Marketing and Monopoly: Lessons from Boston's Electrical Marketplace

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Regulated monopolies appear to have little or no incentive to market. But a detailed historical case study of marketing practices at the Boston Edison Company – the first big-city electric utility monopoly in the US – demonstrates that monopoly status drove this and other leading electric utilities to become aggressive and innovative marketers in their early decades as monopolies. Embedded in its service territory, driven by high fixed costs to maintain growth and capacity, and constrained by rate regulation, Boston Edison aggressively built organizational capabilities to "deepen" its market by boosting per-customer consumption. A tepid marketer before it became a monopoly in 1901, the utility soon thereafter launched an array of ambitious and sophisticated campaigns to sell appliances, finance house wiring, promote electric cooking, encourage outdoor lighting, and launch a fleet of electric vehicles, among other things. Its strategy of forward integration and product diversification paralleled that of non-monopolistic, non-regulated industrial firms.

> We have not yet reached the commercial age, and I predict that within five years the members of our association will almost lose sight of engineering matters in their eagerness to increase their sales. Our earnings through economy of operation have well-defined limits, but the possibilities of increasing our earnings by developing our market have a much wider range.
>
> Henry L. Doherty, President of the National Electric Light Association, 1902[1]

In this paper I investigate a seemingly superfluous, perhaps even irrational, form of corporate behavior. Economic theory and common sense suggest that regulated monopolies--with captive markets, stable revenues, and fixed rates of return--have little need to market (a quintessentially competitive activity) but plenty of incentive to gouge prices and slide into inefficiency. I will suggest that the monopolistic marketing can be explained in part by market mechanisms, but is best understood in terms of technological and regulatory constraints and managerial strategies. More than this, I will show that these constraints proved to be a source of marketing innovation, driving some regulated monopolies to embrace and develop modern marketing methods at least as aggressively – and sometimes more aggressively – than their unregulated cousins.

To illustrate these larger points, I examine the case of the first American big-city electric utility monopoly: Boston Edison. The marketing history of Boston Edison reflects and exemplifies the marketing history of the electric utility industry in the last century. Although Boston Edison often was an industry innovator at the art and science of promotion, its evolving market strategy and structure typified those of other major urban electric utilities in the United States.

Rather than attempting to retell a condensed version of this rich history, I shall focus on the key turning point in Boston Edison's marketing history at the turn of the century. Boston Edison operated in an intensely competitive environment between 1886, the year it was founded, and 1901, when it became the only central station electric company in Boston. But with this transition from competition to monopoly, ironically, Boston Edison became more organized and aggressive as a marketer than ever before.

MARKETING IN THE COMPETITIVE CRUCIBLE, 1886-1900

On January 5, 1886, Boston became home to the second big-city Edison central station incandescent lighting company--after New York's Pearl Street Station--established in the United States: The Edison Electric Illuminating Company of Boston (hereafter Boston Edison). The company was capitalized modestly at $100,000; its two dynamos, producing barely enough power to supply four modern-day homes, were housed in a former livery stable in Boston's theater district.[2] Moreover, the upstart faced formidable competition, for Boston had been a seedbed of artificial lighting development throughout the nineteenth century.

Gas lighting came in 1822, when the Boston Gas Company became the nation's second gas utility. For six decades its tentacles spread through the downtown district,

supplanting thousands of tallow candles and oil lamps. By 1886 the company supplied annually more than 1 million cubic feet of gas through 126 miles of main to 3,500 street lamps and 26,120 private metered customers.[3]

Electric lighting came in waves of technological improvement. In February of 1882, Charles Brush, the pioneer of arc lighting, secured a city contract to provide Boston's first electric street lighting (at Scollay Square).[4] In December, the Edison Company for Isolated Lighting transformed the Bijou into America's first theater with interior (incandescent) lighting, and soon hotels, department stores, factories, and other establishments installed Edison isolated plants.[5] Meanwhile, new central station arc companies emerged and battled to light streets and public venues. Competitive pressure among these rivals led to a merger in November 1886, which created the Boston Electric Light Company, capitalized at $1 million.[6]

Boston Edison's triumphed rapidly and decisively over these competitors in the 1890s. Measured by sales, profits, and capitalization, Boston Gas stagnated while the two electric companies grew dramatically and surpassed it. At the same time, Boston Edison outpaced Boston Electric in incandescent lighting and motor power, and overtook in as a late entrant in arc lighting. Not surprisingly, Boston Edison acquired its giant rival in the summer of 1901, and on the last day of the year became the city's central station monopoly by purchasing the two remaining central station electric companies operating in Boston, Suburban Light and Power and Walworth Light and Power.[7]

