

## The effects of extrinsic cues on online sales of fresh produce: a focus on geographical indications

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**Abstract** – Fresh produce has rich sensory attributes, and consumers generally prefer examining physically these sensory attributes prior to purchase. The nature of e-commerce, however, limits consumers' ability to examine products' sensory attributes while buying online. Customers receive very limited intrinsic cues of fresh produce (such as color) when buying online and thus use only extrinsic cues to assess the quality of fresh produce. This study investigates the effects of extrinsic cues on online shopping for fresh produce, with a particular focus on the effect of geographical indication (GI), which often assumes the role of brand names among producers of fresh groceries. We used data from an online South Korean marketplace for fresh produce to conduct a linear regression analysis. The results show that products linked to GIs sold more and were ordered more frequently; other control variables had somewhat significant effects. The volume of online product reviews was found to have a significant positive effect on the amount of orders and sales, but the product rating itself did not have an effect. The price had a negative effect on the amount of orders, while the number of certifications (*e.g.* "organic agriculture") had a significant positive effect on the number of orders.

**Keywords:** fresh produce / e-commerce / extrinsic cues / geographical indication

**Résumé** – Les effets des caractéristiques extrinsèques sur les ventes en ligne de produits frais : l'incidence des indications géographiques. Les produits frais ont d'importantes propriétés sensorielles, ce qui explique que les consommateurs préfèrent généralement les examiner physiquement avant de les acheter. Or, la nature du commerce électronique limite la possibilité d'estimer les propriétés sensorielles de ces denrées. Autrement dit, seuls certains indices intrinsèques des produits frais (par exemple leur couleur) sont donnés aux clients en ligne, et ces derniers n'ont pas d'autre possibilité que de se référer à des caractéristiques extrinsèques pour évaluer la qualité des articles. Cette étude vise donc à étudier les effets de ces indicateurs extrinsèques sur les achats en ligne de produits frais. Nous nous concentrons notamment sur l'impact de l'indication géographique (IG), qui peut jouer pour les produits frais un rôle similaire à celui des marques dans les épiceries. D'après l'analyse de régression linéaire des données d'un site Sud-Coréen de vente en ligne de produits frais, nous constatons que ceux dont la provenance est indiquée sont commandés plus fréquemment et génèrent un chiffre d'affaire plus important. En étudiant d'autres critères, nous remarquons plusieurs autres influences plus ou moins significatives. Par exemple, si le nombre des avis de consommateurs publiés en ligne a un effet positif non négligeable sur le nombre de commandes et le chiffre d'affaire, par contre la note donnée au produit dans ces avis n'en a aucun. Par ailleurs, le prix est un paramètre susceptible d'avoir une incidence négative sur le nombre de commandes, tandis que le nombre de certificats (labels de qualité, type « Agriculture biologique ») a un effet positif sur le nombre de ventes.

**Mots clés** : produits frais / e-commerce / indices extrinsèques / indication géographique

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## 1 Introduction

Electronic commerce (e-commerce) has swelled since the 1990s, but fresh produce has yet to be fully integrated into the online marketplace (Anesbury *et al.*, 2016). There have been several cases of failed online grocery businesses, such as Webvan in the United States, which went bankrupt in 2001 after 3 years of operation. However, fresh produce is still very attractive to the online market space as the largest single US retail category; the fact that no one has successfully migrated the industry to an online space makes it more attractive still (McDonald *et al.*, 2014). For this reason, many e-commerce companies continually invest in online fresh produce services, such as AmazonFresh (operating in different countries), despite the dismal track record of failed enterprises.

The nature of e-commerce reveals why retailing fresh produce online is such a challenge. Buying fresh produce – namely meat, fish, fruits, and vegetables – is significantly affected by sensory inputs. That is, consumers use color or appearance factors to examine the food's freshness and quality before purchasing (Barrett *et al.*, 2010). This, however, cannot be done in an online environment (Hu *et al.*, 2010), which increases the risk that the product received may not meet the buyer's expectations (Mortimer *et al.*, 2016).

The online context offers only limited intrinsic cues about produce (*e.g.*, color, freshness) to customers. With such limited intrinsic cues, consumers are more likely to use extrinsic cues (brand name, price, customer testimonials) – to assess product quality (Miyazaki *et al.*, 2005).

