditions. In the 1990s activists in the U.S. and Europe raised concerns over labor rights and conditions in developing countries. That induced the creation of an international standard for social accountability, SA 8000. Several European tropical fruit suppliers and retailers sought SA 8000 certification for their plantation crops and began using this certification as a marketing strategy for market-differentiation. This awoke consumers' awareness of labor conditions, as the logical implication was that certification of one set of suppliers as being fair to their workers meant that the complementary set was possibly unfair, and thus overall consumer confidence fell. Thus by early 2001 most major suppliers of bananas and pineapple to Europe were implementing marketing strategies to address the issue of ethical treatment of workers.

A final dimension of standard-definition costs is the congestion that arises from too many users of a compatible-use good, the use-compatibility of which is limited over some range of use. Beyond some point, congestion occurs and additional users inhibit the availability of the good. With fresh produce, there is a potential limit to the number of signals (e.g., brands, labels, certificates, code words) that consumers will find useful. Hence, for any given credence attribute, too many marketing signals leave consumers confused about which signals mean what, and this may ultimately reduce overall confidence.[8]

An example of congestion is the development of the organic label in the U.S. over the past 20 years. In the absence of consensus on the term "organic," many firms developed their own strategies, some unique to a firm, some as collective actions based on shared certification and labeling programs. By 2000 there were many certification programs, labels, and operative definitions of "organic" in the U.S. This was confusing for consumers and hurt overall confidence in organic produce. The U.S. government responded by establishing minimum standards for organic labeling. This sent a signal to consumers, assuring them that the term "organic" now had a

[8] For example, Baines and Davis (1997) note that a proliferation of food-retailer and farm-assurance schemes in the U.K. resulted in the industry and consumers being confused as to what was being assured and by whom. Also, Teisl, Roe, and Levy (1999) suggest that "the proliferation of voluntary eco-labeling programs may actually increase consumer confusion and erode consumer confidence…." (1070)

consistent, standard definition that was backed by the federal government. This improved overall consumer confidence, which through greater demand and lower expenditures on communication to consumers benefited even firms that disagreed with the government's definition. Another example of congestion is the proliferation of claims of "reasonable agriculture" ("*agriculture raisonnée*," a term used in France for reduced pesticide use in farming, an intermediate level between organic and conventional) on agricultural products and in particular on produce occurred in the 1990s in France. To avoid confusing the consumer and the use of abusive advertising by the private sector, the government regulated suppliers' communication to consumers with regard to, as well as the rules concerning farms' qualification for, "*l'agriculture raisonnée*." For produce sold in the European market, however, national regulations with respect to this communication to consumers loses much of its effect and force, becoming merely one among many.

Either collective action or the exercise of market or political power can resolve congestion and determine how many and which signals should be allowed to be given in the market and whether the limits should be voluntary (self-imposed by the collective) or mandated by the government.

Consumer Confidence and Enforcement Costs

Enforcement costs are incurred implementing standards designed to either maintain or raise overall consumer confidence. These costs are sometimes imposed collectively by the actors in the supply chain or production zone, such as for HACCP programs for fresh produce in Europe (Becker 1992; Baines, Davis, and Ryan 2000).[9] However, without government or third-party monitoring or certification, a firm has the incentive to free-ride on the increased overall consumer confidence in produce safety, without incurring the costs of implementing HACCP. This is the case for produce, while in the meat and fish sector these standards are mandatory and monitored and enforced by government.

The French government labeled fruit with "safe pesticide residue levels" to enforce an existing standard definition and maintain (as opposed to attempting to raise) overall consumer confidence. It also prohibits any marketing practices that might erode confidence in that standard definition: it is illegal for French fresh produce marketers to advertise that produce has a pesticide residue level below that legally permitted, even if their residue levels are lower. Thus the government incurs the enforcement costs by monitoring actual pesticide levels, restricting communication to consumers, and banning some forms of product differentiation that might erode confidence in the existing definition of "safe" fresh produce.

Several examples are noted here of successful collective action to gain and maintain the confidence of the consumer when that confidence is put in danger by the media communicating information to the public pell-mell.

"Crisis units" were formed by organizations of producers, with the help of the French government, to respond quickly when information that might panic consumers is spread by the media. Moreover, a growing number of states in the U.S. are enacting anti-defamation laws to protect food suppliers. In 12 states, including Arizona and Florida, whoever makes a public allegation of problems with perishable food products must now show scientific proof of the problem or face payment of damages to the supplier.

