NC11083

Social network analysis of the music industry: from barrel organ To Youtube

Peter Goodrich
Providence College

Stan Renard
University of Connecticut

Nancy Rossiter
Jacksonville University

Abstract

The music recording industry exhibited minimal, slow, gradual change in the first century. The last fifty years has shown a more rapid acceleration paralleling the quickening technological change. The music recording industry exhibited minimal, slow, gradual change in the first century. The last fifty years has shown a more rapid acceleration paralleling the quickening technological change. This paper will employ traditional historical analysis amplified and and enhanced by Social Network Analysis (SNA) to identify and highlight the important linkages among technological developments in the global music industry. All Social Network Analysis graphics have been derived using the SNA open source software ORA designed by Kathleen M. Carley , copyright 2001-2009, Center for Computational Analysis of Social and Organizational Systems (COPAS), School of Computer Science, Carnegie-Mellon University.

Keywords: Social Network Analysis, Music, Recording Industry, Music Technology, Digital Technology

NC11083

Introduction

The music recording industry exhibited minimal, slow, gradual change in the first century. The last fifty years has shown a more rapid acceleration paralleling the quickening technological change. This paper will employ traditional historical analysis amplified and and enhanced by Social Network Analysis (SNA)..

Music Reproduction Technology Development: 1877 TO 2010

For the past 133 years, there has been a constant technological development of music reproduction. Technology has shifted from analog to digital sound recording. Over the past century, music recording and playback has developed from Thomas Edison's 1877 tin cylinder speaking-recording tubular phonograph, Emil Berliner's 1887 flat disk playback-only gramophone, the Victrola, 33 1/3, 45, 78 shellac then vinyl records, reel-to-reel, 8-track, and cassette tapes, compact disk, DAT, and MP3. (Coleman, 2005, p. *xix*)

The technological changes also coincided with a battle between artists, record companies, and consumers over the payment distribution for listening to recorded sound. Paul Israel stated that Edison failed to capitalize on his invention in the long run because he did not recognize how vitally important the quality of the artists and not just the technology were. (Coleman, 2005, p. 10)

This growth of technology is not necessarily an improvement in sound quality The "good-enough" consumer principle overrules excellence if ease of use is also considered.

Let us consider the approaches of several musicians as a response to the emerging technological changes in music recording and distribution.

In the past two decades, computer technology has shifted the knowledge capital from the major music producers first to smaller independent producers and finally to the artists themselves. No longer does the culture require artists to be beholden to the larger music studios and distribution networks. Internal costs shifts in high quality CD recording has made it possible for individual musicians to record their own CDs and distribute them via the world wide web. This cost shifting has placed great strain on the "music industry" (major record labels). Large music producers have had to recognize the competition from smaller firms and individual artists. As a result, many contractual concessions have had to be made to artists which were unthinkable thirty years ago when major record producers monopolized music production and distribution. This paper will dissect these cost changes over the past half century and provide illustration of changing contracts and record deals. It will also examine the changing culture of musicians who no longer feel the urgent need to sign a contract under duress with onerous provisions deleterious to their interests.

Social Network Analysis

We have compiled the major changes in the music industry over the past 150 years and incorporated them in the social network analysis model derived from ORA. (Carney 2001-2009) The data for the

model is included in Table 1.

Table 1. Technological Developments Since the Fifteenth Century

ID.	TECHNOLOGY DATE
1	Barrel Organs 15th century
2	Musical Clocks 1598
3	Barrel Pianos 1805
4	Musical Boxes 1815
5	Telegraph 1832
6	Scott Phonautograph 1856
7	Reis loudspeaker 1861
8	Bell Telephone 1876
9	Berliner Microphone 1876
10	Player Piano 1876
11	Edison Carbon Microphone 1877
12	Edison Cylinder Phonograph 1877
13	Edison Electrostatic Coupling 1885
14	Berliner Lateral-cut disc records 1888
15	Gramophone Disc 1889
16	Popov Radio Receiver 1895
17	Marconi Radio in England 1897
18	Shellac Records Production in Germany 1898
19	Celluloid Records Production 1904
20	De Forest Invents triode making electrical amplification possible 1906
21	Armstrong regenerative circuit in 1914
22	Armstrong superheterodyne receiver 1918
23	Radio Broadcasting 1920
24	Armstrong super-regenrative circuit 1922
25	Marsh pioneered electrical recording 1923
26	Lilienfield First Transistor 1925
27	Standardized LP Value 78 rpm 1925
28	Television Broadcasting 1925
29	Talking Movies 1927

