MONTE J. SHAFFER

July 2017

EDUCATION

2011   Ph.D. Marketing, Washington State University, Pullman, Washington USA

Dissertation   Entrepreneurial Innovation: Patent Rank and Marketing Science
Co-chairs   U.N. Umesh (WSU) and Gerry Tellis (USC)
Members   Leonard Jessup and Babu John Mariadoss
Awards   National Science Foundation (NSF) SBIR, Kentucky Innovation Network

I define the intrinsic value of a patent based on citation network analysis. My methodology I have labeled "Patent Rank" in analogy to Google's PageRank algorithm. This more refined measure should supplant the traditional measure (known as forward-citation counts): if not all patents are equal, why would we equally weight every forward citation? My dissertation consisted of four essays. In the first, I demonstrate that Patent Rank is superior to the traditional measure. In the second, I outline a generalized model for Patent Rank and anchor "Entrepreneurial Innovation" studies through the Austrian economic lens. In the third, I create a prediction model to estimate a patent's lifetime value. In the fourth, I demonstrate the financial implications of Patent Rank on firm performance (abnormal market returns).

2011   M.S. Statistics, Washington State University, Pullman, Washington USA

Advisor   Nairanjana (Jan) Dasgupta
Project   Many-to-one comparison of nonlinear growth curves for
            Washington's Red Delicious apple

2006   MBA Marketing, Brigham Young University, Provo, Utah USA

Hawes Dean's Scholar, 720 GMAT, Mensa eligibility

1997   B.A. Mathematics, Brigham Young University, Provo, Utah USA

Minors in Physics and Spanish, Dorm RA (1994-1995)
Two-year religious-service mission to Argentina (1992-1994)
Trustee scholar, Elks scholar, National Honor Society

1991   Columbia Falls High School, Montana USA

4.0 GPA (top in class), Yearbook editor-in-chief, Montana Boys' State (1991),
National Honor Society, Close-up (1990-1991), "Making of an Engineer" Scholar (1990),
Team debate (1989-1990), Montana State Champion (Babe Ruth baseball 1986 & 1988)

ACADEMIC EXPERIENCE

2012 – 2013   **Assistant Visiting Professor of Marketing, Eller College of Management, University of Arizona, Tucson, Arizona USA**

        Courses   Integrated Marketing Communications, Digital Media Marketing

        Reference   Linda L. Price

2011 –   **Research Director, CRIE (Commercialization Research on Innovation and Research), McGuire Center for Entrepreneurship, University of Arizona, Tucson, Arizona USA**

        Duties   Develop a sustainable research data repository based on U.S. Patent data: Commercialization Research on Innovation and Research (CRIE)

        References   Ted McGuire

2007 – 2011   **Marketing Instructor / Teaching Assistant, Washington State University, Pullman, Washington USA**

        Courses   Internet Marketing (Digital Media Marketing), Marketing Research, Strategic Marketing, International Marketing, Principles of Marketing

        Contact   Jeff Joireman

        Project   Promotion Orientation Explains Why Future-Oriented People Exercise and Eat Healthy: Evidence From the Two-Factor Consideration of Future Consequences-14 Scale

WORK EXPERIENCE

1999 – 2003   **Senior Software Engineer, Universal Internet (Carmel, California USA)**
Web application development, internet marketing services (SEO), client services

1995 – 1999   **Math Teacher**

American Heritage School (American Fork, Utah USA)
American Fork High School (American Fork, Utah USA)
Lone Peak High School[1] (Highland, Utah USA)

        Courses   Math 7/6, 8/7, Algebra ½, Algebra I, Algebra II, Geometry, Internet Communications

1990 – 1994   **Client Services, Meadow Lake Golf Resort, Columbia Falls, Montana USA**
Front-desk, golf course, recreation center (pool & spa) [summers]

1988 – 1989   **Cook, Eddie's Café, Glacier National Park, Montana USA [summers]**

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[1] "Start-up" High School, Utah State Math-Standards Development, Participant in design of mathematics high-school exit exam (Contact: Scott Hendricksen)

