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# **Communications, innovation, and territory: the production network of Swift Meat Packing and the creation of a national US market**

**Gary Fields**

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This study is an historical and theoretical account of how market territory, configured from flows of production and trade, gets reshaped by the innovative behavior of business firms. The research for this study focuses on the production network developed in the late nineteenth century by the American firm of G.F. Swift & Company. The central theme of this case is how businesses reorganize their strategies, routines and structure as transport and communications technology changes, and how the innovations in production networks engineered by firms as part of this reorganization, become territorially embedded and reconfigure the space for economic activity. The production network pioneered by Swift from railroad and telegraph technology, created long-distance production and trade linkages in the economy that widened the boundaries of formerly-localized markets, and established the foundations of a more geographically-extended, nationally-oriented market space. As it widened market boundaries, however, the network of Swift concentrated economic activity in new places. The essay builds a theoretical framework of the route from the ‘communications revolution,’ to the process of innovation in the firm, to the production network, to territorial transformation. This framework reveals how the railroad and telegraph revolution enabled firms in the US to develop innovations in production networks on the basis of vertically-integrated, geographically-dispersed enterprises organized over a national market space.

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## **Introduction**

This essay tells a story of how geographical space for economic activity develops from the innovative behavior of business firms.<sup>[1]</sup> The research for this story focuses on the innovation in business organization created by one of the most pioneering firms of the late nineteenth century, the G.F. Swift Company. The broad theme of this historical case is how business users of transport and communications systems reorient their strategies, routines, and organizational structure as the technology of these systems changes, and how the territory for economic activity gets reconfigured when firms compete differently. As businesses learn about the profit-making capacity of new transport and communications technology, and as they deploy this technology to modify their strategic and operational approach to accumulating, they reorganize the *networks* of production and trade in which they compete. This study examines how innovations in production networks emerge as firms use new transport and communications technology to

reorganize their competitive activity, and the impacts on the geography of economic activity resulting from these networks. The aim of this paper is to uncover a pathway to the reconfiguration of market space by recasting the elements of a story about rail and telegraph technology, organizational innovation in the firm, and flows of production and trade in the beef network organized by Swift.

Three questions frame the research in this essay: (1) How does technological change in systems of transport and communications enable business users of these systems to transform their strategies and routines for trading and producing? (2) How do the changes in strategies and routines of firms using transport and communications systems result in the reorganization of production and trade networks through which these firms compete and make profit? and (3) How do these production and trade networks redefine the structure of the firm, and reshape the geography of economic activity?

Two sets of literature provide theoretical context for addressing these questions. One set of literature derives from Joseph Schumpeter and recent theorists influenced by his notion of ‘evolutionary’ economic change. In employing an historical approach to the process of innovation and economic development, these writers focus on a singular phenomenon occurring within the firm: *entrepreneurial innovation*.<sup>[2]</sup> They seek to uncover the sources and consequences of this phenomenon while positioning the innovative behavior of the firm within historical settings that are distinct, but possess common and comparable characteristics across time. The emphasis in this literature is how the market environment influences business decision-making leading to the creation of innovative business routines and organizations that transform the competitive realm of what is commonly termed, *economic space*.

The second set of literature derives primarily from traditions in geography and regional studies. This area of theory seeks to explain how firms organize their competitive activities in networks that link firms internally, and link firms with other businesses and consumers across space.<sup>[3]</sup> The emphasis of this literature is how business networks become geographically-embedded in the way they organize flows of production and trade across space. While the starting point of this literature is the realm of economic space, it also highlights a second analytical realm—*geographical space*. From the synthesis of these two theoretical frameworks, this study seeks to trace the route from the communications revolution, to the innovative behavior of the firm, to the trade and production network, to the construction of space for economic activity. From the experience of Swift, this route reveals how the communications revolution of the railroad and telegraph enabled business users of this system in the US to develop production networks on the basis of vertically-integrated enterprises organized over a national market space.

This paper consists of three sections. The first section summarizes the argument of the essay and outlines a theoretical model for positioning the case study of Swift. The second section describes the production and trade network pioneered by Swift, and how this network helped create a national market in the US at the end of the nineteenth century. The final section summarizes the findings in the case study and poses questions about the applicability of the model to other historical periods including the present.

### **Theoretical model and argument in brief**

This study of Swift and national market development begins from the observation of economist Allyn Young, that the marketplace is the “aggregate of productive activities tied together by trade”.<sup>[4]</sup> Myriad individual firms, engaged in purchasing supplies, producing finished goods and services, and selling what they produce to other firms or

final consumers, are the agents for this aggregate activity. When individual firms produce, buy, and sell, their activity forms relationships both within and between firms, and between companies and final customers. These relationships position firms within value chains that form networks of production and trade.

These networks are of two basic types: *intra*firm networks in which firms integrate the sequential steps in producing and selling a product into their own organizational structure, thereby creating internal economies of scale; and *inter*firm networks in which firms operate as *dis*-integrated entities, contracting with other firms across markets to produce and sell, while taking advantage of external scale economies and the capabilities created externally by other firms. These two network types reflect different organizational approaches taken by businesses to producing and selling a product that result in the establishment of boundaries between firms.<sup>[5]</sup>

Businesses establish networks for producing and trading on the basis of *choices* for generating profit from their competitive activity. The market and the profit system create the basic parameters in which firms choose alternatives for accumulating and competing. Politics and market rulemaking also play a critical role in conditioning the environment in which firms make choices about how best to compete.<sup>[6]</sup> How firms actually select alternatives, however, is the result of a cognitive process of *learning*.<sup>[7]</sup> In this learning process, firms acquire new knowledge about profit-making, experiment with such knowledge, and act in new ways. These new ways of acting, described by Schumpeter as “the creative response in economic history,” take shape as new strategies, routines and business organizations.<sup>[8]</sup> As firms transform their strategies, routines and structure as part of this creative response, they reorganize their networks in which they produce and trade.

Among the most disruptive historical forces affecting the choices of firms, and igniting the process of innovation in networks of production and trade, is a technological phenomenon that occurs in different historical periods—the phenomenon of the *communications revolution*. The railroad and telegraph system is one of the most far-reaching examples of this phenomenon.<sup>[9]</sup> Communications revolutions affect the profit-seeking activity of economic actors by recalibrating the costs of moving goods or securing information across barriers of distance, thereby reshaping the physical limits or *range* of markets.<sup>[10]</sup>

During communications revolutions, as the range of markets shifts, there is a transformation in the environment for trading and producing, spearheaded by a distinct group of firms, the *builders* of systems such as the rail and telegraph. Their activity in building new transport and communications infrastructure creates new systems of access across space. This activity, in turn, reshapes the horizons for economic activity thereby exerting impacts on a second, more numerous group, the business *users* of this infrastructure. It is the users of new transport and communications technologies that complete a more widespread set of transformations in the economy by adapting their networks for producing and selling to this new infrastructure. Swift represents one such carrier of broad-based economic change.

As the communications revolution spreads, two fundamental elements in the geography of the economic system shift and transform the environment for producing and trading. These elements are: (1) market boundaries, and (2) the linkages between cities in systems of production and trade.