Collective action with a diverse set of actors, including public authorities, is also possible. For instance, a serious problem, able to undermine the image of produce's healthiness, was discovered in 1981 when imported rapeseed oil was blamed by the media for leaving more than 1000 dead and some 25,000 ill. However, Woffinden (2001) reported that the fatalities and illnesses were instead due to large doses of organophosphates on tomatoes from Almeria in Southern Spain. Competing countries could profit from such a threat by differentiating their product by country of origin. However, they did not do so for two reasons. First, claiming differences in country of origin to assert that local products are safer is dangerous, essentially because annual reports on the public control of the label of origin keep showing many irregularities. Second, the national fresh produce industry cannot be sure their members have greater integrity. Hence, instead of profiting from the crisis, private and public actors behaved as if there were a collective agreement to say nothing about the problem. An illustration is given by Woffinden (2001):

[9] HACCP is "hazard analysis and critical control points," a process-focused approach to enhance safety and record keeping in the management of food handling.

The weekly magazine *Der Spiegel* recently revealed an internal note of the German government. According to the document, the analysis of imported food products showed that certain fruits and vegetables coming from Spain still contain dangerous doses of pesticides. Several sweet peppers appear to have been "highly contaminated" and the chemical residues attained "levels that we can no longer tolerate." But the last line of the note is the most eloquent: "In no case should this information be made known to the public."

The Characteristics of Consumer Satisfaction: Challenges Posed to Marketing Strategies

In terms of consumer satisfaction (with respect to organoleptic attributes), the problem of free riding is less marked when the issue is experience attributes that each producer can control, as opposed to trust-related attributes that lead the consumer to seek the expertise of various intermediaries (experts, the media, the rumor mill, etc.) in order to form his or her opinion, all the more because the issues concern his or her own health.

It is certain that the absence of strong branding does not facilitate the enforcement of experience attributes, and thus leads to substantial measurement costs for consumers, both in the search for a reputable retailer, or once in a store, in search of a good product. That said, there nevertheless exist several reference points (such as the consumer's experience, his or her confidence in the retailer, occasional quality signals that may or may not be credible) that allow a consumer to reduce measurement costs and rely on market mechanisms that are to some extent effective. Thus efforts to sell produce of a superior quality are in general rewarded, even if the premium obtained is less than the supplier could have received were the market more finely segmented. These efforts contribute to the improvement of overall consumer satisfaction. Specific examples of situations in which special effort and success in a given product category actually raises the consumer interest in the whole sector are: (a) the success of several high-quality products—such as Chilean apples in the winter—opened the floodgates of consumer desire in the 1980s and early 1990s for more off-season fruit; (b) the availability of good-tasting wines at modest cost from California in the

Table 1. Summary of the Examples Cited for the Production of "Overall Consumer Confidence."

Costs		Content	Who takes action	Quality and geographic area
Definition costs		Government credibility in guaranteeing safety No need for other definition	Government	Safeness/U.S.
		Individual retailer defines more stringent sanitary standard	Firm	Pesticides/France
	Preemptive costs	Adoption of SA 8000 (social label) by multinational bananas exporters	Industry	Social /world
	Congestion costs	Organic and IPM labels	Government	Environment/U.S. and France
Enforcement costs		HACCP as a voluntary (recommended) standard is more costly to enforce; more free riding	Industry	Safety/EU
		Government forbidding communication of pesticide-residue levels	Government	Pesticide residues/ U.S. and EU
		Protection against the media: Crisis cells, laws against defamation, moblization of suppliers across countries	Industry, Government	Safety/US and Europe

1980s initiated a desire in the U.S. for wine and opened the door to a proliferation of wine consumption; (c) the success of Vidalia onions opened up a proliferation in consumption of numerous onion varieties.

Market mechanisms are, however, limited. They do not always allow individual supplier efforts to raise quality to be fully rewarded (relative to the quality of the experience). There are several cases where opportunistic behavior by certain suppliers contributes to the degradation of the reputation of the generic product. Collective organization then becomes necessary to protect the quality reputation of the product, what we have called overall consumer satisfaction.

Like consumer confidence, overall consumer satisfaction is in some cases compatible in use and has high exclusion costs in the produce market—and thus maintaining or increasing that satisfaction involves standard-definition and enforcement costs, and the consequent level of satisfaction conditions the effectiveness and nature of firm marketing strategies.