Marketing played a relatively minor role in this battle. In its early months in business, Boston Edison instituted several liberal promotional policies to gain a foothold in the market: free or subsidized interior wiring, price concessions, rebated gas bills, and free services in exchange for rooftop wire rights. These were soon abandoned as demand outstripped supply. The company also distributed anti-gas circulars, advertised modestly in city directories, and employed half a dozen agents to canvass for new business. But its primary promotional tool--typical of the nineteenth century--was the exhibition. Along with a few small special exhibits, Boston Edison participated in the giant industrial fairs held every two to three years at Mechanics Hall in Back Bay.[8]

Nor did Boston Edison compete vigorously with pricing policies. To gain entry into the indoor lighting market against gas, the company initially sought price parity. But soon it fell behind in matching gas price reductions, relying on the superior characteristics of incandescent lighting to compensate for the difference. As company director Charles Coster explained in 1888, the company's product "was not gas, but electric light ... [and we have] always + respectfully declined to supply a superior product for the price of an inferior one."[9] Throughout the 1890s the candlepower-per-hour cost of Edison incandescent light was double that of gas.[10]

As for electrical price competition, Boston Edison offered prices slightly higher than Boston Electric's, again asserting that "Edison light" was the best service available and deserved the premium. Meanwhile, it did not lower prices in accordance with decreases in production costs. For instance, after completing a giant new station on Atlantic Avenue station in 1892, which produced electricity for half the price of the older stations, no significant price decreases followed.[11]

Rather than market aggressively, Boston Edison relied on the relative attributes of its products and services. As Harold Passer has shown, incandescent lighting was more suitable than gas or arc lighting for interior lighting (where most revenues were gleaned), and incandescent lighting based on Edison technology was generally recognized as the best available. In Boston's competitive crucible, the marketplace was the key arbitrator.[12]

MONOPOLY AND THE RISE OF MODERN MARKETING, 1901-1915

Between 1886 and 1900, then, Boston Edison grew by extending its transmission and distribution lines into virgin territory in downtown Boston or by purloining customers from rival utilities. But by the turn of the century its downtown network, including the former Boston Electric lines, was virtually complete, and Boston Gas had largely abandoned the interior lighting market. Now Boston Edison's managers wondered how to sustain the high level of growth achieved in the formative years.

The utility responded to this challenge with a twofold strategy. First, it continued to broaden its customer base, this time by acquiring smaller, neighboring utilities in surrounding communities and integrating them into its production and distribution system. Second, the utility simultaneously deepened its market by adding new customers within existing service territory, and by encouraging on-line customers to consume more electricity.

Between 1903 and 1912, Boston Edison acquired eighteen suburban utilities, increasing its service territory from the few square miles of downtown Boston with a population of 212,231 to 509 square miles embracing thirty-four cities and towns with 978,000 residents.[13] As former suburban stations were integrated into the system and generation was concentrated into giant state-of-the-art plants in Boston, economies of scale caused costs per unit to plummet.

Unlike before, however, Boston Edison became a promotional rate setter after becoming a monopoly. Having instituted only a single 20 percent price reduction between 1886 and 1900, the utility now lowered its standard maximum rate five times between 1901 and 1914, for a total reduction of 50 percent. Although precise cost data are unavailable, it is clear that Boston Edison's gross operating profits remained stable at approximately 5 percent during this expansionary decade.[14] That rate of return, more stable than in the competitive period, was neither exorbitant nor indicative of a utility hoarding the profits from its efficiency gains.

To be sure, state regulators helped insure that the electrical consumers of Greater Boston received the benefits of Boston Edison's expanding territorial monopoly and efficiency gains. But a close reading of the rate cases reported in the Electric Utility Commission's reports strongly suggests that the primary impetus for the deep rate cuts came from the utility itself. Instead of complacently maintaining the status quo, Boston Edison invested in unproven, state-of-the art generating equipment. Rather than opposing rate reductions like its gas-producing counterparts, it strove for lower rates to expand its market.

