Spices of the future: Forecasting the future of food retailing and distribution with patent analysis techniques

15

Daniel Boller[1,2] *and Johanna F. Gollnhofer*[1,3]
[1]Institute for Customer Insight, University of St. Gallen, Switzerland, [2]Stanford Graduate School of Business, Stanford, CA, United States, [3]Institute for Marketing and Management (Consumption, Culture and Commerce), University of Southern Denmark, Odense, Denmark

15.1 Introduction

Food retailing is a vibrant and highly competitive industry (Colla, 2004). Besides consumer-driven initiatives (for instance "slow food" (Sebastiani, Montagnini, & Dalli, 2012; Tencati & Zsolnai, 2012; Chaudhury & Albinsson, 2015)) or community-supported agriculture (Thompson & Coskuner-Balli, 2007), technological advances challenge the food retailing industry. For instance, Amazon is about to revolutionize the retail sector with automatic checkout ("Amazon Go") in grocery stores, providing Amazon with a competitive edge. These technological advances do not literally fall from the sky, but are developed over the years by companies, research institutions, and other stakeholders in the marketplace. Patents materialize those technological advances on paper and can be used to study these technological advances. For instance, already in 2012, Amazon had applied for patents which substantiate the basis for Amazon Go (Dwarakanath, Blakey, Casteel, & Cooper, 2012).

In 2015 alone, 42,991 patents, representing major technological advances (such as bioprinting for food products; Gatenholm, Backdahl, Tzavaras, Davalos, & Sano, 2010) with specific regard to food retailing and distribution were registered. Understanding such technological advances has been shown to be vital for the long-term success of businesses (Fabry, Ernst, Langholz, & Köster, 2006; Rust & Espinoza, 2006). However, anticipating and forecasting such technological advances is difficult since they are characterized by a high degree of uncertainty and complexity (Lee, Yoon, Lee, & Park, 2009; Lee, Yoon, & Park, 2009) and often lack common understanding and comprehension among practitioners and researchers. Building on this, the current research provides not only a holistic overview of the most relevant techniques in analyzing patent data, but, most importantly, shows how patent analysis techniques can be applied to allow business practitioners to assess future trends in the food retail market.

Case Studies in Food Retailing and Distribution. DOI: https://doi.org/10.1016/B978-0-08-102037-1.00015-3

Patents, patent applications, and utility models (hereafter patents) offer crucial insights into how technologies in a specific field will develop and advance by mapping out available and future technologies (i.e., current R&D activities). Patents can be seen as a representation of R&D development in a specific field of interest as they officially record and institutionalize technological advances (Danneels, 2004). In other words, patents outline the development of (new) technologies, which in turn are likely to affect whole industries and related business practices. Research that relies on patent analysis techniques provides crucial insights into future developments: For instance, Daim, Rueda, Martin, and Gerdsri (2006) analyzed patents in the field of "fuel cell", "food safety" and "optical storage" technologies in order to forecast emerging technologies. Tseng, Lin, and Lin (2007) analyzed patents of the National Science Council Taiwan (i.e., the government agency that sponsors research activities in Taiwan) to detect the core areas of research and development across different sectors and industries. Lee et al. (2009) examined "RFID" (radio-frequency identification) patents yielding to technology-driven strategy assessments for companies.

Recent methodological developments offer innovative avenues to explore technological advancements via patent analysis. The application of these technological advancements in the food retailing industry lies at the core of this book chapter. The chapter proceeds as follows: first, we provide a brief overview of the most recent patent analysis techniques in order to identify technological advances that will drive the future of food retailing. Second, two case studies in the food retailing industry illuminate how patent analysis techniques can be applied in order to detect future technological trends in the food retailing industry. Finally, we summarize the results, outline future potential for the food market based on the applied methods, and stress the implications for practitioners in their strategic decisions.

15.2 Patent analysis techniques

This section explains in colloquial terms trend analysis techniques for patent data with a focus on (1) trend detection and analysis and (2) content analysis. We outline the basic mechanisms to allow business analysts in the food retailing industry to study, investigate, and analyze patent data in order to uncover future trends. The goal of this section is to provide a basic understanding of the most relevant approaches.