ENTREPRENEURIAL EXPERIENCE

2011 –   **Owner/Founder Entrepreneurial Innovation LLC (DBA Patent Rank)**
            http://www.patent-rank.com/
1997 –   **Owner/Founder mshaffer.com**
            Innovation, Marketing, and Internet Consulting

HONORS AND AWARDS

2016   **[*$225,000*] National Science Foundation (NSF) small-business-innovation-research (SBIR) grant**
            Award #1620992: From Search to Research with Fast Patent-document Correlations

> *This SBIR Phase I project attempts to address a fundamental question for innovators: is my idea already patented? This do-it-yourself-initially service will empower small-business enterprises with synthesized research of over 10 million patent documents within 10 minutes based on the concepts contained within the idea. Such a comprehensive, real-time, low-cost offering is currently unavailable for small-business entrepreneurs. Current search tools do not synthesize the results into an executive summary, do not allow an entire document to be entered as the search input, and do not perform real-time concept/correlation computations. This proposed innovation will enable the inventor to submit an entire document (the idea) as the search query; then, utilizing network mathematics and artificial-intelligence algorithms, this service will synthesize search results in real-time summarizing what patent documents are most related to the idea based on natural-language processing. Such a service for small-business entrepreneurs would enable them to initially ascertain the novelty of their idea and give them an on-the-go education about the natural language used in patent documents in comparison to their idea. This meta-innovation would objectively ascertain the intellectual-property merit of any proposed technology, enable small-business innovators, and foster the acceleration of innovation development in the United States.*

> *The development of latent semantic analysis (LSA) has enabled algorithm development to extract latent (or hidden) semantic structure from documents addressing two important word-sense ambiguity issues that text-matching search cannot: polysemy (single term with multiple meanings; i.e., strike as to hit [verb], to start up [verb], or to cease working [noun]) and synonymy (multiple terms with single meaning; i.e., car and automobile). Albeit robust, this concept-search approach for large document collections is not tractable due to the high-complexity computational requirements for performing matrix singular value decomposition (SVD) necessary for LSA. Approximation techniques that use subset approaches necessarily introduce some amount of systematic error. To ascertain the most relevant documents in a large collection for a given focal document, this proposed innovation (search-subset LSA) will subset using proprietary search methodologies without any systematic error, reducing both the number of documents to compare and the number of terms to analyze thereby making real-time document correlations possible. The aims of this research are: to identify the optimal subset approach for comprehensive nomological capture of top-correlation candidates, to ascertain optimal input parameters for the focal query document, and to develop a statistical test to confirm that no systematic bias is present in this approach.*

2014   [*$150,000*] **Kentucky Innovation Network grant, Lexington, Kentucky USA**
   Award #160-166: Better Patent Data, Better Patent Analytics
2014   [*$10,000*] **Lexington Economic Development grant, Lexington, Kentucky USA**
2013   [*$180,000*] **National Science Foundation (NSF) small-business-innovation-research (SBIR) grant**
   Award #1315850: Measuring the dynamics of a patent-innovation's intrinsic value using eigenvector network centrality

> *The innovation aims to develop a patent-valuation system that considers the totality of a United States patent's "prior-art" patent-citations. Using network mathematics of eigenvector centrality, a patent's intrinsic value is calculated based on recursively weighting associations between a patent and other patents (its backward and forward citations). This methodology establishes the values of the patents relative to each other so we have a uniform evaluation standard for all patents in the United States Patent & Trademark Office (USPTO). This algorithm has the potential to bring order to the patent-valuation problem. At a particular point in time, every patent within the entire universe of United States patents receives a score which can be ranked in a myriad of ways, such as: within a respective patent portfolio (a firm portfolio, an inventor portfolio, a patent-agent portfolio), within a technology classification (e.g., 705/310: DATA PROCESSING/Intellectual Property Management), universally within the entire network, and so on. Monitoring the diffusion of a patent's marginal score over time (i.e., a patent's Schumpeterian shock) also makes it possible to predict a potential lifetime value of a patent.*
>
> *The broader/commercial impact of this project is to develop an objective metric for the value of patent innovations (i.e., to deliver transparent and objective patent-network dynamics and in the long term become like the credit-rating FICO® score for patents). The successful completion of this project would provide additional tools and products for those engaged in intellectual-property management, specifically the patent holders and other organizations that strive to estimate a patent's current and potential value. This meta-innovation about technology will benefit all facets of commercialization ecosystems, including: identification of viable entrepreneurial opportunities, assessment of internal/external technological venturing, evaluation of patent-assertion prospects, and overall management of radical innovations.*