Market boundaries take shape to a large extent from technologies of transport and communications, which define an upper limit for economic activity.<sup>[11]</sup> These technologies establish limits on market size by influencing the costs of trading and producing. Such costs, in turn, are a function of two key influences on economic actors as they

produce and trade, *time* and *distance*. The time needed by economic actors to bridge distance in securing materials, transporting merchandise, and communicating terms of an exchange, act as limits on the size of markets. These boundaries also become fixed where 'costs of transfer'—the costs of moving goods or securing information beyond spatial barriers—drive the prices of goods and services beyond their original value.<sup>[12]</sup> The size of markets is thus dependent on the costs to, and capacity of market actors to produce and exchange goods and services over distance, and communicate information needed to negotiate orders and transactions.<sup>[13]</sup> Market boundaries also emerge, however, as a function of politics.<sup>[14]</sup> Markets expand and contract as a result of control over territory exercised by political authorities that set rules for economic activity and establish systems of entitlements, rewards, and costs on market actors in the areas under their rule. Such authorities condition the extent to which market actors engage in, benefit from, or ultimately abandon economic activity within the territory in question. Whether derived from technology, geography, or politics, market boundaries establish limits on firms in their pursuit of profit.

Revolutions in transport and communications reconfigure the constraints of market size on economic actors by recalibrating relationships of time and distance in producing and trading. Historically, such revolutions, in recasting spatial and temporal barriers in economic activity, have established larger markets for economic actors to seek profit. The enlargement of market boundaries, in turn, in which markets blur and spill over into one another, is the basis for more long-distance, interregional flows of economic activity.

As markets widen, they give rise to a shifting pattern of linkages between cities where market activity gets concentrated. Wider market boundaries, in conjunction with revolutions in transport and communications systems, create location rents, elevating the importance of some cities while diminishing the role of others. During the late nineteenth century, the rise of Chicago as the center of the commodities trade, and the connections it forged in shipping commodities via rail transit and telegraphic communications to cities in the East, reconfigured the production and trade linkages in the US economy.<sup>[15]</sup> Firms such as Swift built production networks on the foundations of these newly-created interurban links.

These enlarged markets and changing linkages between cities redefine the environment for profit-making in the economy, and widen the parameters of choice available to firms for competing. Such conditions facilitate the formation of new firms while challenging existing firms to compete differently. In this environment, the most successful firms, both new and existing, are differentiated from others by their capacity to learn from the environment about new profit-making opportunities. What these firms learn from the changes in the geography of the profit-making environment, is how to recalibrate the time and space relationships in competitive activity; how to accelerate the turnover of goods, services and information in production and trade; and how to extend these accelerated activities over a larger and differently-configured territory. The basis for such learning derives from the fact that control over time and space is in all periods a centrally-important strategic, operational, and organizational problem for businesses.<sup>[16]</sup> Firms are constantly engaged in reshaping their strategies, routines, and structure in an effort to overcome temporal and geographical barriers to accumulating profit. What certain firms exploit in this process of learning is how to deploy new transport and communications infrastructure in their business models. Businesses, in effect, use changes in the geography of profit-making as a platform to initiate this learning process, and deploy new transport and communications technology as the technical means to launch innovation in their own networks for producing and trading.

Not all users of new transport and communications systems succeed in learning from changes in the environment. The reason for such variation is that although firms learn to make choices about competing efficiently, their selections do not derive from some omniscient understanding of the most profit-optimizing pathway available in the market as assumed in rational choice models of human action. Firms make choices with imperfect knowledge about profit opportunities, and an incomplete picture of the technological and organizational solutions available for pursuing these opportunities.<sup>[17]</sup> This imperfect knowledge gives rise to differences in the strategy, routines, and structure of firms in which very few business models prove to be truly creative and innovative.

Such creative business models, however, seldom emerge fully-formed but instead evolve as incremental experiments to create more efficient economic routines. Gradually, firms learn how to use new transport and communications systems to expand output, widen their markets, and accelerate the cycle time from production to final sale. From these experiments, more competitive production networks emerge through which firms procure supplies, fabricate goods, and market finished products. These networks are the organizational extension of the entrepreneurial impulses within the firm.

Production networks assume geographical attributes from the configuration of territory over which flows of production and trade circulate. Firms shape the spatial pattern of these flows in the way they arrange the placement of nodes in their networks. Such nodes provide the necessary connection points for the movement of production and trade flows in networks. On the one hand, firms organize the placement of nodes in their production networks in conjunction with the capabilities of transport and communication systems available to them. On the other hand, firms arrange nodes and shape flows in their networks in the way they choose to organize internally. Such choices reflect the extent to which firms integrate and absorb sequential steps in procurement, production, and marketing, and the degree to which they are dis-integrated and contract with other firms in allocating these tasks.<sup>[18]</sup> These choices on organizational structure affect the placement of nodes and the routes by which production and trade flows move across space. In this way, the structure of the firm, along with technologies of transport and communications, condition the arrangement of nodes and the geography of production and trade flows occurring in the network organized by the firm.

With the rail and telegraph system at the core of its business model, Swift creates a network for the manufacture and marketing of fresh beef that obliterates the localized character of beef markets prevailing in the US before the 1870s, and helps establish the foundations for a national market. The Company builds this production and distribution network, however, on the basis of historical outcomes deriving from the communications revolution that are given. Swift essentially appropriates these outcomes. It builds its network from the wider markets created by the rail and telegraph system of overland long-distance interregional trade, and the reconfigured patterns of interurban trade. It succeeds in taking advantage of the resulting process of urbanization and the proliferation of cities as central places. These places furnish Swift with the mass markets and concentrations of consumer demand that are essential foundations for the Company's spatially-extended and internally-scaled production and distribution network. G.F. Swift & Company, in effect, merges its own innovative use of this rail and telegraph infrastructure in producing and marketing fresh beef, with the markets and system of cities in the late 19th century, spreading its system of production and trade over the entire continent.

In establishing this network, Swift integrates virtually all of the steps from production to marketing of fresh beef into its own organization. The result is, on the one hand, a more *direct* route from production to the final customer. Much like other large manufacturers

of the period, Swift's vertically-integrated network eliminates—disintermediates—a large layer of traditional merchant wholesalers in the beef trade.<sup>[19]</sup> Perhaps more importantly, however, this vertically-integrated network, by rerouting production and trade from the producer directly to the customer, creates more geographically-widened flows of economic activity. In pioneering this long-distance network, Swift reflects a change during the late nineteenth century in which American capitalists use new transport and communications infrastructure to seek profit not as in the early part of the century from trade ventures linking coastal port cities. Firms such as Swift exploit the rail and telegraph revolution to profit from manufacturing and the conquest of the spatially-extended American interior as a market area.<sup>[20]</sup>