Consumer Satisfaction and Definition Costs

Ripeness, flavor, shelf-life, and sugar content are closely related to the date of harvest for many types of fresh produce, but there are often substantial profits to be made by the firm that is first on the market. This creates an incentive to harvest early, even before full ripeness, but the lack of ripeness then leads to the product having poor experience attributes, which hurts the reputation of a production zone and diminishes overall consumer satisfaction. For example, in Italy in 2000, Conerpo, a kiwifruit producer, introduced a strict harvesting and export timetable to ensure that only fruit with excellent experience attributes entered the market. However, Conerpo only controlled 15 percent of total Italian kiwifruit output. Other producers were asked to respect the proposed timetable, but adoption was voluntary. Some competitors started exporting six weeks ahead of the proposed schedule. Managers at Conerpo contend that their efforts to enhance international consumer satisfaction with Italian kiwifruit were undermined by those firms not respecting the schedule. *Eurofruit Magazine* (2000a) reported that "there are fears that, if these operators are not brought into line, consumers will lose faith in the product, damaging the whole industry." (45).

Some supplier groups have addressed the premature marketing problem. For example, Chilean apple suppliers annually set specific harvest dates to be strictly respected by all apple exporters in order to maintain a reputation for flavorful apples. Note also the current efforts of the peach/nectarine subsector in France in the face of a general decline in consumer satisfaction that has translated into a reduction in consumption. Accords among peach/nectarine producers and traders were signed several years ago to enforce a maximum level of firmness in the fruit, and several years later to prohibit the sale of small-grade fruit (caliber D entirely, and caliber C only at the start of the season) and more recently for a minimum level of sugar in the fruit.

One can also note switching costs from one classification system (a set of grades) to another, given asset fixity and the inertia created by long traditions of given practices. One can, for example, consider that the fine segmentation of fruit size, color, and even blemishes surely permits logistical advantages but can be accomplished at the expense of flavor/taste: one can have a segmentation less fine and more attention to criteria focused on taste (such as the sugar content). There is thus a tradeoff between emphasis on standards systems that focus on size/color/blemishes and those that focus on sugar content and firmness.

The standards are not the same in all countries, and generally favor the visual aspect over the taste aspect. For example, "skin russetting" in apples is considered in some countries—such as the U.S.—a "physiological skin disorder" that reduces the fruit's visual appeal and which in fact stops their sale in fresh markets. But in countries like Italy, skin russetting is rather seen as a sign of superior taste quality (Reganold et al. 2001). Where the competition between these two sets of standards takes place on the basis of price, one can favor one or the other dimension of quality, but the passage from one to the other is not quickly done and occasions institutional costs.

However, harvest date and location are imperfect proxies for fruit sugar content, a major factor in flavor. Devices now exist to measure the sugar content of a piece of fruit without damaging or puncturing the fruit.[10] This new technology will permit

[10] A device to measure sweetness is called infrared spectroscope (NIR). It was first used commercially in Japan, but recently has been introduced to U.S. and European markets (*Eurofruit Magazine*, 2000b, 2001).

greater market segmentation based on experience attributes. If widely adopted, it will also raise the general consumer satisfaction by making it feasible and cost-effective to establish industry-wide grades and standards for sugar content. At issue will be who will determine that standard and how stringent it should be, which will imply a trade-off between quality reputation and share of output marketed as opposed to dumped or sold at a lower price because of inadequate sugar content.

The Washington apple industry provides an example where fruit taste was given a back seat to fruit appearance in efforts to win consumer satisfaction. Because of favorable growing conditions, Washington Red Delicious apples can be larger and redder than the same type of apple from other regions. Over several decades, the Washington apple industry adapted its practices and genetic research to focus on those two appearance traits, largely ignoring flavor, and built a marketing advantage on them. Retailers were willing to pay more for apples with these traits. The Washington apple industry expanded in response to this price incentive and eventually became the dominant apple-producing region in the U.S. By 2000, however, the overall level of consumer satisfaction for Washington Red Delicious apples was very low because it was perceived that the apples looked good but tasted mediocre, as confirmed by consumer surveys funded by the Washington apple industry.

An analogous problem could occur again today if attention lurches the other way, to the sugar level. The latter is surely a useful proxy for taste, but again, if all effort is focused on favoring the sugar level that can itself end up undermining the taste of the apple. That would already come close to the situation in France where organizations of melon producers are adopting new melon varieties which allow the farmer to more easily raise the sugar level but which do not have the richness of taste of the traditional varieties of melon. Consumer panels for various types of produce (apple, tomato, melon, and others) show that the success in the taste realm depends on a harmonious equilibrium of criteria—not just sugar content, but also crunchiness, juiciness, aroma, acidity, and so on (Decohene 1998). In France, the Interprofessional Technical Center for Fruits and Vegetables (CTIFL) is currently working on an overall index of quality allowing the aggregation of the different criteria. Thus far a consensus has not been reached on such an index

Table 2. Summary of the Examples Cited for the Production of "Overall Consumer Satisfaction."