2012   **American Mensa Inductee, Mensa International, Ltd.**
2010   **American Marketing Association, Sheth Foundation Doctoral Consortium Fellow**
2004   **Hawes Dean's Scholar**
1996   **National Honor Society (college)**
1991   **Elks Scholar**
1991   **Trustee Scholarship (Full-tuition, Brigham Young University)**
1991   **Academic Scholarship (Half-tuition, George Washington University)**
1991   **National Honor Society (High school)**
1990   **Yearbook Scholar (Summer Program, Utah State University)**
1989   **"Making of Engineer" Scholar (Summer Program, University of Denver)**

RESEARCH INTERESTS

I study marketing implications of innovation. In my research, I commonly use patent data to understand the strategic implications of Intellectual Property at the firm and societal level. A fundamental question of my research is who creates market-driving radical innovations?

- Innovation: value to firm/society, adoption, diffusion, origins, strategic planning, public policy, institutional friction, knowledge stocks and diffusion, cannibalization vs. shelving.
- Entrepreneurship: Schumpeter vs. Kirzner, entrepreneurial proclivity, strategy and outcomes.
- Patent-network dynamics: Citation analysis, actor-relationships (degrees of separation), …

Working papers

"Patent Rank: Measuring Network Dynamics" (lead author with U.N. Umesh, Gerry Tellis, Gianna Del Corso, and Francesco Romani); preparing invited resubmission to *Marketing Science*.

"Predicting a patent's lifetime value using Patent Rank" (lead author with Len Jessup, U.N. Umesh); preparing invited resubmission to *Journal of Business Venturing*.

Works in progress

 "Global Innovation: Identifying Innovation Hotspots" (with Nita Umashankar and U.N. Umesh)

"Trajtenberg's value of innovation: 25 years later" (lead author)

"Comparing Kirzner's Entrepreneur to Schumpeter's Entrepreneur: The Texas Two Step" (lead author)

"Blue Ocean Innovations: Implications for economic development" (lead author)

"Leveraging Capabilities for New Product Development: How Emerging Firms Succeed in Biotech" (with Andrew Gallan and Rakesh Niraj); *Marketing Science (Boston 2012)*

"Does IS foster distributed innovation? Lessons learned from inventorship in patented technologies" (with Amar Gupta and Avi Datta)

"Acquiring a Genius Inventor: Assemblage Theory within Biotech" (with Sangeetha Venkataramani and Linda L. Price)

"Hurricane Katrina: Volatility of Wholesale Gas Prices in St. Louis Missouri" (lead author)

"Make versus Buy: Marketing Rationale as a Basis for Entrepreneurs' Outsourcing Decisions" (lead author with Harry Khamis and Len Jessup and U.N. Umesh)

 "Fast Patent-Document Correlations using n-gram (un)common searching and subset LSI" (lead author with Orion Fisher and Tung Tran)

"Mathematical Equivalence of PageRank and Patent Rank: boundary conditions" (with Mirek Truszczynski)

"Controlling for citation gaming with a multi-actor network: the N-class Patent Rank model" (lead author with Gianna Del Corso and Francesco Romani)

"Patent-network Record Linkage: Utilizing network informatics to identify examiners, inventors, and firms" (lead author with Mirek Truszczynski and Tung Tran)

PRESENTATIONS

"Is My Idea Patentable?"

(Kentucky Inventors Council, Lexington, Kentucky, July 2017)

"Internationalizing Innovation: Does Lone Genius Matter?"