At the same time, Boston Edison embraced technological advances in electric lamp design that radically increased their illumination per watt but decreased the utility's per-lamp revenues. (Lamps still were included in the price of Edison service and replaced free of charge.) The combined impact of the rate reductions and lamp improvements between 1901 and 1914 was dramatic. Customers paying the standard lighting rate in the year the company was founded received approximately 1,000 candlepower of illumination per dollar. By 1909 that amount had soared to 4,000 c.p. in metallized filament lamps, then to 8,000 c.p. in tungsten lamps.[15]

All of these tactics--territorial expansion, investment in high-capacity generators, aggressive price cutting, adoption of high efficiency lamps--were part of Boston Edison's overarching strategy of encouraging electricity consumption among a broader market, a strategy that became common among leading American electric utilities in the early twentieth century. This new mass production, mass marketing orientation fostered a self-reinforcing cycle of greater demand, greater production, lower unit costs, greater demand, and so on.

Even so, Boston Edison was not content to rely on falling prices alone to broaden and deepen its markets. The utility also became an aggressive marketer between 1901 and 1914. Whereas marketing was limited and passive before 1900, it became a principal corporate function during the early twentieth century.

Many of the new marketing activities were organized into a series of carefully orchestrated "campaigns." One was designed to increase the usage of electric sign advertising among commercial merchants. Boston Edison would often construct and install signs free of charge for customers who agreed "to keep the sign a certain length of time and agree to burn it either fixed hours or a certain stipulated amount as governed by a minimum bill."[16] Such agreements eliminated a barrier to consumption (the high cost of signs), while guaranteeing the utility a reasonable minimum level of electrical revenues, increasing the likelihood that customers would find other applications for electricity, and implicitly endorsing the concept of electric sign advertising in the public sphere.[17] For the same reasons, Boston Edison promoted decorative and ornamental outdoor lighting.

The utility also devised a variety of tactics to promote the sale of electric appliances. It transformed its "White Pavilion" at the 1898 Mechanics Fair into an elaborate, permanent appliance showroom, the industry's first. The "House of Edison Light," which demonstrated "every possible" use of "Edison light and power" in the "household economy" began touring the utility's service territory in 1910, the "Farm of Edison Light and Power" in 1912.[18] Then came a network of suburban Edison Light Stores, in which customers could pay bills, exchange lamps, purchase appliances, and receive instruction on electric cooking, vacuuming, and so on.[19] In 1912, Boston Edison served as primary sponsor of the world's largest Electric Show, an extravagant "international advertising proposition" touted in London, Paris, Vienna, Berlin, Rome, Tokyo, and elsewhere.[20]

One of Boston Edison's most ambitious marketing efforts before the war was its 1911 electric vehicle campaign, the most comprehensive of its kind in America. For this campaign the utility coordinated the promotional activities of central stations, garage owners, and electric vehicle, battery, and parts manufacturers throughout New England; installed hundreds of charging stations throughout greater Boston; offered promotional vehicle charging rates; purchased a fleet of electric lamp delivery wagons, service vehicles, and heavy work vehicles; opened a twenty-five car electric garage; sponsored a "special research division" at MIT to investigate vehicle performance; exhibited luxury electrics at the "Salon de l' Automobile Electrique de Boston"; spent $100,000 on local "education" about electric vehicles; purchased frequent, often lavish, newspaper advertising and donated company-owned advertising space in metropolitan and suburban newspapers to co-promoters; gave lectures at colleges, churches, trade associations, men's clubs, and other institutions; supplied free electricity for vehicle signs and demonstrations and free advertising space in fixed and talking electric signs throughout Greater Boston; distributed countless booklets, pendants, and the like; and even secured parking spaces for electric cars at prominent downtown locales.[21]

While such residential and commercial campaigns were the utility's most conspicuous and labor-intensive marketing efforts, Boston Edison also devoted considerable resources to marketing among industrial and large-scale commercial clients. Platoons of highly trained, specialized engineer-salesmen were dispatched to factories and offices, churches and schools, government buildings and street lighting installations, real estate developments, and industrial and commercial heating and cooking facilities. They gathered statistics, analyzed consumption patterns, and drew up elaborate electrical installation design plans, working closely with equipment manufacturer and electrical subcontractors.

The new marketing-centered strategy required a new corporate structure. To carry out such extensive promotional activities, Boston Edison allocated an unprecedented amount of resources for marketing functions and created a variety of internal organizations staffed by professionals. By 1913 the Sales Department was the

largest department in the Operating Bureau, employing seventy-two people, including twenty division heads, the largest number within a single division. Four other division heads and their staffs in the Advertising and Appliance Departments carried out additional marketing tasks. Thus, whereas at the turn of the century only a handful of Edison workers and managers were devoted to advertising, canvassing, and other marketing functions, by 1913 more middle managers performed marketing functions than were needed to oversee the operation of the company's giant generating plants or to perform any other key corporate function.[22]

Established in little more than a decade, Boston Edison's "organizational capabilities" (to borrow a term from Alfred Chandler)[23] in marketing--like those of other large, turn-of-the-century industrial corporations--were characterized by: the heavy use of advertising; the regular and systematic use of statistics in market research and campaign evaluation; the training and deployment of territorial sales forces; extensive involvement in end-user "education"; careful coordination and cross-fertilization of disparate marketing functions; and the formulation of long-term strategic goals. This strategy and structure would remain intact for decades, growing in scale and sophistication during the interwar years, stabilizing between 1945 and 1973, receding for a decade, and finally reemerging as a tool of conservation load management in our recent age of scarcity.[24]

WHY MONOPOLISTIC MARKETING?