Despite the importance of extrinsic cues for selling fresh produce online (Roselli *et al.*, 2016), little is known about their effects on online sales performance. Most of the prior literature on extrinsic cues focuses on homogeneous products such as books and general groceries (Duan *et al.*, 2008). Even prior studies of fresh produce have investigated the effects of extrinsic cues on perceived quality (Acebrón and Dopico, 2000) or purchase intentions (Tsiotsou, 2006) using mostly the survey method. The present study, rather, uses actual sales data from one of the biggest online retailers in South Korea to conduct empirical research on how extrinsic cues affect the sales performance of fresh produce.

## 2 Extrinsic cues of fresh produce in e-commerce

Following the terms of cue utilization theory, cues are assigned to products as proxies for quality indication (Olson and Jacoby, 1972). Cues can be classified as extrinsic or intrinsic to the product (Olson and Jacoby, 1972). Intrinsic cues are product-inherent attributes (*e.g.*, ingredients), whereas extrinsic cues are product-related but not part of the physical product (*e.g.*, brand names). Intrinsic cues are generally used over extrinsic cues to assess product quality (Purohit and Srivastava, 2001). However, if sufficient intrinsic cues are unavailable, consumers are more likely to use extrinsic information to form evaluations (Miyazaki *et al.*, 2005).

As such, extrinsic cues become highly significant in e-commerce. Buyers must rely on online-based product descriptions and the few intrinsic cues available online (*e.g.* product appearance *via* photos or videos) to evaluate

products. This is even more true of fresh produce due to its heterogeneous characteristics, meaning buyers cannot determine the quality of a product easily in an online setting (Chung *et al.*, 2006). Hence, consumers must rely on extrinsic cues to reduce risk (Huang *et al.*, 2004) and assess product quality (Miyazaki *et al.*, 2005).

Extrinsic cues have been observed to reduce information asymmetry between suppliers and buyers (Kaes and Busch, 1996). Information asymmetry occurs when online sellers have better access to product information than consumers do. Incomplete and asymmetric information negatively influences consumer quality perception and evaluation (Orth and Krška, 2001). The use of appropriate extrinsic cues in e-commerce is therefore essential for sellers to combat negative evaluations and increase sales. The present study particularly focuses on one extrinsic cue: geographical indications. Other extrinsic cues identified in previous studies of online commerce (Cheng *et al.*, 2008; Hu *et al.*, 2010) are used as control variables: customer reviews, customer ratings, and the number of company certifications given by an independent third party.

### 2.1 Geographical indication

Prior studies have identified brand names as the most critical extrinsic cue within online settings (Degeratu *et al.*, 2000). Brand names lead products to be recognized and differentiated in the market and therefore may gain premiums (Agarwal and Barone, 2005). However, brand names for commoditized products, such as fresh produce, have not yet been widely applied: only a few examples exist (*e.g.*, Dole bananas, Zespri kiwifruit) that use traditional branding strategies. Because individual organizations in the food and agriculture industry are usually too small to communicate with consumers directly about their product quality, governments often intervene to develop standards, or producers bundle together to act (Moschini *et al.*, 2008). Deselnicu *et al.* (2013) also address the importance of GIs “to avoid competition in commodity markets, where brand-based product differentiation is impractical” (p. 206). Geographical indication (GI) may thus play the role of brand names in the agriculture and food industry. GIs perform the function of brand names in “guaranteeing a certain degree of homogeneity, identity, and reference for subsequent purchases and word-of-mouth communication” (Acebrón and Dopico, 2000, p. 232).

Food products are a typical example of origin-bounded brands, meaning that a brand is linked inextricably with its origin (Spielmann, 2014). The use of GIs allows food products to be linked with the particular production or processing methods used in a given region (Moschini *et al.*, 2008) and thus affects image quality (Agarwal and Barone, 2005). The concept of GIs began in Southern Europe in the wine and cheese industries (Biénabe and Marie-Vivien, 2017) and then expanded internationally as intellectual property (IP) rights through the Trade Related aspects of Intellectual Property (TRIPs) agreement. Because this agreement lacks detailed legal means specific to protection, GIs are instead protected in different ways, either privately or publically, within national legislations (Dentoni *et al.*, 2012). In Europe, GIs – namely Protected Designations of Origin (PDO) and Protected Geographical Indication (PGI) – are regulated and governed

under a common EU policy framework (Bureau and Valceschini, 2003). In some countries such as the United States, GIs are protected within the trademark system (Deselnicu *et al.*, 2013).

Nevertheless, one barrier to exploiting market opportunities through the introduction of GIs is that consumers may be unaware of the information on the label or on the region of indication, which may lead to misinterpretation (Vecchio and Annunziata, 2011). This misinterpretation may lead to different results for a GI as a quality cue for sensory characteristics (Greibitus *et al.*, 2011). That is, not all GIs affect consumers' buying behaviors. The strength of the link between a product's GI and its perceived quality may differ from case to case. This phenomenon can be explained by the "mere exposure effect," in which repeated exposure to a stimulus increases product familiarity (Zajonc, 1968). That is, if consumers are exposed repeatedly to a product's GI, product familiarity increases, which leads to consumer preference for products from that geographical region.