15.2.1 Trend detection and analysis

There are two concepts to trend detection and analysis, namely internal and external. The concept of internal trend detection derives relevant trends solely on a specific patent database. Three core concepts can be distinguished. First, patents are grouped and categorized based on topic modeling techniques and are modeled as time series (based on the publication date of the patent) in order to identify

promising and emerging trends within the set of patents in an explorative way. Second, patents are grouped and categorized by patent applicants or inventors and modeled as time series to identify promising and emerging technology leaders within the set of patents. Third, patents are weighted by their relative importance (according to their citations and references by other inventions) in order to identify which patents lie at the nexus of R&D activities and drive technological development in a specific field of interest.

The concept of external trend detection builds on an existing understanding in the area of interest, whereby two core concepts can be distinguished. First, publicly available information (e.g., within newspaper articles, blog posts, etc.) are collected and analyzed with respect to a specific field of interest. The resulting potentially relevant topics are linked to available patent data in order to validate their relevance against actual technological developments. Second, a panel of experts is interrogated with respect to their perception of relevant trends in a specific field of interest, resulting in a set of potentially relevant topics. These potentially relevant topics are linked to available patent data in order to assess their relevance against actual technological developments.

15.2.2 Content analysis

Content analysis techniques do not allow for predictions, but display the status quo of a specific technology. Content analysis techniques provide an initial understanding of patents and, thus, may serve as the basis for the above-outlined concepts of external and internal trend detection (Wanner et al., 2008). Two concepts of content analysis can be distinguished. First, frequent term analysis offers crucial initial insights into patents within a specific field of technologies by showing which terms (or phrases) occur frequently in those patents (see, for example, Schecter & Mortinger, 2013; Tseng et al., 2007). Second, sentiment analysis (based on a predefined set of words or phrases; e.g., Akhondi et al., 2016) or machine learning methods (e.g., Kim, Suh, & Park, 2008) allow for patent data to be structured based on textual information and for higher order categories to be derived, which finally can be used to assess the most relevant topics.

The presented techniques constitute the basis of patent analysis approaches. Depending on the research questions and the study objectives, the different patent analysis techniques can be applied simultaneously, consecutively, and in combination. The following two case studies serve as hands-on illustrations of patent analysis techniques with the objective to provide novel insights into the future of food retailing.

15.3 Case studies

15.3.1 Case study 1

The aim of case study 1 is to show how future trends in the field of food retailing can be derived based on external information and patent data (i.e., external trend

detection). In particular, we first identified a set of potentially relevant trend indications based on external information (i.e., newspaper and website articles), and, second, linked those trend indications to patent data. This process assures the validity of the trend indications.

In the first step, we obtained 768 newspaper and website articles (published in the period from January 2016 to December 2016) via LexisNexis, with specific regard to future trends in food retailing (search term: "future food retailing"). The collected newspaper and website articles included the name of the publishing house, publication date, headline, publication type, publication language, and publication texts. Based on term frequency analyses of the publication texts, we identified and defined a set of nine trend indications (see Fig. 15.1). The abscissa indicates the percentage of how often a trend indication was mentioned across all the collected newspaper and website articles.

The derived set of trend indications set the stage for the following patent analysis, which was based on 75,075 patents, patent applications, and utility models dealing with "retailing" (published in the period between January 1899 and October 2016; requested via the European Patent Office). The collected patent data included the publication number, publication date, title, abstract, description texts, International Patent Classification (IPC), applicants, and inventors for each of the patents. The subsequent analysis relied on the abstracts of each patent given that the patents' abstracts reflect the most relevant aspects of the invention.

First, building on the corpus of 75,075 patents, we extracted those patents which explicitly referred to the previously derived set of nine trend indications (based on key term extraction procedures for the respective nine trend indications; e.g., smartphone: patents including the phrase/term "mobile device," "mobile phone," "cellphone," or "smartphone") and that were published between January 1990 and December 2015, finally resulting in a set of 24,066 patents. Second, we aggregated