How, then, to explain this puzzling phenomenon: the blossoming of marketing under monopolistic conditions? The following analysis will suggest that the answer lies in a confluence of factors, only a few of which are explained by the operation of market forces or have been identified by economic theorists or electric industry historians.

Contesting Competitive Markets

To begin with--and in contrast to the Bell Telephone case--Boston Edison never operated under completely monopolistic conditions, even after 1901. It continued to face competition from gas utilities in critical markets such as the street lighting, heating, and cooking. Boston Gas built formidable marketing capabilities and relied on many of the same marketing strategies as Boston Edison, from its promotional appliance offers and heavy advertising to its Home Service Department.[25] Marketing also proved useful to Boston Edison for stemming the spread of isolated plants, which continued to control a large portion of the most desirable commercial and industrial customers in its territory.[26]

Disseminating Product Information

But even in monopolistic markets--especially the markets for residential and small-scale commercial lighting, where there were no reasonable substitutes for electricity--marketing served important ends. Economists since Adam Smith have emphasized that consumer knowledge is essential for the operation of markets; knowledge of prices and products is a necessary condition for competition. With imperfect knowledge, consumers make less than optimal choices. Perfect knowledge (theoretically) is a prerequisite for the existence of perfect competition.

Yet imperfect knowledge can hinder sales by monopolies and competitors alike. Quite apart from the issue of how the absence of competition affects prices and goods, a monopoly will have less than optimal sales if all potential consumers are not aware of its offerings. Edward Chamberlain, one of the few economists to study the phenomenon of monopolistic competition, notes that advertising can be cost effective for a monopoly if there exists "imperfect knowledge on the part of buyers as to the means whereby wants may be most effectively satisfied, and ... the possibility of altering wants by advertising or selling appeal."[27] Indeed, it is widely recognized that, as profit-maximizers, monopolies can employ advertising rationally to influence consumers to pay more at a given price, pay more for the same product, or decrease the elasticity of demand.[28]

For such strategies to work, a monopoly must insure that marketing expenditures are more than matched by marginal increases in revenues and, moreover, that advertising outlays are monitored carefully and linked to specific increases in marketing expenditures. As all advertisers know, it is often impossible to correspond such expenditures and returns. But some marketing campaigns can be controlled and monitored so as to gauge their profitability, and Boston Edison placed considerable on this approach by having its Sales Department collect and analyze thousands of monthly statistics and evaluate campaigns using cost-benefit analysis. The utility calculated, for example, that for a total selling cost of $443,221; the House Wiring Campaign of 1913-1916 yielded 4,836 kilowatts of new connected load, boosting annual electrical revenues by $112,447.[29]

Other monopolies similarly have encountered the need to prime the demand pump with marketing. Alcoa, America's monopoly producer of aluminum from 1888 to the Second World War, found that marketing was needed to broaden and deepen demand for aluminum around the turn of the century, despite dramatic price decreases and the metal's unique attributes. According to historian George David Smith: "For aluminum, markets would have to be 'made' to realize the metal's potential for mass production.... The major markets for aluminum were and latent would have to be cultivated like so many seeds whose mature plants were as yet unknown."[30] The Singer Sewing Machine Company, while a monopoly in Russia, had to

market aggressively to inform potential customers about its products, encourage trials, and insure their proper operation.[31]

Boston Edison discovered that product knowledge was best conveyed through first-hand experience. Consumers were most likely to adopt electrical service once they were convinced to try it. Over the long term, the technology itself assumed the burden of proof, surviving because it possessed genuine value. (Even the most ambitious marketing campaign could not save the technologically flawed electric vehicle.) But Boston Edison shouldered the burden of introduction. Inertia worked against the new form of energy; marketing worked against inertia.