### The national beef network of G.F. Swift

The story of how fresh beef is liberated from the control of localized markets, and how it travels long-distance in arriving at retail butcher shops, is one of the most compelling series of events in the creation of a national market in the US.<sup>[21]</sup> This story is built upon the foundations of three historical outcomes resulting from the rail and telegraph revolution. First was the enormous drop in shipping and information costs stemming from this communications revolution that enabled firms to move merchandise and transact business far less expensively across distance. The second outcome was the expansion of market boundaries and the creation of a rail- and telegraph-based system of long-distance interregional trade that replaced the system of localized markets and water conveyance prevailing before the 1870s. The third outcome of the rail and telegraph revolution was the creation of mass markets in cities, both mass consumer and mass business markets, which emerged as favored points of concentration in a more-extended system of rail and telegraph-based long distance trade. All three outcomes gave advantages to, and created opportunities for firms with the capacity to operate on a large-scale. Such scale economies of firms, in turn, functioned as an integral element in a pattern of growth in which lower freight and communications costs, larger markets, and the agglomeration economies of urbanization became mutually-reinforcing and self-generating.<sup>[22]</sup>

TABLE 1 *Urbanization, railroadization and industrialization of the US 1850–1900*

	1850	1860	1870	1880	1890	1900
Total Population (millions)	23.1	31.5	39.9	50.3	76.1	92.4
Urban Population (millions)	2.6	6.2	9.9	14.1	22.1	30.2
Number of Cities With Population > 10 000	62	93	168	223	363	440
Railroad Mileage (000s)	9.0	30.6	52.9	93.3	166.7	206.6
Telegraph Mileage (000s)	12.0	56.0	133.6	291.2	848.8	1307.0*
Index of Manufacturing Output (1900 = 100)	—	16	25	42	71	100
Meat Packing Output (\$ millions)	—	—	62.1	303.6	564.7	790.3

Source: Pred, Allan R., *The Spatial Dynamics of US Urban-Industrial Growth, 1800–1914: Interpretive and Theoretical Essays*. Cambridge: M.I.T. Press (1966), p. 17.; Bureau of the Census, *Historical Statistics of the United States: Colonial Times to 1967*. Washington: US Department of Commerce (1960); Thompson, Robert Luther, *Wiring a Continent: The History of the Telegraph Industry in the United States 1832–1866*; Princeton: Princeton University Press (1947), p. 241; Frickey, Edwin, *Production in the United States 1860–1947*; Cambridge: Harvard University Press (1947), pp. 10–11.

\*Telegraph mileage in 1902.

In addition to these structural foundations, however, the story of fresh beef is also one of entrepreneurial agency and innovation in which G.F. Swift is a lead actor.<sup>[23]</sup> Although surprisingly neglected by Schumpeter, Swift is among the most innovative and entrepreneurial firms of late nineteenth century. To some extent, the Company assumed this role by developing a new product—beef slaughtered in one location and sold in another.<sup>[53]</sup> Yet, the real innovation of Swift was the network it built to produce and distribute this product in high volume over an extended national territory.<sup>[24]</sup>

The railroad and telegraph played the catalytic role in this innovative process. Through trial and error, Swift learned how to use rails and telegraphy in building a spatially-extended business organization for production and distribution of fresh beef. In this learning process, Swift figured out how to bridge economies of scale in the production of the new commodity, with mass consumer demand for the new product that was spread among innumerable, geographically-dispersed urban areas—a market demand that Swift itself had actually helped engineer.<sup>[25]</sup>

The Company built this bridge between mass production and mass consumption by creating a network linking three basic nodes: (1) stockyards where the Company secured its supply of cattle raw materials; (2) (dis)assembly factories where it processed cattle into cuts of butchered fresh beef; and (3) branch distribution houses in cities to market the new dressed beef product. Of these three nodes, it was the branch houses, reaching into every corner of the country, that assumed the pivotal position in Swift's operation.

Swift's network of branch distribution houses served as the collection and distribution points for long-distance shipments of fresh beef sent by the Company from the disassembly sites. Swift was the first to establish such a network linking the purchase, slaughter, and disassembly of cattle in the Midwest, with distribution and sale of fresh beef to retail butchers.<sup>[26]</sup> The Company operated these branches initially in the East, and later throughout the entire nation. What Swift accomplished that was fundamentally new, was to link production directly with the retail butcher, bypassing an entrenched, well-established distribution channel for fresh beef.

In building this branch house network and coordinating a high-volume of product from procurement of animals, to production of dressed beef, to final marketing, Swift & Company also became the nation's first vertically-integrated meat packing firm.<sup>[27]</sup> The Company assumed ownership and control over a network of adjacent but spatially-dispersed steps from cattle purchasing to delivery of freshly-slaughtered beef to retailers. Linked by rail and telegraph connections, these sequential steps in beef production and distribution integrated by Swift, spread the organizational structure of

TABLE 2 *Branch house expansion of swift and major firms*

Year	Cumulative # of branch Houses					
	Swift	Armour	Morris	S & S	Cudahy	All firms
1878	2	—	—	—	—	2
1880	12	—	—	—	—	12
1884	43	2	—	—	—	45
1888	67*	10	9	2	1	89
1895	138	125	61	31	28	383
1899	189	152	87	42	47	517

Source: G.F. Swift & Company, *Branch House Dividends 1895*, Swift & Company Records, Box 4, Chicago Historical Society; Yeager, Mary, *Competition and Regulation: The Development of Oligopoly in the Meat Packing Industry*. Greenwich: JAI Press, Inc. (1981), p. 63; US Bureau of Corporations, *Report of the Commissioner of Corporations on the Beef Industry*. Washington: US Government Printing Office (1905), p. 32; \*Estimate (precise figure for Swift missing that year).



the Company outward from Chicago over great distances. This vertically-integrated organizational structure, and the diverse activities controlled by this firm, created flows of production and trade that obliterated the local character of the beef business prevailing before the 1870s. G.F. Swift effectively transformed the production and sale of fresh beef into a geographically-dispersed, interregional and continental activity.

So successful was Swift in lowering the cost structure for fresh beef with this long distance production and marketing network, that the firm's major competitors—Armour, Morris, Cudahy, Hammond, and Schwarzchild and Sulzberger—all were compelled to imitate Swift's branch system. By the 1890s these firms, all taking advantage of the same economies of scale, operated networks much like Swift. The innovation of the latter had diffused to other beef producers and had become the standard for entry and competition within the industry. In precipitating the development of long-distance networks throughout the beef trade, the competitive standards pioneered by Swift established the foundations of a production system in which production and trade flows spanned the continent and created the basis of a national market space.

### **Early meat packing**

In order to grasp the achievement of Swift, it is imperative to understand the nature of the industry, and the structure of markets that Swift revolutionized. Two attributes stand out as primary in early meat packing: (1) the local, decentralized character of the industry; and (2) the dominance of pork over beef.<sup>[28]</sup> Beginning in the late 1870s, both of these attributes would change. How the meat industry expanded from a locally-oriented activity focused overwhelmingly on pork, to a national activity centralized in Chicago in which beef rivaled pork, and how, as the beef industry expanded, the practice of shipping slaughtered beef great distances assumed ascendancy over live cattle shipments, are central themes in the story of Swift's innovation in producing and marketing meat.

Prior to the railroads, meat packing was undertaken by innumerable small firms that supplied local markets.<sup>[29]</sup> Virtually every town had its own slaughterhouse, which provided for local consumption.<sup>[30]</sup> Meat packing was thus a reflection of a market structure prevailing in the US before the 1850s with limited intermarket links.