## 2.2 Control variables: Number of customer reviews and ratings, number of certifications, price

Online customer reviews have become a major information source for consumers seeking to check product quality (Hu *et al.*, 2008; Zhu and Zhang, 2010). A number of previous empirical studies have been conducted to examine the impact of online reviews on the level of sales (*e.g.*, Duan *et al.*, 2008). Online review systems are widely known to be among the most powerful tools to generate online word-of-mouth (Dellarocas, 2003). Prior studies have addressed the "awareness effect" and the "persuasive effect" to explain why customer reviews influence product sales (*e.g.*, Duan *et al.*, 2008). Reviews lead consumers to include the product in their choice set for purchase after the awareness effect has occurred, whereas the persuasive effect shapes consumers' attitudes toward and evaluation of a product. We selected two variables related to online word-of-mouth, following Duan *et al.*'s (2008) study: customer ratings and number of customer reviews. While customer ratings are used to measure the persuasive effect, the volume of online user reviews is used to measure the awareness effect (Duan *et al.*, 2008).

Food labeling is known "to help consumers distinguish the labeled food from otherwise similar products and enable choices to be better in line with preferences" (Vecchio and Annunziata, 2011, p. 82). Prior studies have addressed signaling theory to explain the effect of certification seals on consumer attitudes toward products and the sources of claims (*e.g.*, Atkinson and Rosenthal, 2014). According to signaling theory, buyers face incomplete and imperfect information compared to sellers (Spence, 1973). In this asymmetric information environment, the endorsement of signals or cues in the form of certifications may play a role in increasing confidence in the credibility of claims and in improving consumer attitudes toward the product (Atkinson and Rosenthal, 2014). An overwhelming number of food quality-related labels are used today on food packaging (Vecchio and Annunziata, 2011), including GIs. The current study thus uses the number of certifications as a variable to control the other food labels.

Price is a key variable for users to determine online purchases (Souiden *et al.*, 2019). This study focuses on the effect of GIs as a variable, but the impact of price over "total revenue" and "number of orders" cannot be ignored; we have included price variable in the testing of our research model.

## 2.3 Hypothesis development

On the basis of a literature review on GIs (Sect. 2.1), we propose two main hypotheses in the current study. We have chosen two different dependent variables, *total sales revenue* and *number of orders*, as retailers sell products with differentiated prices and units.

H1: If the product and its origin are registered within a geographical origin system, then the total sales revenue of the product will be greater than those of unregistered products.

H2: If the product and its origin are registered within a geographical origin system, then the number of orders will be greater than those of unregistered products.

Several prior studies have addressed the role of GIs in signaling product quality to consumers (Deselnicu *et al.*, 2013; Greibitus *et al.*, 2011; Moschini *et al.*, 2008). However, GIs do not always work as indicators of quality: consumers may be unaware of information about the region of indication (Vecchio and Annunziata, 2011), which may lead to different effects of various GIs. That is, the strength of the link between a product and its GI may influence sales performance. The present study examines the use of GI as a proxy to measure links between products and their places of production. In general, GIs are used to develop and protect food products linked to specific geographic locations (Carpenter and Larceneux, 2008). A GI is not only "a place-based name that conveys the geographical origin" but also indicates cultural and historical identity (Bowen, 2010, p. 209). Including GIs on a product thus implies a strong link between the product and its geographical origin.

To clearly see the effect of geographical origin, four variables were selected to control the effect, on the basis of prior studies on extrinsic cues in online situations: customer ratings, number of customer reviews, unit price, and number of certifications. This study will examine the hypotheses proposed above using the data of a prominent online retailer.

## 3 Material and methods

This study uses sales data of an online retailer in South Korea. In this online marketplace, each individual product has its own webpage for its sellers to promote and sell their fresh produce. The producer's name, a picture of the product, and the product's geographical origin are displayed on a banner on the marketplace's main page. Customers move to each product's webpage by clicking on the corresponding banners.