Costs		Content	Who takes action ?	Quality and geographical area
Definition costs		Premature marketing problem may be resolved by imposing specific harvest dates to exporters	Firm Industry	Harvest date/ Italy, Chile
		More stringent quality standards in the peach sector affected by a long-term drop in consumption	Sector	Sugar rate, firmness, size/France
	Switching costs	Priority to experience attributes within cost constraint could be achieved through downgrading search attributes (color, size)	Sector	Skin russeting/ Italy, USA
		Choice of proxies might backfire in the long run: example of brix and color level in apples	Industry	Color/sugar and taste/US, France
		Difficulty in finding a consensus on the definition of an aggregate indicator	Industry	France
Enforcement costs		Effectiveness of rules in open markets suggests the participation of various competitor countries on the market: example of rules prohibiting the marketing of small-sized peaches	Industry across countries	Size and taste/ EU

Consumer Satisfaction and Enforcement Costs

The above examples also highlight the importance of enforcement costs associated with general consumer satisfaction. The efforts noted above undertaken in Chile and Italy to try to regulate harvest and marketing timetables are vulnerable to opportunistic behavior. Monitoring and certifying compliance is possible with either government or third-party certification programs, but this kind of enforcement of timetables and harvest quality can be costly and difficult, and, like the case of the promotion of consumer confidence, effective collective action by suppliers to promote general consumer satisfaction is dependent on the supplier group's ability to establish standard definitions of experience attributes and enforce the consensus standard. Collective action is made even more difficult by the fact that the markets in which it is implemented are typically international markets; it often happens that an effort is successful in causing a standard to be adopted in a national market but that the efficacy of this rule or standard is weakened by the lack of adherence to the rule or standard in competing countries.

Several years ago the organizations of French producers obtained the extension of a rule prohibiting the sale of size C peaches, a small size. Because smaller sizes are reputed to be of lower quality than the larger sizes, by prohibiting the sale of the small peaches the average peach quality and peach price are increased on the market. The rule cannot be imposed on importing countries, but the French organizations are trying to obtain the accord of competing countries. Italy has already agreed, but Spain has not yet.

Tradeoffs in the Provision of Consumer Confidence and Consumer Satisfaction

Is the provision of both consumer confidence and consumer satisfaction compatible or a trade-off relationship, and over what range? Several trade-offs are evident. First, as noted earlier, less pesticide use could increase consumer confidence in the market's ability to supply safe fresh produce but could also lead to more insect damage, thus lowering consumer satisfaction.

Second, delaying the harvest of many fruits can increase the sugar content of the fruit. But a delayed harvest often requires higher levels of pesticide use and narrower time gaps between late-season pesticide applications and harvesting.

Third, market congestion exacerbates the tradeoff, as some firms focus on experience attributes while other focus on credence attributes. One can imagine a piece of fruit with multiple stickers, each one a label for a different attribute (origin, environmentally friendly growing conditions, ethical worker conditions, variety, sugar content, and harvest date). Not only will this type of congestion diminish the effectiveness of each label, but consumers may also be completely alienated by fresh produce covered with stickers. Moreover, consumers may not interpret correctly a given label. Blend and van Ravenswaay (1998) found that 37% of their respondents in a consumer study indicated food safety was their first reason for buying eco-labeled apples, compared to 27% citing environmental concerns first. Similar results were found in a 1991 survey of Georgia consumers (Huang 1991). Likewise, researchers in Europe have noted that some consumers purchase organic foods because they believe that they taste better and are more nutritious (Hervieu 2000). But European organic labels make no guarantees concerning either of these attributes. Such errors in the perceptions of consumers can erode both overall consumer confidence and consumer satisfaction.

From a theoretical perspective, it has also been shown that an increase in the minimum quality standard leads to an increase in the costs of differentiation (Ronnen 1991; Crampes 1995). When the increase in the standard concerns a safety standard (which is most often the case), this is followed by a narrowing of the options to increase quality, particularly with respect to taste—and hence there is a safety/quality tradeoff. That is one reason why certain supermarket chains in Europe have hesitated to adopted the EUREPGAP standard, which is basically focused on safety and environmental quality—the adoption of that demanding standard may well be at the expense of efforts aimed at raising quality, particularly produce taste. Retailers cannot charge consumers a price premium for a product meeting the EUREPGAP standard, and thus the added cost engendered by meeting the standard forces producers to economize on production costs aimed at other attributes.