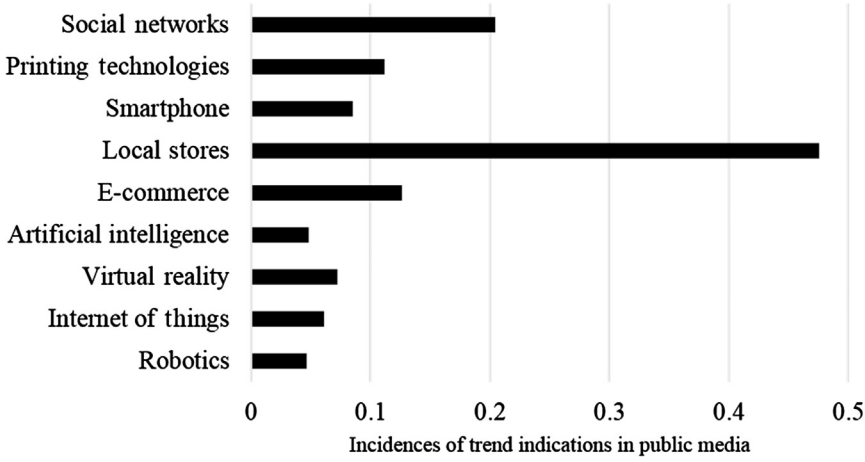

Figure 15.1 Incidences of trend indications in public media.

the number of patents per trend indication and month (based on the publication date of the patents) to control for divergent dates of disclosure among the patent and trademark offices. This procedure resulted in nine-time series (i.e., the number of monthly issued patents for each trend indication during the entire time period). Third, we applied the unobserved components model (UCM) (Harvey, 1989) to forecast the future development of the previously identified trend indications (forecasting period: 4 years; January 2016−December 2019). Finally, we calculated the growth factor for each of the nine trend indications (i.e., (monthly) average number of patents that are expected to be published within the next 4 years divided by the (monthly) average number of patents that were published during the last 4 years). The results show us which trend indications are supposed to be relevant in the future of food retailing and merit explicit attention from a technology perspective (compare Fig. 15.2).

Patent analysis techniques offer valuable insights into the future of an industry and offer guidance to top executives. By juxtaposing those results with the current trend indicators (compare Fig. 15.1), we argue that managers need to make a mental shift from current topics to future topics. Future topics and trends might not be so prominent in public media right now, but our patent analysis indicates a significant shift in some areas. According to our results, the "internet of things," "robotics," "e-commerce," and "printing technologies" (i.e., food printing technologies) are the four biggest trends that will shape the retailing industry in the future. However, local stores and social media seem to lose traction. This does not mean that they become irrelevant but only that innovation pace loses traction in those domains.

Next, we will turn to those domains where we expect—according to our results—major changes, challenges, and opportunities:

- The "Internet of Things"—referring to objects exchanging data with other objects—will provide the technology for developing decentralized, integrated, networked, and adaptive

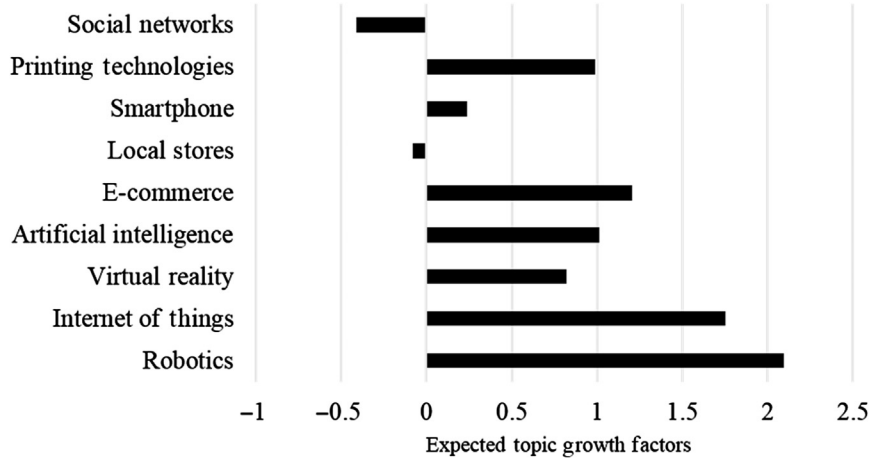

Figure 15.2 Expected topic growth factors.

order options for customers. For instance, Walmart (the US retailer) developed a technology, which aligns different channels (i.e., omnichannel management). This technology puts the consumer in the center of interest and organizes the different channels around the consumer (Natarajan & High, 2015).