Until the late nineteenth century, consumption of pork far exceeded beef. Pork was more easily preserved and more readily eaten in preserved form than beef and was thus transportable even without well-developed, rapid forms of transport. Hogs were also less expensive to raise than cattle.<sup>[31]</sup> Consumption of fresh beef had severe restrictions. In the absence of viable overland transportation, beef had to be dressed (butchered), and sold to wholesale or retail butchers close to where it was slaughtered or it would spoil. This constraint limited the distance which beef could be transported. As a consequence, fresh beef remained a local product. Admittedly, after the 1840s, some cattle made its way to Eastern abattoirs as a result of long-distance cattle drives. Such supplies from the West, however, only supplemented Eastern-raised cattle. Prior to the railroads, the overwhelming bulk of cattle traveled no more than twenty miles to market.<sup>[32]</sup> Consequently, as late as 1870, beef packing as an industry was barely perceptible (Table 3) while meat packing as a whole, with output of \$62.1 million was relatively small, ranking as the eleventh largest industrial activity in the US in 1870.

### **Rails and cattle**

By the late 1850s, as railroads began to replace water as the primary source of transport for bulk commodities, the cattle and beef trade was completely transformed. Rails made

TABLE 3 *Size of beef and pork packing industries (1870)*

	Establishments	Employees	\$ Output (millions)
<b>Beef Packing</b>	<b>36</b>	<b>435</b>	<b>1.9</b>
Pork Packing	206	5551	56.4
Meat (Misc.)	17	499	3.8
Total Meat Packing	259	6485	62.1

*Source:* Ninth Census Volume III, *The Statistics of the Wealth and Industry of the United States* (Washington: Government Printing Office, 1872), Table VIII(c), p. 458.

possible the large-scale, long-distance shipment of live cattle ‘on the hoof’ to Eastern cities where demand for fresh beef had outstripped the supply available from Eastern cattle farmers, or through drovers. This situation created a lucrative opportunity for Western cattle businesses. As a consequence, the period just prior to, and immediately following the Civil War witnessed an enormous expansion in eastbound rail shipments of live cattle and brought a new and powerful actor directly into the cattle and beef business—the railroads.

Two daunting problems confronted Western cattle shippers owing to railroad involvement in the cattle and beef trade. First, as the eastbound cattle trade over the railroads expanded, and as a national cattle market developed in Chicago to synchronize Western supply and Eastern demand, exchange points in the wholesale network actually multiplied. A new layer of intermediaries, taking advantage of the rail shipment system for live cattle, entered the trade in the East. As a consequence, myriad new merchant jobbers, wholesalers, and cattle commission houses emerged to facilitate delivery of livestock to Eastern butchers and slaughtering establishments. The effect of this expansion in the number of intermediaries in the system of cattle transport and distribution was to drive down margins in the trade, especially for the Western grazer and shipper.

Secondly, and more significantly was the economics of live cattle shipping itself. Roughly 60 per cent of the animal was inedible. This fact imposed a freight cost on cattle shippers that was very difficult to recoup. Cattle also had to be fed and watered along the route adding to transit charges. Animals lost weight during such trips, thereby bringing in less money at the point of sale, which had negative impacts throughout the selling chain. Finally, cattle often died on these rail trips East. In effect, shipping live cattle on railroads had not yet successfully overcome barriers of distance, in terms of redefining a viable market range. As a result, the business of shipping live cattle was far more lucrative for the Railroads. By the late 1850s cattle shipments served as the rail industry’s most profitable eastbound trade and was therefore a business that the railroads aimed to protect.<sup>[33]</sup> Despite cooperation between the largest cattle shippers and the roads, however, these two groups did not meet in the market as equals. The size of the railroads and their control over such a vital transportation service provided them with the power to maintain freight rates over cattle shippers.<sup>[34]</sup> This power of the railroads, along with the inefficient system of intermediation in the trade, acted as catalysts for dramatic changes in the industry.

### **Learning a new business**

In confronting the costs posed by rail shipments of livestock, Swift, who had set up a cattle-buying and shipping business in Chicago in 1875, came up with a concept of how he might conduct the trade differently. His idea was to buy and butcher cattle in Chicago,

and somehow ship the dressed beef East without spoilage. This concept, however, posed enormous logistical challenges. The key obstacles facing Swift in trying to implement his idea were time and distance; the window of time before the dressed beef spoiled, and the distance between the locations of slaughter in Chicago and sale in the East.

Swift's solution to this problem was both technological *and* organizational. Through trial and error, Swift learned how to link recently developed refrigeration technology, to the technology of rails and telegraphy. He developed his own refrigerated rail car in 1878 and experimented with his first large-scale shipments of refrigerated dressed beef to the East. Clinton and Fall River served as his distribution points where he had family and a close friend in the butchering business to assume the task of selling the product to local retail butchers. Initially Swift used the Canadian Grand Trunk Railroad for these shipments. This Road accommodated Swift because, unlike all other major trunk lines, it did not have a significant live cattle business. Not only was Swift intent on avoiding freight charges on the inedible portion of the cattle in developing this innovative system. His aim was to transform the entire cattle and beef distribution channel. In his own words, Swift sought to "eradicate the waste of buying cattle which had passed through the hands of too many middle men and against which too many charges had accumulated".<sup>[35]</sup>

With his refrigerator car and rail carrier in place, Swift soon approached other existing wholesale meat businesses in New England in order to establish the initial foundations for his distribution system. His strategy was to gain the cooperation of the traditional wholesale network of commission merchants, jobbers, and wholesale butchers. His tactic was to buy minority stakes in these firms in order to stem their potential opposition to his expansion plans. By 1880 he had a small, fledgling network of Eastern branch houses connected to his slaughtering facility in Chicago. Nevertheless, opposition from other wholesale butchers was not long in coming.

Tied to an older system of beef production and trade based on live animals, cattle merchants and wholesale butchers in the East feared the competition from Swift's dressed beef business. Dressed beef shipments on a large scale were, in effect, potentially ruinous to actors in the existing distribution channels for the meat business.<sup>[36]</sup> By slaughtering in Chicago, Swift's firm avoided the freight charges on the inedible portions of the live animal. Consequently, the Company was able to sell dressed beef up to 75 cents per 100 pounds cheaper in New York or Boston than parties who shipped live cattle, roughly a 7–10 per cent cost advantage.<sup>[37]</sup> It was thus the opposition from Eastern wholesalers that compelled Swift to bypass the existing networks of meat distribution and set up his own branch network. This branch system, in turn, enabled Swift to subdue Eastern opposition and overturn the established system of meat distribution dominated by local wholesale merchants.<sup>[38]</sup> Dressed beef shipments pioneered by Swift and imitated by Swift's competitors, expanded dramatically during the 1880s (Table 4). By the end of the decade, shipments of dressed beef, not live cattle, dominated the industry.

### **The ascendancy of Swift**

The long-distance network developed by Swift expanded spectacularly during the 1880s and 1890s. After establishing its first two branch houses in New England in 1878, Swift steadily expanded its branch house network. By 1880, the Company's twelve branch houses reached into three New England states.