Improving Load Factor

If marketing can serve monopolies by introducing goods and services faster than market mechanisms, it can also help them shape the nature of demand in accord with the firm's technological constraints. Historians Forest McDonald, Thomas Hughes, and Harold Platt have emphasized the importance of load factor in Samuel Insull's turn-of-the-century growth strategy at Chicago Edison. Briefly stated, the higher the load factor (the ratio of peak load to average load during a specified period), the more efficiently an electric utility utilizes its fixed investment. According to these historians, Insull used marketing primarily to improve his company's load factor by encouraging increased consumption among off-peak customers and by generally increasing load diversity.[32]

Boston Edison certainly used marketing as a means of improving its load factor. Indeed, one reason for its early success was that, by 1887, it supplied more electric motors than any other central station. These ran mainly during daylight in elevators, fans, blowers, pumps, lathes, saws, buffers, grinders, thereby counterbalancing the company's nightly lighting peaks.[33] The clearest manifestation of a load-balancing marketing strategy was the company's system of differential rates. Boston Edison offered preferential or "promotional" rates to categories of customers it wished to encourage, while subsidizing the loss of revenues from other categories.

But load balancing was neither the sole nor the predominant technological imperative behind much of Boston Edison's marketing. The problem was acute in the very beginning, when the company supplied mostly theater customers (which incurred steep, short-lived, night time peaks), but even then managers were reluctant to spurn theater business.[34] Growth into diverse neighborhoods and markets automatically ameliorated much of the problem. As General Manager Charles Edgar noted in 1892, for some time "it has not seemed good business policy to refuse to accept customers who were temporarily undesirable, knowing as we did that the growth of the Company's business would soon include such a variety of classes of lighting that the load would gradually be evened up."[35] Nor could the utility blatantly refuse service, since state regulators required "compulsory supply" of service to all customers who requested it on "legal and reasonable" terms from all franchised electric utilities.[36]

Even Boston Edison's differential rates schedule was fashioned not so much to balance load as to allow the utility to compete against gas companies and isolated plants. During a critical rate case in 1907, Louis Brandeis (acting on behalf of the Public Franchise League) criticized Boston Edison for charging smaller (generally residential and retail) consumers more than larger (typically wholesale) customers because only the latter existed in a competitive market--that is, they could operate their own isolated plants. Boston Edison replied that its rate schedule was an attempt to apportion fixed and variable costs and to differentiate among customers according to their contributions to load "diversity." The Commission's closely reasoned ruling make it clear that both positions were correct.[37] Years later, company president Charles Edgar concurred, admitting that differential rates included "some reference to cost and some reference to what the traffic will bear," but that the utility strived to maintain rate making "flexibility" so as to compete freely for business.38

Boston Edison employed marketing first and foremost to sustain its overall rate of growth, and secondarily to improve its load factor. Otherwise it would not have continued to pour resources into the promotion of, for example, lighting, residential cooking and other early evening peak businesses. Generally, the company devoted more attention to load balancing in periods of relatively scarce excess capacity.

Constraints of Network Technology

The "networked" nature of the electric utility business also embodied technological constraints that shaped Boston Edison's marketing. The high cost of transmission and distribution apparatus contribute a major portion (roughly half) of utilities' fixed costs. More importantly, network dependency embeds utilities into their service territories. Unlike non-networked manufacturing firms, they cannot seek customers outside of their legal service territories.[39] Confronted with a maturing market or unfavorable factor inputs, electric utilities cannot relocate in search of new customers or lower fuel and labor costs. They must exploit as fully as possible the existing market. For this, marketing can be an effective tool.

At the same time, territorial monopoly encouraged electric utilities to share information--including marketing expertise--to an extent unparalleled among more competitive firms. Beginning in 1885 central station electric companies shared technical knowledge through the National Electric Light Association and the Association of Edison Illuminating Companies.[40] In the early 1900s, as territorial competition subsided and the industry turned to marketing to sustain growth, inter-industry cooperation intensified and became increasingly focused on promotional issues. As Charles Edgar explained in 1927, "There is

nothing known by the officials of the Boston Edison Company ... which they are not willing to share with their friends who are managing other public utilities. The result is that we have in our business the strongest trade organization which exists anywhere in the world."[41] The massive FTC "power trust" investigation that commenced the following year proved him correct.

Regulation and Public Relations

Regulation further inspired Boston Edison and its industry counterparts to market. Massachusetts regulators, although holding to no hard and fast rate-of-return formula, generally upheld petitions for lower rates on utilities whose profits exceeded about 9 percent.[42] This ceiling on profitability heightened the utility's need for sustained growth. If investors could not expect dramatically high dividends, they might be satisfied with reasonably high returns--if those returns were consistent. But without steady growth, stock prices would fall and sources of investment would dry up, starving the utility of capital and slowing future growth. To the extent that marketing fostered growth, it offered escape from this dilemma.