An example is the case of beef, where the formulation of a minimum safety standard after the mad-cow-disease crisis led to less effort on taste quality;

Giraud-Heraud, Rouached, and Soler (2003) use a simulation model to show that with a more stringent safety standard the costs of differentiation rise, which takes place in particular at the expense of taste quality of the beef.

The tradeoffs imply an incompatible use in the composition of the final bundle of attributes of fresh produce. A choice of one good cannot be made independent of the choice of the other. It then is an empirical question to determine which choice was made and by whom.

There exist, however, complementarities between the two goods: it has been shown that Good Agricultural Practices based on Integrated Crop Management help the environment, food safety, and the taste of produce (Codron et al. 2003), in particular due to better irrigation water management.

Reganold et al. (2001) report the sustainability of organic, conventional, and integrated apple-production systems in Washington State from 1994 to 1999. To be sustainable, a farm must produce adequate yields of high quality, be profitable, protect the environment, conserve resources, and be socially responsible in the long term. They found that fruit damage due to other physiological disorders, pests, and diseases were minimal and equal for each of the three systems. All three systems gave similar apple yields. The organic and integrated systems had higher soil quality and potentially lower negative environmental impact than the conventional system. When compared to the conventional and integrated systems, the organic system produced sweeter and less-tart apples, higher profitability and greater energy efficiency. Their data indicate that the organic system ranked first in environmental and economic sustainability, the integrated system second and the conventional system last.

Strategic Options for Providing Credence and Experience Attributes

The observations and examples presented in this paper demonstrate that individual firm strategies are also a part of an interdependent process. As firms try to create proprietary levels of consumer confidence and satisfaction associated with their own produce, their efforts will influence and be influenced by the prevailing overall level of market-wide consumer confidence in and satisfaction with a fresh produce product category. This is the inevitable consequence of the high exclusion costs and compatible use of the overall levels of consumer confidence and satisfaction.

An implication of these interdependencies is that they must be resolved, i.e., choices must be made about how credence and experience attributes will be marketed. One alternative for providing collective goods is collective action. The alternative, where each firm pursues its own strategy, will only increase the costs and diminish the effectiveness of these individual strategies.

A fragmented subsector increases costs, and this is exacerbated when the supply chain is international. Collective action can be led by a "channel captain." Earlier studies showed that sometimes the costs of collective action are incurred by a single actor or a small number of actors that are large-scale suppliers, and taking into account the risks of reduction of consumer confidence, pay all of the cost of action. Traditionally the government has assumed this cost, while recently supermarket chains—as in the case of EUREPGAP or the Global Food Safety Initiative of CIES—and large-scale processors, such as Nestle, who, by its promotion of natural fruit yogurts reinforced the consumers' appreciation of "natural and flavorful" fruit, have also undertaken these costs. The suppliers themselves typically do not have budgets for generic promotion of fruit.

Since market trends in both the U.S. and Europe clearly indicate that there will be more rather than less emphasis on credence and experience attributes by consumers, more research is needed in identifying and quantifying the trade-offs of marketing multiple attributes, some with conflicting outcomes. This is especially true since suppliers, in response to perceived consumer demand for "quality" attributes in fresh produce, are striving not only to increase their market share but also to gain a price premium for their differentiated fresh produce. What is still unknown is the degree to which consumers will tolerate a fragmentation of fresh produce product categories into multiple niche markets that target a wide range of combinations of numerous credence and experience attributes that are already being delivered to the market in an evolving, hodge-podge manner.

One can also say that despite the need to develop two collective goods—"satisfaction" and confidence"—collective action must not restrict the individual strategies of differentiation of supplier. That is because the latter can also have positive effects on the production of the collective goods

and can be sources of innovation. This is true in particular with respect to experience attributes such as superior quality. We have seen, in the case of Nature's Choice of Tesco, that an individual firm's strategy to gain consumer confidence, can, under certain conditions, push others to follow suit.

It is nevertheless true that the near absence of brands or other collective signals with astrong reputation for the consumer obliges suppliers and retailers to protect the collective goods which form the reputation of the products from the perspective of taste (hence satisfaction) and food safety and environmental protection (hence confidence) against the behavior of free-riding.

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