Three years later in 1883, Swift was operating 43 branch distribution houses.<sup>[39]</sup> Armour, by contrast, did not build its first branch house until 1884. During this period, Swift grew rapidly as a result of its advantage as a 'first mover' in creating its long-

TABLE 4 *Number of cattle shipped live and as dressed beef\**

Year	Number received	Shipped live	Shipped dressed	% Shipped dressed
1880	1 382 477	833 835	548 642	39
1881	1 547 498	880 853	666 645	43
1882	1 607 495	820 586	786 909	49
1883	1 909 167	841 136	1 068 031	55
1884	1 870 050	661 127	1 208 923	64
1885	1 964 018	619 818	1 354 200	69
1886	2 015 190	570 705	1 444 485	71
1887	2 437 867	605 812	1 832 055	75

*Source:* Senate Hearings, Senate Select Committee on the Transportation and Sale of Meat Products Report. US Congressional Hearings (Senate). Volume 3, no 829. 51st Congress, 1st Session (1890), p. 3.

\*Shipped from Chicago.

distance production and distribution system. From a position of relative obscurity in 1878, the Company ten years later had become the nation's second largest meat packing firm (Chicago Board of Trade, 1888). By 1903 the G.F. Swift Company surpassed Armour in emerging as the largest meat packing firm in the US—and the world.

In assuming this preeminent position, Swift controlled seven slaughtering establishments, located in Kansas City, Omaha, E. St. Louis, St. Joseph, St. Paul, and Fort Worth as well as the headquarters plant in Chicago. The Company distributed the production from these factories through 189 branch houses located in virtually every urban center throughout the country.<sup>[37]</sup> In the larger urban areas such as Boston, New York and Philadelphia, Swift had multiple branch facilities, sometimes as many as ten (Figure 2). Branch houses were, in essence, a reflection of urbanization.

As other packers learned from Swift and implemented branch distribution systems of their own during the course of the 1880s, these firms, together with Swift, collectively changed the nature of the beef industry. As long-distance shipments of dressed beef began to dominate the beef trade (Table 4), the beef segment of the meat packing industry, a mere 3 per cent of the industry in 1870, achieved rough parity with pork by 1890 (Table 6). During this crucial period of transformation, as the activity of meat packing was redefined by the business model of Swift, the industry itself emerged from a position of relatively minor significance in 1870, to an industrial activity of premier rank. By 1900, meat packing became the nation's second largest industrial activity just behind iron and steel (Table 7).

More than a shift in the nation's industrial structure, this ascendancy of the beef industry and meat packing represented a shift in the nation's geographical structure for economic activity. Embedded in this ascendancy was a system of elongated routes of production and distribution in which fresh beef traveled between disparate points of slaughter and sale in branch distribution houses. Built upon the foundations of the rail and telegraph infrastructure, the long-distance flows of the fresh beef industry helped define a newly emerging national market space.

### **The network in operation**

The branch house network pioneered by Swift represented a 'direct' system of marketing fresh beef from the manufacturer to the retail butcher.<sup>[41]</sup> Owing to the perishability of the product, this direct system, in turn, functioned on the basis of demand 'pull' from customers rather than supply 'push' from the producer. Branch houses were



Figure 1. Dressed Beef Network of G.F. Swift (1880).

the source of this direct pull system. Sales agents from branch houses in each location collected orders from retail butchers on the grades, cuts, and quantities of beef needed on a daily basis. In this way, purchasing and slaughtering of cattle were balanced with orders collected. With slaughtering and disassembly operations located predominantly in the Midwest, and branch houses dispersed throughout the country, the direct-pull system pioneered by Swift created a geographically diffused organizational structure for the firm that routed production and trade flows over distances exceeding one thousand miles. Providing the linkages for the product and information flows in this long-distance, nationally-oriented production and selling network was the rail and telegraph infrastructure.

This national market, however, was not simply a function of technology and innovation in the firm. Politics also helped construct this long-distance production and selling system. When wholesale butchers succeeded in persuading lawmakers in several states to enact state-level, pre-slaughter inspection laws in 1886, Swift and other large

TABLE 5 Meat packing firms ranked by size (1903)

Rank	Firm	Cattle slaughtered	Hogs slaughtered	Market capitalization
1	<b>Swift</b>	<b>1 578 215</b>	<b>4 079 756</b>	<b>\$35 000 000</b>
2	Armour	1 255 366	3 451 892	27 500 000
3	National Packing	848 884	3 101 425	15 000 000
4	Morris/Fairbank	761 179	1 247 393	6 000 000
5	Cudahy Packing	469 228	1 347 675	7 500 000
6	Schwarzchild & Sulzberger (S & S)	559 200	623 598	4 373 400

Source: US Bureau of Corporations, Report of the Commissioner of Corporations on the Beef Industry. Washington: US Government Printing Office (1905), pp. 30–32.

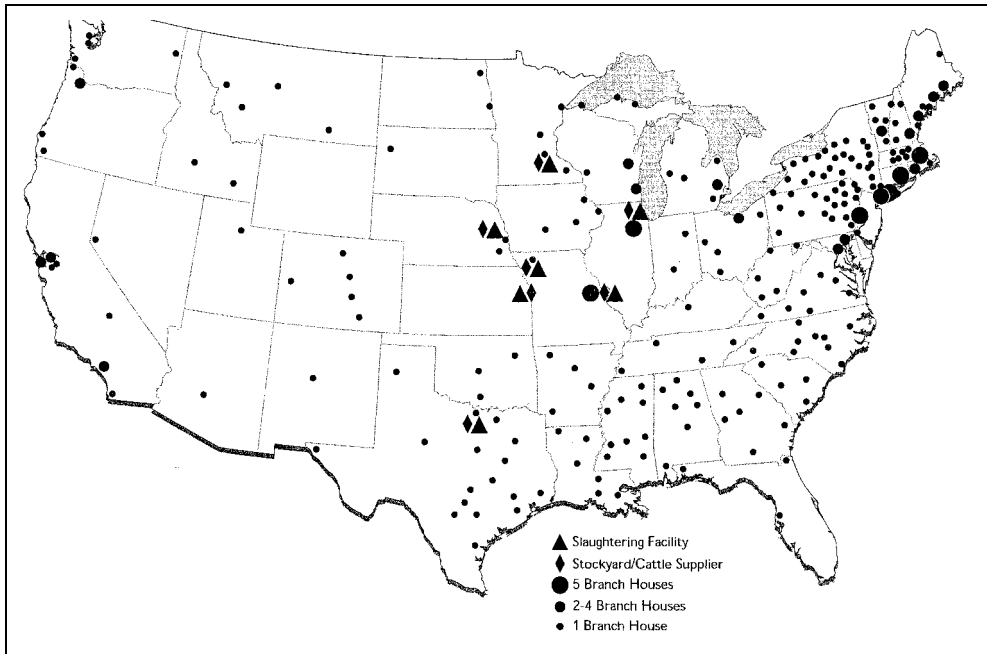


Figure 2. Dressed Beef Network of G.F. Swift (1903).

packers were placed on the defensive. They launched a campaign in the courts and in the national legislature arguing that such laws violated the interstate commerce clause of the US Constitution.<sup>[42]</sup> The outcome of this political and legal contest waged between Swift *et al.* and local wholesale butchers was the passage by Congress in 1891 of *federal* meat inspection laws. While this legislation placed new regulatory burdens on the industry, it nevertheless enabled Swift and other large packers to secure the national markets they had created.