- "Robotics" will improve food storage by replacing established inventory systems with intelligent and integrated robotic systems (a network of supply and demand resources). Moreover, robot technologies are expected to revolutionize distribution channels through autonomous agents, such as vehicles and drones. For example, Zume Pizza (American pizza baker) developed a technology, which allows pizza delivery by drones and, thus, has replaced traditional delivery channels (Garden, 2013).
- E-commerce technologies remain a relevant topic in the food retailing industry since e-commerce technologies lie at the nexus of retailer−consumer interactions in our increasingly digital world. Those technologies allow for improving pricing strategies (e.g., Mohapatra, Sahu, Chowdhury, & Panda, 2012) and for seamlessly aligning online and offline distribution channels (e.g., Chelly, Levi, Dekel, & Menipaz, 2013).
- Finally, in our analysis, we identified printing technologies as a driver in the retail industry. Printing technologies for food, including, but not limited to, 3D techniques or composition of ingredients, will change food retailing as well as the food consumption habits of consumers. For example, Natural Machines (a Spanish technology company) developed a 3D printer, which allows the consumer to create food items (e.g., cookies) at home (Kuo et al., 2013).

Understanding and developing these four technologies in-depth is expected to be crucial for companies and managers as it may influence competitive advantage and consolidation within the industry. It is noteworthy to mention that not all topics that receive a lot of "buzz" in our current times are expected to grow in the future (for instance, social media). Such insights might allow managers to reschedule their priorities.

15.3.2 Case study 2

The objective of case study 2 was to gain a better understanding of future consumer-centric retail technologies without any preexisting knowledge (internal trend detection). The analysis was based on 412,078 patents, patent applications, and utility models dealing with "food" (published in the period between January 1893 and November 2016; requested via the European Patent Office). The collected patent data included the publication number, publication date, title, abstract, description texts, IPC, applicants, and the name of inventors for each of the patents. The subsequent analysis relied on the abstracts of each patent given that the patents' abstracts reflect the most relevant aspects of the invention. We narrowed our dataset by focusing on those patents that explicitly referred to consumer-centric retail technologies (based on key term extraction: "consumer," "buyer," and "shopper"). In order to capture the most recent status of the field, we grounded the analysis in patents that were published between January 2010 and December 2015 (based on the publication date), leaving us with a set of 463 patents for further analysis. We applied topic modeling techniques to the patents in order to obtain a set of topics (i.e., terms or phrases which occur in thematically or temporally related contexts

and can be grouped into higher order topics). The latent Dirichlet allocation (LDA) algorithm (i.e., three-level hierarchical Bayesian model; Blei, Ng, & Jordan, 2003) allowed us to detect the main topics within the patents (i.e., the patents' abstracts). In LDA algorithms "each item of a collection is modeled as a finite mixture over an underlying set of latent topics. Each observed word originates from a topic not directly observable. Each topic is, in turn, modeled as an infinite mixture over an underlying set of topic probabilities." (Blei et al., 2003, p. 993).

The number of topics (10) was determined by maximizing the log likelihood values for a prespecified number of 1−100 topics (Griffiths & Steyvers, 2004; Hornik & Grün, 2011). Following this, the LDA algorithm computed term to topic ratios for each of the 10 topics. We opted for a two-step approach in order to summarize the terms that were assigned to each topic. In the first step (Step I), 29 participants ($M_{Age} = 33.38$, $SD_{Age} = 10.32$, and female = 51.72%; recruited from an online panel) were presented with the derived terms assigned to each topic and asked to propose a name for each of the 10 topics. In the second step (Step II), 32 participants ($M_{Age} = 32.84$, $SD_{Age} = 8.91$, and female = 25.00%; recruited from an online panel) rated which of the 29 proposed names from Step I best characterizes the terms assigned to each of the 10 topics. We took the proposed names with the highest approval rate to name the 10 topics.

Finally, we applied the UCM method to forecast the future development of the previously derived trends (see Table 15.1) for the following 4 years (January 2016 until December 2019). The UCM method allows us to predict the number of patents for each of the 10 topics. As in case study 1, we calculated the growth factor for the 10 topics (i.e., (monthly) average number of patents that are expected to be published within the next 4 years divided by the (monthly) average number of patents that were published during the last 4 years). Fig. 15.3 displays the trends that are supposed to shape the future of retailing and related R&D activities.