Regulation also fostered the development of public relations (then called "institutional advertising") at Boston Edison, which in turn contributed to its mass marketing orientation. For example, Boston Edison gained favor among state regulators through its program of territorial expansion and system building. The Gas and Electric Light Commission permitted, indeed encouraged, the acquisition of smaller, contiguous utilities so long as the consolidations led to increased efficiency and reduced rates. And acquisitions usually were accompanied by dramatic rate reductions. Too, good public relations encouraged leniency in rate decisions, just as the voluntary utility rate reductions promoted regulatory leniency in other matters.[43]

More than this, marketing and public relations efforts reinforced each other at Boston Edison. The latter, born out of political necessity (the utility's defense against public ownership), eased the way for effective marketing to the extent that it promoted a positive image for the utility. The line between the two often blurred. The House of Edison Light, for instance, not only displayed modern electric appliances for sale but also served as a gathering place for community social events.[44] Boston Edison's marketing and public relations professionals shared many of the same techniques, campaigns, and personnel. These practitioners acknowledged that the results of public relations efforts, unlike those of many marketing campaigns, could never to be "proven by figures or curves," but they remained convinced that its positive "indirect results" were considerable.[45]

A STRATEGY OF FORWARD INTEGRATION AND PRODUCT DIVERSIFICATION

In sum, a constellation of technological and regulatory constraints compelled Boston Edison to seek growth through marketing. As a network-based public utility it was confined within its territory. Reliant on mass production technology, it was driven to sustain high levels of plant utilization. As a regulated public utility, its profit margins were limited. Only growth would attract capital and thus allow further growth. Growth had to occur within limits, through the full exploitation of the existing market. By priming the pump of demand, marketing was instrumental in sustaining growth.

These constraints called for a dual strategy of forward integration and product diversification. For electric utilities, most distribution problems were obviated from the outset because the companies owned and operated their own transmission and distribution networks. Wires carried their "commodity" from plant to point of consumption more quickly and efficiently than could any fleet of trucks or chain of warehouses and retail outlets. The problem arose at the point of consumption, where customers decided how the electricity would be used by choosing a particular application and purchasing a device to perform that application.

As a "commodity," electricity was completely uniform and undifferentiated by the early twentieth century, when 60-cycle alternating current became the industry standard. From the consumer's perspective, electricity produced by one plant at one moment was completely indistinguishable from current originating at another place and time. Given the uniform nature of electricity, utilities sought to diversify its uses, to broadened the scope of its market applications.[46] Electricity was especially amenable to that strategy since its applications seemed almost limitless. How much electricity consumers used depended on which consuming devices they bought and how they used those devices.

Alfred Chandler has shown that manufacturers of machinery requiring specialized services--office equipment, sewing machines, agricultural machinery, and so on--integrated forward into marketing when wholesalers and retailers failed to provide those services.[47] Electric utilities did the same for similar reasons. By World War I Boston Edison realized the vital importance of "educating" consumers in the use of appliances. But unlike many appliance manufacturers, the utility also was motivated to increase appliance sales in order to boost electrical revenues, and because its fortunes were embedded in the local market.[48]

For Boston Edison, as for other large industrial enterprises, the twentieth century was characterized by challenges associated with consumption rather than production, problems for which marketing was an appropriate solution. Not content to rely on the "invisible hand" of the marketplace to create demand for their

products and services, it created large, internal bureaucracies responsible for developing and administering a wide variety of marketing activities. Like other leading industrial firms of the day, the monopoly integrated forward into marketing.

NOTES

Abbreviations

BECo./Boston Boston Edison Company corporate records, Boston Edison Company, Boston.
BECo.P/Baker Boston Edison Company Papers, Baker Library, Harvard University Graduate School of Business Administration, Boston.
BGP/JJBL Boston Gas Company Papers, John J. Burns Library, Boston College, Boston.
NELA National Electric Light Association.

1. Henry L. Doherty, "Address of President Doherty," *NELA Proceedings* (May 1902): 39.

2. Directors' Minutes, BECo./Boston; A. Michael McMahon, "Reflections: A Centennial Essay on the Association of Edison Illuminating Companies," (New York, 1985), 63.

3. Boston Gas Company, "Boston Gas History, 1822-1972," BGP/JJBL; Thomson King, *Consolidated of Baltimore, 1816-1950: A History of Consolidated Gas, Electric Light and Power Company of Baltimore* (Baltimore, 1950), 34; Massachusetts Gas Commission, 2nd Annual Report (Boston, 1887).