With the national character of this network secured, Swift's spatially-extended, national direct-pull system created unprecedented management challenges that changed the organizational structure of the firm. In order to coordinate the flows of production and trade between slaughtering units and branch house nodes, and between branch houses and final customers, Swift absorbed the various procurement, disassembly, distribution, and marketing operations into its own ownership structure. The Company was not only a purchaser, disassembler, and seller of cattle and beef. Swift became intimately involved in myriad different businesses connected with the slaughter, transport and sale of fresh beef and its byproducts. It established ice harvesting operations on lakes in the Midwest for its rail cars and branch house cooling facilities; it set up the Swift Refrigerator Transportation Company to build and supply rail cars;

TABLE 6 Comparative expansion of beef and pork packing 1870–1890

Year	Meat packing output (\$ millions)	Pork as % of output	Beef as % of output
1870	62.1	90.8	3.2
1880	303.6	61.8	27.8
1890	564.7	42.1	34.4

Source: Ninth Census (1870), Table VIII (c); Tenth Census (1880), *Statistics of Manufactures*, Table VII (pp. 464–465); Eleventh Census (1890), *Report on Manufacturing Industries*, Table VIII (pp. 730–735).

TABLE 7 Rank of manufacturing industries by \$ value of output

1870			1900		
Rank	Industry	Output (\$ millions)	Rank	Industry	Output (\$ millions)
1	Flour Milling	445.0	1	Iron & Steel	803.9
2	Textiles	380.9	<b>2</b>	<b>Meat Packing</b>	<b>790.3</b>
3	Lumber	252.3		Pork	321.3
4	Iron & Steel	199.5		Beef	230.0
5	Clothing (Apparel)	161.5		Misc.	239.0
6	Leather/Leather Goods	157.2	3	Foundry/Machine Shop	644.9
7	Machinery	138.5	4	Textiles	640.4
8	Sugar Refining	119.6	5	Clothing (Apparel)	622.9
9	Tobacco Products	71.8	6	Lumber	566.6
10	Furniture	69.1	7	Flour Milling	560.7
<b>11</b>	<b>Meat Packing</b>	<b>62.1</b>	8	Industrial Machinery	385.0
	Pork	56.4	9	Boots & Shoes	359.9
	Beef	1.9	10	Printing & Publishing	347.1
	Misc.	3.8	11	Tobacco Products	264.0

Source: Ninth Census Volume III, The Statistics of the Wealth and Industry of the United States (Washington: Government Printing Office, 1872), Table VIII(c), p. 458; Abstract of the Twelfth Census, Table 154 (pp. 302–321); Shaw, Table I 1, p. 52.

it created the Swift Fertilizer Works to make money from the inedible byproducts of cattle which became an increasingly critical source of profit for the Company.<sup>[43]</sup> Swift sought the widest possible control of the beef production and distribution chain. The Company created an integrated enterprise, expanding the boundaries of the firm to include virtually all of the functions and transactions connected to making and marketing beef. It spread these activities under its control to every corner of the country.

What enabled Swift to manage the dispersed activity in this complex production and marketing organization, and what provided the fundamental linkages in this trade and production network, was the technology of rails and telegraphy. The entire network was an intricate web of rail connections and telegraphic information flows linking stockyards, slaughtering facilities, and branch houses. All of these locations were interconnected by rail. Branch houses especially required convenient railroad facilities and were located where switching capability from trunk lines could be expedited.<sup>[44]</sup> Equally critical was the need for real time information to coordinate the movement of product through the network, and to match inventories with market conditions. The large packing companies such as Swift,

which have charge of the purchasing, killing, dressing, and selling of fresh meats are organized in a most extensive and thorough manner. The central office is in constant telegraphic correspondence with the distributing houses, with a view to adjusting the supply of meat and the prices as nearly as possible to the demand.<sup>[45]</sup>

Swift's vertically-integrated organization was highly centralized.<sup>[46]</sup> The major departments—procurement, disassembly, distribution, and accounting—were tightly controlled from headquarters in Chicago which served as the coordination point for the entire circuit of activity within the network. The central office initiated the day's activity by telegraphing instructions to its stockyard cattle buyers as to the needs of the firm on any given day.<sup>[47]</sup> The sources of these procurement activities, however, were the orders received from retail butchers that were telegraphed by branch house sales staff to the Company's central office.<sup>[48]</sup> Demand from individual branch houses was aggregated in

Chicago where production quotas were telegraphed to each of the Company's seven packing plants to locate sources of inventory. Dressed beef was then allocated to branches, shipped in Swift's refrigerated rail cars, and stored in the refrigerated areas of the branch houses. There the dressed sides were further butchered by Swift employees in accordance with the orders received. Retail butchers would then call at the branch house and pick up their goods.

As cattle moved from stockyards to the (dis)assembly line in the various slaughtering facilities, the final destination of the various sides and parts was already known.<sup>[49]</sup> For Swift, the importance of telegraphic communications to secure information from on demand, supply and inventory in order to modulate production and distribution flows was a critical part of the operation. Such a system of production and marketing was as information-intensive as it was transportation-intensive. Swift's network could not have functioned in the absence of instantaneous communications from telegraphy.

The other important characteristic of the nationally-organized network was high volume throughput. Large production volumes, in turn, were dependent on mass distribution. By 1903 Swift was slaughtering roughly 4500 cattle per day at its seven facilities. Such a scale of production enabled Swift to operate this branch system at minimal cost. The larger the volume of output, the lower were the relative costs incurred by the Company in operating branch houses.<sup>[50]</sup> In this way, mass production and mass distribution through the branch house network operated interdependently.

Swift's innovation of branch houses in urban areas thus occupied a central position in this direct pull system of production and marketing. These branches are what facilitated the high-volume flow of dressed beef from the factory to the retail butcher. Direct distribution also enabled Swift to capture value in the network from economies of scale. By eliminating the intricate network of wholesalers and jobbers who had dominated the beef trade prior to the innovations of Swift, the direct system of moving beef directly from production to the retailer removed bottlenecks in the channel that had constrained volumes and created the levels of throughput necessary for the system to be profitable. The distribution system was, in effect, a nineteenth century form of disintermediation. It emerged in conjunction with a profound transformation in the organizational structure of the firm. It also reflected a wider reorganization in the nation's wholesale and distribution networks as the mass production economy expanded.<sup>[51]</sup> This organizational change is what reshaped the beef industry as a geographically-dispersed activity linking Chicago and the West with the cities of the East in a fundamentally new way.

### **Concluding remarks**

The central issue examined in this story of the G.F. Swift Company is how geographical space for economic activity becomes (re)constructed as a result of the innovative activity within the firm. When the profit-making environment changes, innovative firms such as Swift learn to compete differently and as a consequence, innovate their strategies, routines, and organizational structure to exploit new profit opportunities. What the story of Swift reveals is how the process of operational and organizational innovation within the firm becomes embedded in territorial outcomes. In forging this connection, this essay has aimed to broaden theoretical approaches to the creation of geographical space by fusing literature on innovation, with literature on production networks and the organizational structure of the firm. It has used as a starting point for this synthesis the notion of the 'communications revolution.'