Our results indicate the future trends of customer-centric retail technologies. As such, they offer first indications to managers in terms of allocation of human, monetary, and material resources. The most important trends should be addressed. First,

Table 15.1 Topics and example terms of topics

Topic	Example terms
Customer services	Cloud, self-service, and wireless
Food production	Fresh, instant, and vegetable
Storage technologies	Contain, chamber, and portion
Human physical comfort	Need, health, and diet
Order/Information services	Phone, menu, and mobile
Organization/Inventory	Reorder, inventory, and reusable
Marketing/Information issues	Develop, advertise, and marketing
Delivery technologies	Transport, configure, and move
Hardware technologies	Device, automat, and machine
Kitchen technologies	Cook, cabinet, and box

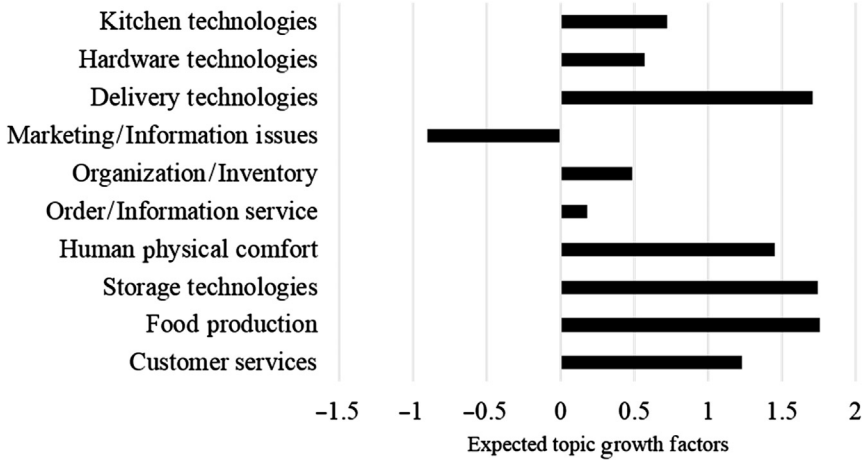

Figure 15.3 Expected topic growth factors.

food production technologies are found to be a driver for future food retailing, including, for example, in-store and local as well as fresh production technologies. For example, Restaurant Technologies (a US company) developed an RFID-based technology that automatically monitors food items (e.g., in a restaurant) and creates automatic orders or even produces the food itself (Schackmuth & Sus, 2006). Second, storage technologies, like intelligent food portioning and packaging systems are suspected to play a major role in future food retailing. For example, Kraft Foods (the US food production company) developed an intelligent food packing systems, which allows consumers to cook instant food items without unpacking them (Raymond et al., 2006). Third, food delivery, including local or at home production systems and transport infrastructures (e.g., drone delivery) constitute, as already outlined in case study 1, a major pillar in current and future R&D activities, and are suspected to shape the way in which retailers interact with customers and food producers.

15.4 Discussion and future research

In this chapter, we have demonstrated how patent analysis techniques allow managers and researchers to shift their focus from contemporary topics (such as social media) to future trends that are supposed to shape significantly the food retailing industry. Patent analysis techniques offer a competitive edge in highly competitive and vibrant industries as they allow managers not only to make judgments and decisions based on their gut feeling, but based on rigorous analysis. According to our analysis, topics that are highly relevant this year in food retailing, such as social media, will lose relevance, whereas other topics, such as robotics, will be of paramount importance for the food retailing industry (compare case study 1).

Moreover, the production, storage, and delivery of food products are shaped by major technological advances in the near future (compare case study 2). Our analyses offer first valuable insights into the trends in the retailing industry. These trends could constitute the basis for further research that might focus on one specific trend and explore this trend in-depth (through qualitative as well as quantitative approaches).

Besides this, the chapter also offers insights into patent analysis techniques by outlining relevant methodological approaches in the area of patent analysis and by applying those in two case studies in the food retailing industry. In case study 1, we illustrated the concept of external trend detection, which draws on public media coverage. We link these insights with patents in order to identify relevant technology trends in the food retail industry. In case study 2, we employed the concept of internal trend detection that identifies a set of topics within a given patent database (through topic modeling techniques). Both the external and internal trend detection approaches allow us to forecast the future developments of the identified topics in the food retailing industry.

We argue that patent analysis techniques constitute a major competitive advantage in the food retailing industry as they allow practitioners to evaluate future business opportunities based on a technology perspective. Both internal and external trend detection represent essential approaches for business analysts in order to identify future trends in their defined field of practice. Once the understanding for future trends is created, subsequent strategic decisions regarding the company's future can be considered and implemented. This understanding does not only allow for an assessment of promising future market technologies, but also constitutes a major advantage in the rapidly consolidating food retailing industry as potential merger and acquisition (M&A) activities can be evaluated against the identified trends or with regard to relevant technology leaders.