4. City of Boston, Lamp Department, Annual Report for 1882 (Boston City Documents, 1883).

5. Edison Electric Light Co., *Bulletin* (May 31, 1883) and (April 9, 1884), BECo.P/Baker. Despite several attempts to forge cooperative license and revenue sharing agreements, Boston Edison and the Edison Company for Isolated Lighting continued to have strained relations over the Edison isolated plants operating in the former's district.

6. Boston Electric Light Co. of Maine, Directors' and organizational meeting Minutes, November 1, 17, 23, and 24, 1886; January 5, 1887; and April 6, 1887, BECo.P/Baker.

7. The sale was finalized on February 5, 1902. "Antecedents of Boston Edison Company," document at the Office of the Corporation Clerk, BECo.P/Boston.

8. David B. Sicilia, "Selling Power: Marketing and Monopoly at Boston Edison, 1886-1929" (Ph.D. diss., Brandeis University, 1990), 186-272.

9. Charles Coster to Jacob C. Rogers, January 11, 1888, BECo.P/Baker.

10. The calculation is based the assumption that a 16-candlepower gas jet burned five cubic feet of gas per hour. Harold C. Passer, *The Electrical Manufacturers, 1875-1900: A Study in Competition, Entrepreneurship, Technical Change, and Economic Growth* (Cambridge, Mass., 1953), 120, 184-85; Massachusetts Gas Commission, 2nd Annual Report (Boston, 1887).

11. Massachusetts Gas and Electric Light Commission reports for the 1890s; Boston Edison, "Report of the General Manager to the President for 1893" (January 29, 1894), BECo.P/Baker.

12. Passer, *Electric Manufacturers*, passim.

13. Over the years Boston Edison has had a few territorial gains and losses on the periphery of its service territory as well as changes in the communities to which it supplies bulk power. The current service territory is approximately 590 square miles. Massachusetts Gas and Electric Light Commission, 19th and 28th Annual Reports (Boston, 1904, 1912); *Edison Life* 3 (September 1912): 198; Boston Edison Co., *Annual Report*, 1989.

14. Boston Edison, "Souvenir Twenty-Fifth Anniversary of the Edison Electric Illuminating Co. of Boston," (1911), 39, BECo.P/Baker.

15. Old Colony Trust Company, Bond Department, "The Edison Electric Illuminating Company of Boston," booklet (Boston, 1921), 26, BECo.P/Baker.

16. LaRue Vredenburgh, "Sign and Decorative Lighting," *NELA Proceedings* (June 1905): I, 345. See also C. W. Lee, "Free Signs and Flat Rates," *NELA Proceedings* (June 1905): I, 351-355.

17. *Edison Light* 3 (October 1905): 3.

18. Boston Edison, "Electrical Exhibit by the Edison Electric Illuminating Co. of Boston, 1900" (c. 1900), BECo.P/Baker; *Edison Life* 1 (December 1910): 2; *Edison Life* 3 (June 1912): 115.

19. *Edison Life* 4 (November 1913): 313-317.

20. Boston Electric Show Developments," *Electrical World* 57 (January 12, 1911): 90.

21. "The Boston Electric-Vehicle Campaign," *Electric World* 59 (April 6, 1912): 738-739. See also "Electric-Vehicle Publicity at Boston," *Electrical World* 59 (May 18, 1912): 1071.

22. *Edison Life* (July 1910): 3-5; Boston Edison, Sales Department Annual Reports, 1914-1920, BECo.P/Baker. For a detailed description of a similar sales department see T. I. Jones, "The Organization and Functions of a Sales Department," *NELA Proceedings* (May 1910): II, 125-135.

23. See Chandler, Alfred D., Jr., *Scale and Scope: The Dynamics of Industrial Capitalism* (Cambridge, Mass., 1990).

24. For a survey of parallel, industry-wide trends see Richard F. Hirsh, *Technology and Transformation in the American Electric Utility Industry* (Cambridge, England, 1989).

25. Boston Edison, "Report of the General Manager to the President for 1894" (February 1, 1895); and "... for 1895" (February 1, 1896), BECo.P/Baker; Boston Gas Papers, Home Service Department documents, box 22, BGP/JJBL.

