Food policy in cyberspace: A webometric analysis of national food clusters in South Korea

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ABSTRACT

This study analyzes the Triple Helix (TH) structure of an online national food cluster. Although the university–industry–government (UIG) approach provides useful insights into innovation and its diffusion, few studies have examined how such systems are organized and operate in cyberspace. Foodpolis is an export-oriented national food cluster targeting markets in Northeast Asia, including China and Japan. Foodpolis encompasses national food industry complexes and government-led agricultural and food R&D institutes whose goal is to advance food-processing technologies. This study employs the webometric analysis method to reveal the communication pattern of interactions between participating actors. The study evaluates web mentions and hyperlink networks to investigate links to and from the website of Foodpolis (Foodpolis.kr) by using the NodeXL software package. The results for links to and from Foodpolis do not indicate sufficient interactions between UIG websites and Twitter accounts. Instead, the website and Twitter account of Foodpolis were linked to its own online café, websites of individuals, and government websites. The results suggest that UIG actors should employ online communication channels in a more proactive manner for diffusing innovative initiatives such as Foodpolis.

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1. Introduction

Innovation is crucial for the survival and growth of the food industry. Lundvall (1995) described innovation as an ongoing process of learning, searching, and exploring, which results in new products, techniques, organizational forms, and markets. Innovation is conventionally perceived as something new that invites social and technological changes and involves diverse actors ranging from designers to society (Earle, 1997). At the micro level, innovation is a series of interactions between firms and consumers, whereas at the macro level, it involves industries, governments, and relevant researchers and developers.

Earle (1997) pointed out that innovation in the food industry occurs in many sectors, including "production, harvesting, primary and secondary processing, manufacturing, and distribution" (p. 166). In addition, because this innovation deals with what people eat, a critical part of everyday life, its effects are felt in "consumer eating patterns and general social and cultural trends" (p. 166). One only has to think about the impact that microwavable refrigerated food, wholesale markets such as Costco or Sam's Club, and organic food stores have to see the pervasive impact of innovation in the food industry.

This raises the question of whether innovation in the food industry can materialize relatively easily. Sarkar and Costa (2008) reported that a number of food production actors in various sectors and diverse constraints introduced by consumers, together with legislators and government institutions, keep this innovation a "challenging and complex process" (p. 575). In addition, insufficient R&D investment, a small number of innovative firms, and consumers' conservative attitudes toward new or changed products challenge innovation in the food industry (Costa & Jongen, 2006; Grunert, Harmsen, et al., 1995; Grunert, Hartvig Larsen, Madsen & Baadsgaard, 1995).

Lundvall (1995) argued that innovation processes occur in product, process, market choice, and organizational domains. Therefore, the present study examines Foodpolis, a food cluster driven by the Korean national government that focuses on these four domains. Foodpolis is an export-oriented national food cluster located in the southeastern region of Korea (Iksan, Jeonbuk Province) and targets markets in Northeast Asia, including China and Japan. Foodpolis represents a national food industry complex and includes government-led agricultural and food R&D institutes whose focus is to advance food-processing technologies.

The Korean government is known for its strong engagement policy in industrial development, and the food industry has been no exception (Lee, Hadwiger, & Lee, 1990). One of the many successful cases is the rapid diffusion of the broadband internet and personal computers between the mid-1990s and 2000s (Choi, 2011; Park, 2002). However,

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such strong initiatives have not always had positive outcomes for Korea. For instance, the "new-town policy" failed to provide people with enough apartments and other types of residential facilitates at affordable prices.

Foodpolis, another ambitious project stimulated by the Korean government, was founded by the national government but is located in the relatively underdeveloped southern region. In addition, the Foodpolis project is still in its initial stages. However, its window to cyberspace is highly active, which is partly due to its provision of services in four languages (English, Japanese, Chinese, and Korean). Consumers, wholesalers, retailers, and information seekers can acquire information and decide on their possible purchases or sales by using the website.

This study analyzes the Foodpolis ego network in cyberspace by considering various online sources, including websites, blogs, and Twitter accounts. This approach is relevant because hyperlink structures in cyberspace are good predictors of online actors' reputation and decision making (Kim, Barnett, & Kwon, 2010). Although the Foodpolis project itself is in the initial stages, its online presence has attracted many visitors and followers. By examining the online communication structure of Foodpolis, this study provides not only a deeper understanding of strategic communication in the context of Korea's food policy but also insights into the prospects for the development of the country's future national food clusters.

2. Literature review

2.1. National/regional food clusters

Integrating research, manufacturing, and government institutions to innovate an industry (more broadly the national economy) is a common strategy employed by many countries (Kwon, 2011). Previous studies, including Gellynck, Vermeire, and Viaene (2007), have discussed many concepts regarding this trend, including "clusters" (Porter, 1998), "milieux innovateurs" (Amara, Landry, & Ouimet, 2003), "national innovation systems" (Lundvall, 1995), "regional innovation systems" (Iammarino, 2005), "technological innovation systems" (Markard & Truffer, 2008), "sectoral innovation systems" (Malerba, 2003), "functional innovation systems" (Ylinenpää, 2009), and the "Triple Helix" (Leydesdorff & Meyer, 2003).