This study collected data from 1061 fresh products, including fresh meat (6.7%), vegetables (36.8%), fruits (36.6%), grains (6.7%) and fish (13.2%). The following information was collected from each product webpage: customer rating, number of customer reviews, product unit price, and number of certifications. The number of customer reviews was accounted for by a logarithm to control for size effects in the analysis. Products with geographical indications

registered were encoded as 1, and 0 if not registered. GIs of South Korea are benchmarked against the Protected Geographical Indication (PGI), a European Union certification system. This PGI label protects food products linked to a specific geographic location (Carpenter and Larceneux, 2008). Data regarding the total sales revenue and number of orders per product webpage was collected from the beginning of November 1st, 2015 to the end of November 30th, 2016. Table 1 presents the descriptions and measurements of the variables used in the empirical analysis. Table 2 summarizes the statistics of the study's 1061 samples.

## 4 Results

The results of the linear regression analysis show that the stronger the link between a product and its geographical origin, the more the product sells in terms of volume and frequency per order. Tables 3 and 4 present the results of the linear regression analyses.

The result shows the total sales revenue and the number of orders of a product whose origin is registered to the geographical origin system in Korea outnumber those of a non-registered one by \$2471 and 141 respectively ( $p < 0.01$ ).

**Table 1.** Description of variables.

*Tableau 1.* Description des variables.

Variables		Descriptions
Dependent variables	Total sales revenue	Product <i>i</i> 's cumulative sales revenue (US\$)
	Number of orders	Cumulative number of orders for product <i>i</i>
Independent variable	Presence of GIs	Dummy variable indicating if product <i>i</i> and its geographical origin are registered as GIs in Korea (coded as 1 if product <i>i</i> has registered GIs; 0 if not)
Control variables	Customer rating	Average customer rating
	Number of customer reviews	Cumulative number of customer reviews in logarithmic form
	Product unit price	Price of product per unit (US\$)
	Number of certifications	Number of certifications provided by an independent third party (e.g., Organic)

**Table 2.** Summary statistics.

*Tableau 2.* Statistiques descriptives.

Variables		<i>n</i>	Mean	Std.Dev.	Min.	Max
Dependent variables	Total sales revenue	1061	5194.67	12 399.85	13.17	188 803.00
	Number of orders	1061	308.31	920.47	1	15 406
Independent variable	Presence of GIs			Presence(1): <i>n</i> = 192; Absence(0): <i>n</i> = 869		
Control variables	Customer rating	1061	91.99	6.53	45	100
	Number of customer reviews	1061	342.44	1385.97	1	37 465
	Product unit price	1061	19.75	12.45	1.78	118.5
	Number of certifications	1061	0.106	0.386	0	3

**Table 3.** Results of linear regression for hypothesis 1.

*Tableau 3.* Résultats de la régression linéaire pour l'hypothèse 1.

Variables		B	S.E.	Stand.B.	<i>t</i>	<i>p</i>
Independent variable	Presence of GIs	-7534.02	4425.05		-1.703	0.089
	Customer rating	2471.05	818.31	0.077	3.020	< 0.01
Control variables	Number of customer reviews (log)	-51.22	48.70	-0.027	-1.052	0.293
	Product unit price	8713.08	391.86	0.584	22.235	< 0.001
	Number of certifications	66.37	25.41	0.067	2.612	< 0.01
Adjusted $R^2 = 0.343$		994.26	807.49	0.031	1.231	0.218

**Table 4.** Results of linear regression for hypothesis 2.**Tableau 4.** Résultats de la régression linéaire pour l'hypothèse 2.

Variables		B	S.E.	Stand.B.	<i>t</i>	<i>p</i>
Independent variable	Presence of GIs	−277.16	346.93		−0.799	0.425
	Customer rating	141.86	64.16	0.059	2.211	< 0.05
	Number of customer reviews (log)	−3.91	3.82	−0.028	−1.023	0.306
Control variables	Product unit price	543.24	30.72	0.491	17.682	< 0.001
	Number of certifications	−3.62	1.99	−0.049	−1.818	0.069
Adjusted $R^2 = 0.267$		184.91	63.31	0.078	2.921	< 0.01

**Table 5.** Results of *t*-test.**Tableau 5.** Résultats du test *T*.

	Registered GI	Unregistered	<i>p</i>
Total sales revenue	\$8900.36	\$4375.92	0.000
Number of orders	508.1	264.2	0.000

We could find the same tendency from the result of less rigorous analysis method, *t*-test (Tab. 5), which does not consider other factors that might affect the total sales revenue and the number of orders.