Duke University Fuqua (Durham 2015)
Nazarbayev University, Graduate School of Business (Astana, KZ 2016)

"Patent Rank: Measuring Network Dynamics"

Marketing Science (Houston 2011), Marketing Science (Boston 2012), Michigan Tech University, Central Michigan University, University of Arizona faculty, University of Arizona Eller College of Management National Board of Advisors, Duke University

"Predicting a patent's lifetime value using Patent Rank"

Marketing Science (Boston 2012)

"Identifying Schumpeterian Shocks and Kirznerian Competition using Patent Rank"

Patent Statistics Conference for Decision Makers (OECD, Paris, 2012)

"Patent-data Repository: CRIE"

Marketing Science (Houston 2011), Marketing Science (Boston 2012), Mergent, Infogroup

"Historic Innovation"

Mergent, Princeton, New York Public Library (December 2014)

Firm-specific implications of Patent Rank

RCT (Founder/CEO, multiple presentations)
Emerson Network Power (CEO / CIO, multiple presentations)
Core Logic Data (CEO)

Conferences

- Conference on Intellectual Property and Innovation, Kauffman Foundation and Searle Center on Law, Regulation, and Economic Growth at Northwestern Law, Chicago
- Patent Statistics Conference for Decision Makers
- AMA Conference
- Marketing Science Conference

PUBLICATIONS

Patent Applications

US 20120317041   Patent Value Calculation (with Gianna "Maria Del Corso, Francesco Romani)

1. A method of calculating a value of a patent, comprising: identifying a forward citation and a backward citation of a first patent, the forward citation being a citation in a second patent to the first patent, the backward citation being a citation in the first patent to a third patent; weighting at least one of the forward and backward citations; and calculating a value of the first patent based at least in part on at least the weighted forward citation or the weighted backward citation. […]

US 20120317040   Patent Value Prediction

1. A method of predicting a potential value of a patent, comprising: calculating a plurality of patent values for a patent, each of the plurality of patent values comprising the patent value of the patent at a respective point in time; and generating a predicted potential value of the patent based at least in part on the plurality of patent values, the predicted potential value of the patent at least partly representing a future value of the patent. […]

Research Articles

2016   Monte J. Shaffer, Kevin Chastagner, and U.N. Umesh (2016). Internationalizing-Innovation Profiles and High-Technology Exports: Does Lone Genius Matter? *Journal of International Marketing,* 24(3), 98-120.

2012   Jeff Joireman, Monte J. Shaffer, Daniel Balliet, and Alan Strathman. Promotion Orientation Explains Why Future-Oriented People Exercise and Eat Healthy: Evidence From the Two-Factor Consideration of Future Consequences-14 Scale, *Personality and Social Psychology Bulletin* October 2012; vol. 38, 10: pp. 1272-1287.

2012   Nairanjana (Jan) Dasgupta, Monte J. Shaffer. Many-to-one comparison of nonlinear growth curves for Washington's Red Delicious apple, *Journal of Applied Statistics* vol. 39, 8: pp. 1781 - 1795.

Databases

CRIE   Commercialization Research on Innovation and Entrepreneurship
                  (see http://crie.org)
            Analogous to CRSP (University of Chicago), the purpose of CRIE is to make patent-innovation
            data more readily available to the academic community using a query/panel interface.

                  Partner: Kauffman Foundation ($25,000 grant for R&D at the University of Arizona)
                  Partner: Mergent, Inc. (Server and hosting)

Archives   Patent Archives
                  (see http://patentarchives.patent-rank.com/)

                  Partner: Mergent, Inc.

1828   First Dictionary of American Langauge
                  (see http://1828.mshaffer.com/)

PERSONAL INTERESTS

I enjoy sports (basketball and golf – 10 handicap); meaningful discussions on innovation, history, and cultural perceptions; and a quick game of chess (Blitz rating – 1750).

Languages: English (native), Spanish (proficient), Russian (novice)

Adhoc reviewer: Marketing Science (technical reviewer), Journal of Service Research, Journal of Statistical Computation and Simulation, Journal of Applied Statistics

Affiliations: AMA, ASA, Mensa