30 TV Broadcast in Germany 1929
31 Edison Ends Production 1929
32 Beauchamp Electric Guitar 1931
33 Armstrong FM Radio 1935
34 Magnetophon 1935
35 Reeves Pulse code modulation 1937
36 Bell Two-Channel Stereo 1937
37 Vynil Records Production 1939
38 Surround Sound for movie Fantasia 1940
39 Bell digital scrambled speech transmission system SIGSALY 1943
40 Hi-Fi 1946
41 Fender solid-body electric guitar 1946
42 Les Paul Multi-Track Recorder 1948
43 Goldmark/Columbia Records released 12-inch LP album 1948
44 RCA Victor released the 7 inches 45 rpm single 1949
45 Robert Fine single microphone monaural recording technique 1951
46 Audio Engineering Society standard playback Hi-fi curve 1951
47 Standard RIAA equalization 1952
48 Mercury first three-channel stereo recordings 1955
49 VCR 1956
50 Mattews/Bell digital recording via computer 1957
51 First commercial stereo two-channel records 1957
52 RCA Tape Cartridge 1958
53 Sony first transistorized radio 1960
54 Sessler & West electret condenser microphone 1962
55 Philips Compact Cassette 1962
56 Norelco Carry-Corder 150 recorder/player 1964
57 Dolby A noise reduction system 1966
58 Digital tape recorder 1967
59 Russell first digital-to-optical record-playback system 1970
60 Development of quadraphonic records 1971
61 Microprocessor 1971
62 Denon first 8-track reel to reel digital recorder 1972
63 Personal Computers 1975

64 VHS Cassette 1976
65 Sony Walkman 1978
66 Laserdisc 1978
67 Compact Disc 1979
68 Kramer Earliest Digital Audio Player 1979
69 Masuoka Flash Memory 1980
70 Sony First CD Player 1982
71 Yamaha Digital Keyboard 1983
72 Commercial Internet 1988
73 Berners-Lee invents the World Wide Web 1989
74 Digital Radio L-Band 1990
75 Sony Minidisc 1992
76 Webcasting 1993
77 Internet Radio 1994
78 USB 1995
79 MP3 Player 1996
80 DVD and DVD Players 1996
81 iPod 2001
82 Mp3 Player installed in mobile phone 2001
83 Introduction of iTunes 2001
84 Podcasting 2004
85 Youtube 2005
86 Youtube/Vevo 2009

NC11083

The Social Network Analysis findings are in Figure 1(names) and Figure 2 (numbers).

Figure 1. Social Network Analysis for Music Technology Changes(names)