The food industry reflects a complex and dynamic system involving many vertical and horizontal relationships (Earle, 1997; Sarkar & Costa, 2008). According to Chesbrough (2003) and Sarkar and Costa (2008), innovation processes can take place within a firm's boundaries (closed innovation) or outside (open innovation). Modern innovation trends in the food industry focus more on regional networks than on regional resources (Camps, 2004; Gellynck et al., 2007; Lu & Beamish, 2001; Myers, 1995) because participation in regional networks enhances innovative capability by promoting learning and exchanging new knowledge (Johannisson, Alexanderson, Nowicki, & Senneseth, 1994). In addition, scholars have reported that firms that participate more aggressively in regional networks can shift to international innovation networks more efficiently (Davenport, 2005). That is, engagement in regional networking reflects participation in global networking and can facilitate enriched innovation processes and outcomes.

Trail and Meulenberg (2002) analyzed innovation cases in the food industry and reported that sample firms generally oriented themselves toward products, processes, types of markets they supply, ownership, market size, and scope and that innovation cases related to food clusters were extremely rare. This finding is partly due to the fact that the absolute number of food clusters was relatively small at the time of their analysis.

The Triple Helix (TH) model has gained widespread popularity in academia as a way to analyze an industry. The model, suggested by Leydesdorff and Etzkowitz (Etzkowitz & Leydesdorff, 2000; Leydesdorff, 2003; Leydesdorff & Etzkowitz, 1996), suggests that three sectors (helices)—university–industry–government (UIG)—

communicate with one another and can assimilate one another's value sets, orientations, and goals. For instance, universities adapt to changing environments by coordinating their functional and institutional roles (Etzkowitz & Leydesdorff, 2000) and by assimilating industry or government roles. This trend is referred to as the "entrepreneurial university" (Leydesdorff & Meyer, 2003, p. 196).

Using the TH model, Park and Leydesdorff (2010) analyzed the effects of national science and technology (S&T) policy initiatives on UIG collaboration in South Korea, focusing on global competitiveness. They found that the policy assessed Korean scientists' performance based on the number of international papers published, not on the level of cooperation between academic, private, and public domains, and that this change in evaluation methods discouraged interinstitutional UIG collaboration (Shapiro, 2012; Shapiro & Park, 2012; Shapiro, So, & Park, 2010).

In the analysis of the TH structure, the relationships between domestic innovation systems and globalization have become more important (Popkin, 2006). Kwon, Park, So, and Leydesdorff (2012) reported that Korea's global R&D benefitted from increased international research co-authorship efforts because both universities and industries collaborated with foreign researchers between 1968 and 2009. However, they also found that the domestic university–industry bond started to decline in the 2000s. These findings demonstrate an intensifying shift from national innovation systems to international ones.

Khan, Cho, and Park (2012) employed the well-known case of Edinburgh (the U.K.) as an example by analyzing its online presence through the TH model and found that, in comparison to Daegu City (Korea), Edinburgh illustrated harmonious UIG development in the music industry, was fully integrated into both local and international industries, and attracted diverse domains over the internet.

In addition, although the central government's policy goals tend to be established at the national level, their implementation is often conducted in regional clusters. In the case of food clusters in Rogaland, Norway, municipal and regional authorities cooperated to support the food industry through projects involving ecological food and micro algae (Asheim & Coenen, 2005). Similarly, in Scania, Sweden, a cross-disciplinary research center was established in the form of a networked regional innovation system. The project focused on optimizing logistics and quality. More specifically, it designed and implemented the whole cold chain from food producers to restaurant catering (Asheim & Coenen, 2005). Lee, Kim, and Lee (2009) examined the "Food Valley" cluster in the Netherlands, which was based on a UIG network initiated by a university. Wageningen University and Research Centre (WUR) coordinated R&D, and medium-sized local firms with innovative food technologies cooperated directly with WUR to form an innovative learning community.

Drawing on previous studies, this study investigates the case of Foodpolis, whose vision is to be the "Northeast Asian food market hub" (Foodpolis, 2011). It is an "R&D-based national food cluster" created by the Korean government and is supported by and located in Iksan City, Jeonbuk Province. Planning of the site was completed in 2010, and construction began in 2011, which means that the project was in its initial stages as of January 2012. Organizers plan to have the 2,390,000 m^2 national food complex built on the site by 2014. In the long term, the Korean government plans to construct a large agricultural production and food-processing complex by 2020 (Foodpolis, 2011).

Following Foodpolis (2011), this study defines the "national food cluster" as a "government-led cluster created in a specific area" to strengthen regional industrial innovation and promote benefits of integration and collaboration between researchers, industries, and governments.

2.2. Theories of regional innovation systems

Industrial clusters generate competitive regional innovation systems (RISs) because of their ability to reduce costs, induce positive externalities from networking, and facilitate knowledge sharing. These benefits