This study also found some additional intriguing insight from control variables used for the analyses. The number of customer reviews of the product has a significant positive effect on the amount of orders ( $\beta = 0.491$ ,  $p < 0.001$ ) and sales ( $\beta = 0.584$ ,  $p < 0.001$ ), but the review ratings do not have an effect. This result mirrors those of prior studies, such as that by Duan *et al.* (2008). The significant effect of review volume suggests that consumers are swayed more by visibility than rating. Price also has a positive effect on total sales ( $\beta = 0.067$ ,  $p < 0.01$ ), but a negative effect on the number of orders ( $\beta = -0.073$ ,  $p < 0.10$ ). The number of certifications associated with a given product has a significant positive effect only on the number of orders placed ( $\beta = 0.078$ ,  $p < 0.01$ ).

## 5 Discussion

Less information will likely be available online for product categories such as fresh produce that have many sensory attributes (Degeratu *et al.*, 2000). For fresh produce, brands can thus play an important role in instilling trust and confidence in product quality and may lead to a final purchase decision. Brand names for fresh produce are not yet in widespread use, however; many types of fresh produce are sold without their own brands. This situation could help to explain why the online retail market for fresh produce still lags behind the markets of other products.

Branding fresh produce is typically challenging, because it is difficult to find words that will effectively represent the various attributes of fresh produce. This paper has thus investigated the effect of geographical origin on online sales of fresh produce; we have shown that using geographical origin in

representing (or branding) fresh produce can increase the sales of fresh produce, which may in turn reduce the hindrance of future growth of the online market for fresh produce.

This paper has focused on an online retailer platform that is managed directly by the producer, so there are no intermediaries to support producers. In such a system, the producers themselves (who are typically unaccustomed to online platforms) are limited in setting up sales strategies; based on the results of this study, using GIs could thus be a simple but effective marketing strategy for increasing sales. Since there may be incentives for sellers to make the most of the GIs at their disposal, a systematic program to prevent the use and abuse of GIs could also be introduced. In the case of the online platform we used in this study, from the user's point of view there is no way to verify that GIs can be used at the discretion of the vendor of the product.

The results for the four control variables used in the analysis also included some interesting indications. First, the price was shown to negatively affect both the number of orders and total sales, which is the same as in previous studies (*e.g.*, Rödiger and Hamm, 2015). Second, the results showed that the number of certifications positively affected the number of orders but had no significant impact on overall sales. Many previous studies have shown that users' willingness to pay increases as information about products – for example, safety related certifications – is added (*e.g.*, Boccaletti and Nardella, 2000). The present study was partially consistent with this existing research. Finally, this study also provided interesting results concerning online reviews for fresh produce. Previous studies on electronic word of mouth have verified that the amount and quality of reviews positively affect product sales (Luca, 2016). The results also confirmed that a large number of reviews positively influences sales of fresh produce. However, for fresh food, reviews reflecting individual tastes and preferences were shown to be an insignificant variable in determining purchases. Therefore, it can be inferred that matching information about individual tastes must be provided to link reviews to sales.

Although the results of this study offer guidelines to online retail managers on how to describe their products to solicit better sales, this study also has certain limitations. First, we used only data from one of South Korea's largest online retailers. Although geographical origin is widely used in different countries, future studies should expand the subject to extrapolate our results to other countries.

Second, this study examined the effect of geographical origins on fresh groceries, without considering the varied characteristics among fresh produce categories. Within the fresh groceries sector, levels of homogeneity differ. Most fresh agricultural products (such as vegetables, meats, and fruits) are known to be highly heterogeneous, while grains are relatively homogeneous (Chung *et al.*, 2006). Consumers are less concerned about the freshness of a product when purchasing homogeneous groceries. Future studies may expand and compare the effects of extrinsic cues based on the level of homogeneity among groceries.

Third, this study has addressed only the positive effect of extrinsic cues. For example, a few adverse effects of certifications or labels have been addressed in prior studies due to the amount of information they provide (or not provide): “too much information can confuse consumers and too little information can mislead them” (Wansink, 2003, p. 305). Because consumers rely more on extrinsic cues in the online context, especially regarding fresh groceries, further studies should consider these adverse effects of extrinsic cues.

Finally, the present study has assumed that purchasing behavior can be explained by extrinsic cues, such as GIs, in a traditional way; future research could explore the impact of multiple variables in a nonlinear manner.

## 6 Conclusion

This study examined the effects of extrinsic cues on sales performance for fresh produce by using sales data of one of the biggest online retailers in South Korea. The geographical origin plays the role of brand names in fresh groceries, the branding of production location. The results show that if the product and its origin are registered on the geographical origin system in Korea, the total sales revenue and number of orders increase. That is, geographical origins positively affect the sales of fresh products. This implies that customers prefer products with geographical origins, and geographical origins can enhance the sales of fresh produce.

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