26. City of Boston, Wire Department Annual Reports for 1901-1903 (Boston, 1901-1903).

27. Edward H. Chamberlain, *The Theory of Monopolistic Competition* (Cambridge, Massachusetts, 8th ed., 1962), 72.

28. See, for example, Richard Caves, *American Industry: Structure, Conduct, Performance* (Englewood Cliffs, New Jersey, 7th. ed., 1992), 60.

29. Boston Edison, Sales Department Annual Report for 1916, BECo.P/Baker.

30. George David Smith, *From Monopoly to Competition: The Transformations of Alcoa, 1888-1986* (Cambridge, England, 1988), 78-79.

31. Fred V. Carstensen, *American Enterprise in Foreign Markets: Studies of Singer and International Harvester in Imperial Russia* (Chapel Hill, North Carolina, 1984).

32. Forrest McDonald, Insull (Chicago, 1962), 63-70; Thomas P. Hughes, *Networks of Power: Electrification in Western Society, 1880-1930* (Baltimore, 1983), 201-226; Harold L. Platt, *The Electric City: Energy and the Growth of the Chicago Area, 1880-1930* (Chicago, 1991), 59-138.

33. A. T. Moore, Jr., to Edward Johnson, June 26, 1886, and William J. Hammer to Hubbard Breed, July 23, 1887, BECo.P/Baker; "Distribution of Power by Sprague Motors in Boston [including diagram designed by William J. Hammer]," *Electrical World* 10 (September 3, 1887): 130-32; "New England Notes," (May 7, 1887): 221; E. S. Mansfield, "The Edison System in Boston--Its Development and Present Status," 37 *Electrical World and Engineer* (May 18, 1901): 798.

34. Moore to Frank S. Hastings, May 10, 1886; Moore to Johnson, June 9, 1886, Johnson to Moore, June 22, 1886; Hammer to Johnson, August 18, 1886, BECo.P/Baker.

35. Charles L. Edgar to Jacob C. Rogers, February 1, 1892, BECo.P/Baker.

36. Massachusetts Acts of 1886, Ch. 346, Sec. 5.

37. The main arguments of both sides were reprinted in pamphlet form as "Petition of the Public Franchise League Relative to the Edison Electric Illuminating Company of Boston" (Boston, 1908); see also Massachusetts Gas and Electric Light Commission, 23rd Annual Report [Boston, January, 1908]); and Edison Electric Illuminating Co. of Boston, "Answers of the Edison Electric Illuminating Company of Boston to Special Inquiries of the Public Franchise League, Submitted to the Massachusetts Board of Gas and Electric Light Commissioners at hearing April 29, 1907," (Boston, 1907).

38. Charles L. Edgar, "Public Utility Management," reprint of an address delivered before the class in public utility management of the Harvard Graduate School of Business Administration, May 4, 1927, BECo.P/Baker.

39. This discussion pertains to operating companies, not holding companies or the wholesale exchange of power through pooling arrangements.

40. National Electrical Manufacturers Association, *Chronological History of Electrical Development from 600 B.C.* (New York, 1946), 54-55.

41. Charles L. Edgar, "Public Utility Management."

42. Melvin G. de Chazeau, "Some Chapters in the History of Regulation of Electric Utilities in Massachusetts," (Ph.D. diss., Harvard University, 1930), 217, 396.

43. Boston News Bureau clipping, August 9, 1912, BECo.P/Baker; Chazeau, "Some Chapters in the History of Regulation of Electric Utilities in Massachusetts," 226-231; "Electric Rates Reduced by Boston Suburban Consolidation," *Electrical World* 54 (September 9, 1909): 598.

44. *Edison Life* 1 (December 1910): 1-2; *Edison Life* 4 (February 1913): 47-50.

45. "Presentation of the Accomplishments of the Edison Electric Illuminating Co. of Boston in Competition for the Charles A. Coffin Medal for 1926," (1926), BECo.P/Baker; Charles A. Parker, "Advertising," *NELA Proceedings* (May 1908): 684.

46. "Presentation of the Accomplishments of the Edison Electric Illuminating Co. of Boston in Competition for the Charles A. Coffin Medal for 1926," (1926), BECo.P/Baker; Charles A. Parker, "Advertising," *NELA Proceedings* (May 1908): 684. The concept of marketing scope as an industrial strategy is developed in Chandler, *Scale and Scope*.

47. Alfred D. Chandler, Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass., 1977), passim.

48. As Chandler notes, electrical generating equipment manufacturers such as GE and Westinghouse entered the appliance business to encourage the spread of electricity and thus the sale of their generators. Alfred D. Chandler, Jr., *Strategy and Structure: Chapters in the History of the American Industrial Enterprise* (Cambridge, Mass., 1962), 365.