When communications revolutions occur and the profit-making environment changes, certain firms are able to learn about new opportunities for competing and accumulating. In this process of organizational learning, firms reconceptualize strategic approaches to profit-making. As firms implement new visions for competing, they experiment with different operational routines for carrying out this strategic reorientation. These innovations in routines lead to changes in business organization. What emerges from these changes in the structure of the firm is a process of reorganization in the *networks* of production and trade in which firms compete and seek profit. Innovations in the production networks of firms become embedded in territorial reorganization in the way that these innovations reroute production and trade flows in which goods move from where they are produced, to where they are consumed.

G.F. Swift used the communications revolution of rails and telegraphy to create a system of long-distance linkages between the American Midwest where Swift disassembled cattle, and the Eastern Seaboard of the US where Swift marketed the slaughtered beef. Swift later expanded these flows of production and trade over the entire continent. Such linkages, built upon product and information flows carried over the rail and telegraph system, were unprecedented. Never before had cattle been slaughtered in one location and the dressed beef sold in a completely different regional locale. So successful was Swift's long-distance, *intrafirm* production and trade network that other packing firms, in order to compete, were forced to adopt the same organizational innovation and create networks roughly equivalent to Swift. Collectively, these operational and organizational innovations pioneered by Swift and imitated by Swift's competitors, obliterated the localized character of beef markets prevailing prior to the railroad and telegraph system. From these innovations in economic routines and business organization emerged the production and trade flows of a national market space.

The case of Swift also emphasizes the critical role played by *users* of transport and communications systems in recasting the geography of the economic system. While builders of the rail and telegraph infrastructure are often assigned the primary role in the historical project of national market creation, users such as Swift actually shaped this project in an equally fundamental way.

At the same time, as Swift and the rest of the industry were creating the elongated production and trade flows of a national market, these firms were concentrating the activity of the industry in new places. The disassembly operations of Swift and the other packing firms—the production nodes in the network—became highly localized. Chicago, and later cities such as Omaha, Kansas City, and St Joseph, among others, emerged as meat packing centers, veritable industrial districts. Firms in these cities benefited from common sources of supply from local stockyards, labor forces with requisite skills for meat packing, and proximity to other firms promoting spillovers of technical knowledge. The meat packing industry, in effect conformed to the same characteristics of concentration initially observed by Alfred Marshall in 1890 in describing the benefits of agglomeration and external scale economies.<sup>[52]</sup> In this way, geographical spread *and* concentration were part of the same process of communications revolution and innovation within the firm.

The new transport and communications infrastructure of the railroad and telegraph acted both as a catalyst in transforming the profit-making environment for firms, and as the means for firms to innovate their strategies, routines, and structure. This infrastructure redefined the geography of market boundaries, and rerouted the linkages between cities in urban systems of production and trade. In this environment, innovative firms such as Swift, through a process of learning and experimentation, were able to

reconceptualize the time and distance relationships in the process of making and marketing goods. Perhaps more importantly, however, the communications revolution of the rail and telegraph, along with the new technology of refrigeration, provided Swift with the technological means for re-engineering the production and trade flows for the beef industry. This new infrastructure gave the company the capacity to build an integrated, geographically-dispersed organization that controlled long-distance production and trade flows in a fundamentally new way.

Nevertheless, this route from the communications revolution to geographical transformation was not defined solely by technology and innovation. The national network of Swift and the creation of a national market space had a political edge. Firms ranging from Swift, to the sewing machine manufacturer, I.B. Singer, were forced to confront resistant local businesses in the courts, in Congress, and in the Interstate Commerce Commission in order to secure the long-distance, national markets they had created from their operational and organizational innovations. The power of these firms as political actors contributed to the creation of a national market alongside their role as innovative entrepreneurs.

Although the case of Swift is historical, it raises research issues of a contemporary nature. Implicit in this case is the question of whether there are common patterns of innovation in the firm in the wake of different communications revolutions, and geographical transformation following such innovations. Swift may very well provide the outlines of a broader story across time of communications revolutions, innovation in production networks, and the production of different regional worlds.

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## Notes

- [1] Geographical space in this essay is similar to the notion of the 'region' developed by Perloff *et al.* who refer to the region as an area "tied by extensive interareal activity or flows". See H. S. Perloff, E. S. Dunn Jr, E. E. Lampard and R. F. Muth, *Regions, Resources and Economic Growth* (Lincoln 1960), 4. The idea of linking space to flows permeates work ranging from that of Hirschman, who introduced the concept of 'linkages' in the late 1950s, to that of Castells who wrote of "the space of flows" in the 1990s. See A. O. Hirschman, *The Strategy of Economic Development* (New Haven 1958) and M. Castells, *The Rise of the Network Society* (Oxford 1996).
- [2] The classic works by Schumpeter include *Business Cycles* (New York 1939) and *Capitalism, Socialism and Democracy* (New York 1942), though see also J. A. Schumpeter, The creative response in economic history, *Journal of Economic History* 7 (1947) 149–159. More recent works on 'evolutionary' economic change include R. R. Nelson and S. G. Winter, *An Evolutionary Theory of Economic Change* (Cambridge Mass. 1982); C. Perez, Structural change and assimilation of new technologies in the economic and social systems, *Futures* (1983) 357–375; G. Dosi, *Technical Change and Industrial Transformation* (New York 1984); G. Dosi, R. Giannetti and P. A. Toninelli (Eds), *Technology and Enterprise in Historical Perspective* (Oxford 1992); and G. Dosi, D. J. Teece and J. Chytry (Eds), *Technology, Organization and Competitiveness* (Oxford 1998).
- [3] See Castells, *op cit.*; M. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance* (New York 1985); A. Saxenian, *Regional Advantage: Culture and Competition in*