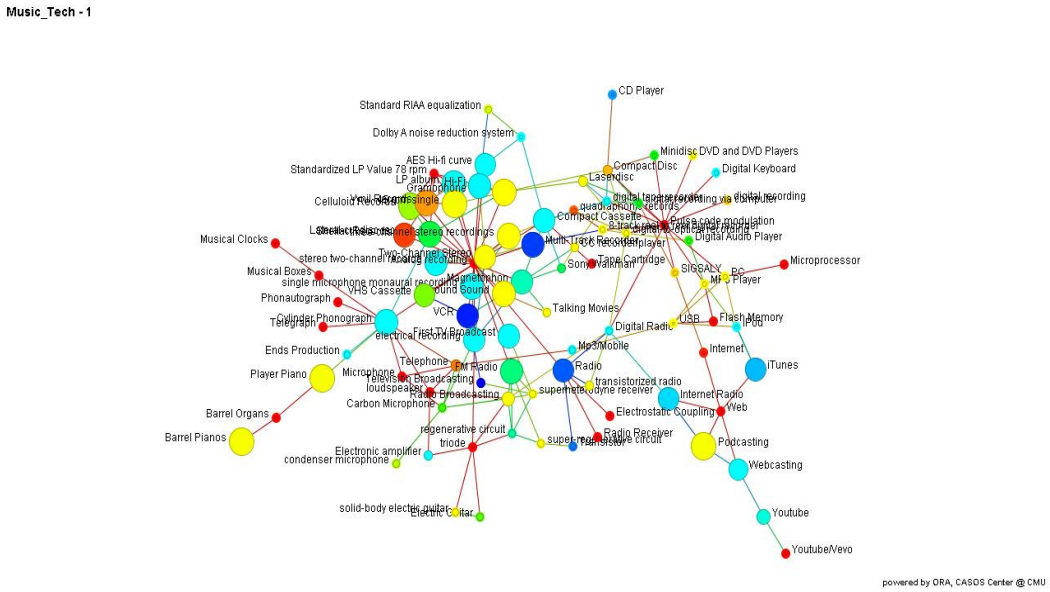
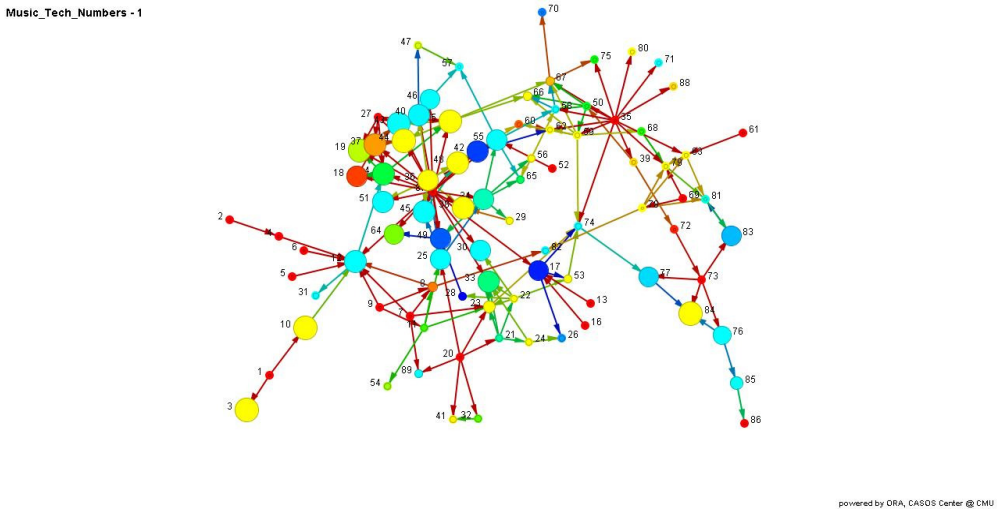


Figure 2. Social Network Analysis for Music Technology Changes (numbers)



NC11083

These eight-six items represent technological developments *per se.* The development of the music industry entails more than technology but how that technology has been used and adapted.

At the end of the nineteenth century, Thomas Edison invented the cylindrical recording machine which was eminently suited to the reproduction of Enrico Caruso's tenor voice. The Carter Family took advantage of enhanced recording capabilities to produce a series of phonograph records which used high power AM radio located just over the U. S. border in Mexico to blanket the USA and Canada between the Rockies and the Apalachians in the evenings during the 1920s and 1930s.

After World War II, Les Paul and Mary Ford produced the first multi-track recordings for which Paul was admitted into the Inventors Hall of Fame. These techniques were further developed in the 1960s with digital recorded Phil Spector's "Wall of Sound". Roger McGuinn started to use the internet and home music recording capabilities in the early 1990s. The Icelandic star, Björk, took these techniques a step further with avant-garde music composition using digitized artificial instruments. The future of these technologies will be analyzed using sophisticated computer Social Network Analysis to predict the role of the major music recording companies vis-a-vis internet piracy and the increasing importance of Apple Itunes.

References

British Invisibles. Overseas Earnings of the Music Industry, British Invisibles, London. 1995.

Carley, K, (2001-2009) ORA Social Network Analysis (SNA) computer program, Carnegie-Mellon University.

Coleman, M.(2005). Playback. Da Capo Press.

Cvetkovski, T. *The Political Economy of the Music Industry: Its Rise and Stall*. School of Political Science and International Studies. The University of Queensland. Presented at the Australasian Political Association Conference. University of Adelaide. October 2004.