The presentation of the applied patent analysis approaches in this research work can be seen as an introduction for business analysts who are interested in future perspectives and trends in the food retailing industry. Thus, this book chapter not only provides insights with regard to future perspectives and trends in the food retailing industry, but also introduces a powerful tool that opens up more advanced and nuanced ways of investigation into the future compared to common market research and trend analysis techniques.

The following steps provide guidance for implementing and applying patent analysis in the food retailing industry:

1. *Definition of Purpose*. The main power of patent analysis is to draw meaningful conclusions (e.g., definition of future market trends or segments) from a technology perspective for a defined topic of interest. Thus, it is important to develop an initial scope and goal for the envisioned patent analysis. These goals might refer, for example, to considerations of novel market segments, product developments, M&A activities, or food distribution channels. Based on the defined goal, practitioners should assess the different possible patent analysis approaches, that is, external trend detection or internal trend detection. Following this, a relevant cluster of technologies, industries, patent applicants, or regions for the analysis purposes has to be selected.

2. *Data*. Patent data constitute an integral part of the analysis. Patent data can be retrieved from public patent and trademark authorities (e.g., United States Patent and Trademark Office, European Patent and Trademark Office, or World Intellectual Property Organization), although it should be noted that those platforms work with different search parameters and modalities. Finally, the obtained patent data should be verified with regard to data consistency and correctness.
3. *Analysis and Modeling*.
   a. Data Preparation. The most relevant variables are represented by the applicant/inventor/assignee, publication/filing/priority date, patent text (title, full text, and abstract of the patent), citations, publication/patent number, and the responsible patent and trademark authority. The textual information has to be prepared for further analysis by applying text preparation procedures.
   b. Data Analysis. The prepared data can be analyzed using longitudinal or cross-sectional analysis procedures. The relevant variables, models, and model parameters have to be set in accordance with the general analysis purpose and available variables.
4. *Verification*. The results of the analysis have to be checked in order to ensure the results' overall validity. The verification includes, for example, the modification of sensitive model parameters and scenario-based model applications.
5. *Interpretation and Preparation*. Finally, the results of the analysis should be interpreted and presented in a practical way to make the results accessible and visible to the targeted audience (i.e., to make findings applicable to a defined business strategy).

Patent analysis techniques are an emerging methodological toolbox that promise to deliver intriguing results about future developments; thus, they are a perfect supplement to established market research activities for companies operating in the retail industry.

References

Akhondi, S. A., Pons, E., Afzal, Z., van Haagen, H., Becker, B. F. H., Hettne, K. M., … Kors, J. A. (2016). Chemical entity recognition in patents by combining dictionary-based and statistical approaches. *Database*, *2016*, 1−8.

Blei, D. M., Ng, A. Y., & Jordan, M. I. (2003). Latent Dirichlet allocation. *Journal of Machine Learning Research*, *3*(1), 993−1022.

Chaudhury, S. R., & Albinsson, P. A. (2015). Citizen-consumer oriented practices in naturalistic foodways: The case of the slow food movement. *Journal of Macromarketing*, *35*(1), 36−52.

Chelly, Y., Levi, O. S., Dekel, T., & Menipaz, A. R. (2013). *Online and offline ecommerce connections*. U.S. Patent No. US20140279013 A1. Washington, DC: U.S. Patent and Trademark Office.

Colla, E. (2004). The outlook for European grocery retailing: Competition and format development. *The International Review of Retail, Distribution and Consumer Research*, *14*(1), 47−69.

Daim, T. U., Rueda, G., Martin, H., & Gerdsri, P. (2006). Forecasting emerging technologies: Use of bibliometrics and patent analysis. *Technological Forecasting and Social Change*, *73*(8), 981−1012.

Danneels, E. (2004). Disruptive technology reconsidered: A critique and research agenda. *Journal of Product Innovation Management*, *21*(4), 246−258.

Dwarakanath, S. H., Blakey, S. W., Casteel, B. R., & Cooper, B. J. (2012). *Inventory system with climate-controlled inventory*. U.S. Patent No. US9185998 B1. Washington, DC: U. S. Patent and Trademark Office.

Fabry, B., Ernst, H., Langholz, J., & Köster, M. (2006). Patent portfolio analysis as a useful tool for identifying R&D and business opportunities—An empirical application in the nutrition and health industry. *World Patent Information*, *28*(3), 215–225.