- Silicon Valley and Route 128* (Cambridge Mass. 1994); E. Schoenberger, Competition, time and space in industrial change, in G. Gereffi and M. Korzeniewicz (Eds), *Commodity Chains and Global Capitalism* (Westport 1994); E. Schoenberger, *The Cultural Crisis of the Firm* (Oxford 1997); R. Walker, The geographical organization of production-systems, *Environment and Planning D: Society and Space* 6 (1988) 377–408.
- [4] A. Young, Increasing returns and economic progress, *Economic Journal* 38 (1928) 527–542.
- [5] While it is common to conceive of business networks as a contemporary phenomenon, firms have organized their activities in networks since the early period of capitalist development. See T. K. Hopkins and I. Wallerstein, Commodity chains in the capitalist world economy prior to 1800, in Gereffi and Korzeniewicz, *op cit.*
- [6] G. Berk, *Alternative Tracks: The Constitution of American Industrial Order, 1865–1917* (Baltimore 1994); S. Christopherson, Market rules and territorial outcomes: the case of the United States, *International Journal of Urban and Regional Research* 17 (1993) 274–288; Saxenian, *op cit.*; J. Zysman, How institutions create historically rooted trajectories of growth, *Industrial and Corporate Change* 3 (1994) 1–41.
- [7] Dosi, Giannetti and Toninelli, *op cit.*; N. R. Lamoreaux, D. M. G. Raff and P. Temin (Eds), *Learning by Doing in Markets, Firms and Countries* (Chicago 1999); N. Rosenberg, *Inside the Black Box: Technology and Economics* (Cambridge 1982).
- [8] Schumpeter, The creative response, 152; A. D. Chandler Jr, *Strategy and Structure: Chapters in the History of Industrial Enterprise* (Cambridge, Mass. 1962).
- [9] This idea was first developed in R. Albion, The communications revolution, *American Historical Review* 37 (1932) 718–720 which described the breakthroughs in transport and communications beginning in the late eighteenth century. The concept is traceable, however, in accounts of the current so-called 'internet revolution'. See R. R. John, American historians and the concept of the communications revolution, in L. Bud-Frierman, *Information Acumen: The Understanding and Use of Knowledge in American Business* (London 1994) 98–110.
- [10] W. Christaller, *Central Places in Southern Germany* (Englewood Cliffs 1996), first published in German in 1933.
- [11] *Ibid.*, 72; M. D. Irwin and J. D. Kasarda, Trade, transportation and spatial distribution, in N. J. Smelser and R. Swedberg (Eds), *The Handbook of Economic Sociology* (Princeton 1994).
- [12] B. Ohlin, *Interregional and International Trade* (Cambridge Mass. 1935).
- [13] R. B. DuBoff, Business demand and the development of the telegraph in the United States, 1844–1860, *Business History Review* 54 (1980) 459–479; and more generally K. Polanyi, *The Great Transformation* (Boston 1957).
- [14] Berk, *op cit.*; Christopher, *op cit.*; Saxenian, *op cit.*; Polanyi, *op cit.*; Zysman, *op cit.*
- [15] W. Cronon, *Nature's Metropolis: Chicago and the Great West* (New York 1991).
- [16] Schoenberger, *The Cultural Crisis of the Firm*, 12.
- [17] Lamoreaux *et al.*, *op cit.*, 6–8.
- [18] See R. D. Coase, The nature of the firm, *Economica* 4 (1937) 386–405 and more generally O. E. Williamson, *Markets and Hierarchies* (New York 1975).
- [19] G. Porter and H. Livesay, *Merchants and Manufacturers* (Baltimore 1971) 168–173.
- [20] A. R. Pred, *The Spatial Dynamics of US Urban-Industrial Growth, 1800–1914: Interpretive and Theoretical Essays* (Cambridge, Mass. 1966) 18–19; A. D. Chandler Jr (edited by T. K. McCraw), *The Essential Alfred Chandler: Essays Toward a Historical Theory of Big Business* (Boston 1988) 230; B. Page and R. Walker, From settlement to Fordism: the agro-industrial revolution in the American Midwest, *Economic Geography* 67 (1991) 281–315.
- [21] Cronon, *op cit.*, 207–259.
- [22] A. R. Pred, *City Systems in Advanced Economies* (New York 1966) 18–19.
- [23] On the distinction between structure and agency and its use in business history, see J. Yates, Using Giddens' structuration theory to inform business history, *Business and Economic History* 26 (1997) 145–183.
- [24] A. D. Chandler Jr, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass. 1977) 300; Porter and Livesay, *op cit.*, 168–173.
- [25] C. M. Destler, Entrepreneurial leadership among the 'robber barons': a trial balance, *The Tasks of Economic History* 6 (1946) 28–49.
- [26] Porter and Livesay, *op cit.*, 168–173; M. Yeager, *Competition and Regulation: The Development of Oligopoly in the Meat Packing Industry* (Greenwich 1981) 59.

- [27] Chandler, *The Visible Hand*, 300.
- [28] M. Walsh, *The Rise of the Midwestern Meat Packing Industry* (Lexington, KY 1982).
- [29] Yeager, *op cit.*, 59; M. Walsh, The spatial evolution of the mid-western pork industry, 1835–1875, *Journal of Historical Geography* **4** (1978) 1–22.
- [30] R. A. Clemen, *The American Livestock and Meat Industry* (New York 1923).
- [31] Yeager, *op cit.*, 4.
- [32] Clemen, *op cit.*
- [33] Chandler, *The Essential Alfred Chandler*, 230.
- [34] According to a Senate Report of 1890, “The enormous power wielded by the Trunk Line Association is almost incalculable. Every pound of freight and every head of cattle and hogs going either way across the continent must pay tribute to the roads comprising this vast combine”. See *US Congressional Hearings (Senate), Senate Select Committee on the Transportation and Sale of Meat Products Report, Vol. 3, No. 829, 51st Congress, 1st Session* (Washington 1890) 17.
- [35] Yeager, *op cit.*, 59.
- [36] Porter and Livesay, *op cit.*, 168–173.
- [37] Yeager, *op cit.*, 62.
- [38] The town of Fitchburg, Massachusetts provides a telling example of Swift’s strategy. Unable to convince the leading meat wholesaler of Lowe & Sons to distribute his beef, Swift set up one of his first branch warehouses in 1880 and used this branch to undercut Lowe and supply the town with dressed beef. When Lowe eventually capitulated, Swift hired him to manage the Fitchburg branch. See L. F. Swift, *The Yankee of the Yards: The Biography of Gustavus Franklin Swift* (London 1927) 70–71.
- [39] Yeager, *op cit.*, 63.
- [40] *US Bureau of Corporations, Report of the Commissioner of Corporations on the Beef Industry* (Washington 1905) 30–32.
- [41] E. L. Rhoades, *Merchandising Packinghouse Products* (Chicago 1929) 262.
- [42] C. W. McCurdy, American law and the marketing structure of the large corporation, 1875–1890, *Journal of Economic History* **38** (1978) 631–649.
- [43] Although Swift had integrated most steps in the fresh beef trade, the boundaries of the firm stopped short of backward integration into the raising of livestock. Few incentives existed for owning supplies of cattle. The existing system of buying from cattle at the stockyard centers, where large packers owned considerable shares in the stockyard companies, provided Swift with animals at acceptable prices. See *US Bureau of Corporations, Report of the Commissioner of Corporations on the Beef Industry* (Washington 1905) 16.
- [44] Rhoades, *op cit.*, 270.
- [45] *US Bureau of Corporations, Report of the Commissioner of Corporations on the Beef Industry* (Washington 1905) 21.
- [46] Chandler, *The Essential Alfred Chandler*, 53.
- [47] *US Bureau of Corporations, Report of the Commissioner of Corporations on the Beef Industry* (Washington 1905) 21.
- [48] Chandler, *The Visible Hand*, 300.
- [49] Chandler, *The Essential Alfred Chandler*, 237.
- [50] Clemen, *op cit.*, 406.
- [51] Porter and Livesay, *op cit.*, 168–173.
- [52] A. Marshall, *Principles of Economics* (2 Vols, London 1961), first published in 1890.
- [53] M. Yeager Kujovich, The Refrigerator Car and the Growth of the American Dressed Beef Industry, *Business History Review* **XLIV** (1970) 460–482.