David, P.A. A Tragedy Of The Public Knowledge 'Commons'? Global Science, Intellectual Property and the Digital Technology Boomerang. Stanford University. September 2000.

Einhorn, M. (2002) 'Musical Licensing in the Digital Age' in R. Towse (ed) (2002) Copyright in the Cultural Industries, Edward Elgar, Cheltenham, UK and Northampton, MA, USA; 165-77.

Ferguson, T. *Stop treating iPod users like criminals*. www.silicon.com Retail and Leisure. October 2006.

Goodrich, P. and Rossiter, N. *Entrepreneurship Strategies in the Emerging Music Industry*. Preceedings of the Association for Small Business and Entrepreneurship. 33rd Annual Conference. October 2007.

Graham, G. Burnes, B. Lewis, G. Langer, J. The transformation of the music industry supply chain. International Journal of Operations & Production Management, Vol. 24, No 11, 2004, pp.1087-1103

Graham, G., Hardaker, G. and Burnes, B. (2002), "The peer-to-peer revolution: how the Internet is transforming the supply chain for music", International Journal of New Product Development and Innovation Management, June/July, pp. 115-23.

Hamill, J. *The Internet and international marketing*. International Marketing Review, 14(5):300-323. 1997.

Hauprich, K Donnelly, B. Digital Age Shifts, Roles of Labels, Music Publishers. Entertainment Law & Finance.

IFPI (2002) Music Piracy Report.

IFPI (2009) Recording Industry in Numbers 2009. The Definitive Source of Global Music Market Information. Published by IFPI, May 2009.

Israel, P. (1998). Edison: A Life of Invention. Wiley.

Lacy, J., Snyder, J.H., and Maher, D.P. Music on the internet and the intellectual protection problem. In

Proceedings of the IEEE International Symposium on Industrial Electronics, 1997, 77-83.

Lam, Calvin K.M. and Tan, Bernard C.Y. The Internet is Changing the Music Industry. Communications of the ACM. August 2001/Vol.44.NO.8.

Leyshon, A. Time-space (and digital) compression : software formats, musical networks, and the reorganization of the music industry. Environment and Planning A 2001, volume 33, pages 49-77.

Liebowitz, S. 2005. Pitfalls in measuring the impact of file-sharing. CESifo Economic Studies 51, 435-473.

Matsumoto S.(2000) Performers in the Digital Era; 196-209, in R. Towse (ed) (2002) Copyright in the Cultural Industries, Edwrd Elgar, Cheltenham, UK and Northampton, Mass, USA.

Negus, K. *Where the mystical meets the market: creativity and commerce in the production of popular music*. Sociological Review, 43, 316-341. 1995.

Nooy, W. Mrvar, A. and Batagelj, V. *Exploratory Social Network Analysis with Pajek*. Cambridge University Press. 2005.

Normann, H. *Digital Distribution of Music: The role of networks and knowledge in the Norwegian recorded music industry*. Faculty of social Sciences at the Oslo University, Norway. Globalization, Innovation and Policy, 2005.
in Sandler PC, 1999.

Parikh, M. (1999), "The music industry in the digital world: waves of changes", available at: www.ite.poly.edu/htmls/musicwave01.htm (accessed 25 March 2003).

Poel, M. and Rutten, P. (2000), "Impact and perspectives of electronic commerce: the music industry in The Netherlands", available at; www.oecd.org/pdf/M00027000/M00027095.pdf (accessed 9 March 2003).

The Recording Industry Association of America. *Reasearch and Data.* 2009, Washington, D.C. www.riaa.com

Reece, D. (2004), "An industry poleaxed by power of the Net", The Independent, 31 March, p. 40.

Renard, S. (2010), "Unbundling the Supply Chain for the International Music Industry", doctoral dissertation, Southern New Hampshire University.

Rosen, Hilary. Chairman and CEO, Recording Industry Association of America, July 8, 2002.

Solleveld, C. (1983) "From Depression to Digital", in John Borwick (ed), The First Fifty Years: Celebrating the Fiftieth Anniversary of the IFPI. IFPI, London.

Zentner, A. 2004. Measuring the Effect of Music Downloads on Music Purchases, mimeo, University of Chicago.