Garden, A. J. (2013). *Systems and methods of preparing food products*. U.S. Patent No. US9292889 B2. Washington, DC: U.S. Patent and Trademark Office.

Gatenholm, P., Backdahl, H., Tzavaras, T. J., Davalos, R. V., & Sano, M. B. (2010). *Three-dimensional bioprinting of biosynthetic cellulose (BC) implants and scaffolds for tissue engineering*. U.S. Patent No. US8691974 B2. Washington, DC: U.S. Patent and Trademark Office.

Griffiths, T. L., & Steyvers, M. (2004). Finding scientific topics. *Proceedings of the National Academy of Sciences of the United States of America*, *101*(1), 5228–5235.

Harvey, A. (1989). *Forecasting, structural time series models and the Kalman filter*. Cambridge, NY, USA: Cambridge University Press.

Hornik, K., & Grün, B. (2011). Topicmodels: An R package for fitting topic models. *Journal of Statistical Software*, *40*(13), 1–30.

Kim, Y. G., Suh, J. H., & Park, S. C. (2008). Visualization of patent analysis for emerging technology. *Expert Systems with Applications*, *34*(3), 1804–1812.

Kuo, C. J., Huang, S. H., Hsu, T. H., Rodriguez, L., Olivé, X., Mao, C. Y., … & Delgado, V. (2013). *Apparatus, method and system for manufacturing food using additive manufacturing 3D printing technology*. U.S. Patent No. US20160135493 A1. Washington, DC: U.S. Patent and Trademark Office.

Lee, S., Yoon, B., Lee, C., & Park, J. (2009). Business planning based on technological capabilities: Patent analysis for technology-driven roadmapping. *Technological Forecasting and Social Change*, *76*(6), 769–786.

Lee, S., Yoon, B., & Park, Y. (2009). An approach to discovering new technology opportunities: Keyword-based patent map approach. *Technovation*, *29*(6), 481–497.

Mohapatra, M. P., Sahu, D., Chowdhury, S., & Panda, D. (2012). *Product pricing in E-commerce*. Patent No. EP2626827 A1. Munich, Germany: European Patent and Trademark Office.

Natarajan, C., & High, D. R. (2015). Retail subscription in internet of things environment. U.S. Patent No. US20170124633 A1. Washington, DC: U.S. Patent and Trademark Office.

Raymond, M. N., Teasdale, A. C., Kwiat, C. L., Forneck, K. D., Pai, S., & Gan, R. (2006). *Packaging system for storage and microwave heating of food products*. U.S. Patent No. US20080063760 A1. Washington, DC: U.S. Patent and Trademark Office.

Rust, R. T., & Espinoza, F. (2006). How technology advances influence business research and marketing strategy. *Journal of Business Research*, *59*(10), 1072–1078.

Schackmuth, G., & Sus, G. (2006). *RFID food production, inventory and delivery management method for a restaurant*. U.S. Patent No. US20070254080 A1. Washington, DC: U.S. Patent and Trademark Office.

Schecter, M., & Mortinger, A. (2013). *Using analytics to generate glossaries in patent applications*. Available from ⟨https://www.uspto.gov/sites/default/files/patents/init_events/swglossary_e_ibm_2013oct03att.pdf⟩ Accessed 09.01.17.

Sebastiani, R., Montagnini, F., & Dalli, D. (2012). Ethical consumption and new business models in the food industry. Evidence from the Eataly case. *Journal of Business Ethics*, *114*(3), 473–488.

Tencati, A., & Zsolnai, L. (2012). Collaborative enterprise and sustainability: The case of slow food. *Journal of Business Ethics*, *110*(3), 345−354.

Thompson, C. J., & Coskuner-Balli, G. (2007). Countervailing market responses to corporate co-optation and the ideological recruitment of consumption communities. *Journal of Consumer Research*, *34*(2), 135−152.

Tseng, Y. H., Lin, C. J., & Lin, Y. I. (2007). Text mining techniques for patent analysis. *Information Processing & Management*, *43*(5), 1216−1247.

Wanner, L., Baeza-Yatesa, R., Brügmann, S., Codina, J., Diallo, B., Escorsa, E., … Zervakig, V. (2008). Towards content-oriented patent document processing. *World Patent Information*, *30*(1), 21−33.