
The Handbook of Economic Sociology

14 Trade, Transportation, and Spatial Distribution

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TRADE, transportation, and the distribution of human activity in space are intrinsically interrelated concepts. Trade links territorially distinct communities, regions, and nations across space through economic exchanges. Trade is, thus, a specific type of social interaction, one involving both a spatial component (distance) and a relational component (exchange between sociospatial systems).

Transportation is the primary technological means by which these exchange relationships are made possible. The physical limitations of transportation define an upper boundary for trade among sociospatial systems and circumscribe the influence of one system upon another. Where physical impediments to trade are great, economic exchanges are minimal, as is the influence of one system upon another. Where these limitations are reduced, the potential influence of one territorial system on another is raised, as is the potential for functional integration of these systems.

Trade ceases to be distinguished from other types of exchange where integration is largely complete and barriers to social interaction overcome. Under such circumstances, social and economic organization coalesces into observable spatial patterns and takes on the appearance of cohesive sociospatial units; in sociology, neighborhoods, communities, and societies; in economics, markets and economies. The organization of interactions within these units is qualitatively different from interactions among them. It is the nature underlying the systemic basis of sociospatial units which differentiates the sociological from economic approaches to trade, transportation, and distribution.

In sociology, the boundaries of the social system are often defined by a population sharing a common life through a unifying set of norms and institutions. Most treatments of social systems assume that propinquity is a necessary condition for common life and that there are distances beyond

which regular social interaction does not extend. The effects upon individuals and groups differ to the extent that social organization differs among sociospatial systems. Thus, economic approaches and many sociological approaches regard social systems as normatively and institutionally integrated in space and as possessing a unit functional character. Interactions across social systems are qualitatively different in that they necessarily confront differences in social organization not encountered within the social system. Trade is one such category of intersystem interaction.

In economics, trade is a special case of economic interdependence and exchange resulting from general processes creating specialization and division of labor. It occurs only between distinct economies, either economic regions or nations. Trade is qualitatively different from other forms of economic exchange only in that the dynamics of interaction confront limitations not encountered *within* an economy. The boundaries of an economy fall at the limit of the unencumbered movement of the factors of production (land, labor, or capital). Within these boundaries, prices, profits, wages, and productive volume are integrated into a single market through mutual adjustments of these factors.

Both economic and sociological theories linking transportation, trade, and distribution address a multiplicity of analytical (territorial) units possessing varying degrees of integration and boundary closure. These variations in analytic units create conceptual problems when comparing and contrasting theories. To minimize such problems, we will designate territorial units central to each theory. This grounding of theory in territory clarifies elements internal to the system (the analytical unit) from those external influences, and establishes the generality and validity of application across the multiplicity of units.

We seek to compare and contrast economic and sociological perspectives on trade, transpor-

tation, and spatial distribution at various analytical levels beginning with classical theories in each discipline. We also address neoclassical approaches of regional economics and human ecology and more contemporary perspectives, including world systems/dependency theories and network approaches. A discussion of current models and some likely future lines for theory and research concludes our chapter.

CLASSICAL THEORIES AND PERSPECTIVES

The core of economics has relatively little to say concerning either the spatial boundaries of economic organization or of the role of transportation in creating and maintaining these boundaries. However, the nature of trade cannot be understood without reference to transportation and spatial distribution.

The Classical Approach in Economics

The basis of economic interdependence from Adam Smith onward lies in the efficiency of specialization and the total benefits accrued to individuals by concentrating on particular activities and exchanging the products.

Adam Smith (1776) argued that self-sufficiency (autarky) is inefficient since no individual will have the same talents in producing each good. Additionally, since specialization in production accrues benefits through economies of scale, the division of labor increases total productive capacity beyond that of autarky. If specialization develops utilizing differentiated skills, efficiencies are obtained and total output increases. More goods are therefore available through exchange than would be available through universal self-sufficiency.

Division of labor and the corresponding exchange system is a necessary condition for economic interdependence, but does not ensure it. Although self-sufficiency does not maximize production, it does provide the necessities of life. Further, the tendency in a system based upon a division of labor would be toward self-sufficiency since any movement toward autarky on the part of one specialist would force others away from specialization in order to produce the good withdrawn from the exchange system. Division of labor requires reliance among specialists. In this sense, reliance is a requirement of the division of labor, not simply a result of that division. Without

mechanisms ensuring this reliance, interdependence based on division of labor would be unstable.

The stabilizing factor introduced by Smith was the assumption that all individuals recognize the economic advantages of specialization and that all individuals are motivated to maximize economic well-being. Exchange occurs because each party recognizes benefits from this arrangement. Individual economic rationality, as a universal human motivation, therefore provides a sufficient foundation for the development and continuance of the division of labor.

Smith's conception of exchange and trade among areas is a straightforward extension of individual foundations of division of labor. Areas with greater natural advantages in land, labor, or resources specialize in the products most suited to those resources. Capital and production gravitate to areas where absolute advantages exist, creating specialization among areas. Patterns of exchange among areas then result from this process of territorial differentiation.

Although accepted as the basis of trade theory, Smith's discussion of absolute advantage is really only the beginning of classical trade theory. In Smith's conception, trade is undifferentiated from exchange within an economy and does not require special treatment.

David Ricardo (1817), on the other hand, argued that exchange across national boundaries involves factors qualitatively different than within boundaries since social and political systems place barriers to the mobility of labor, capital, and enterprise. This bounding of the mobility of production factors, in turn, places boundaries on the process of specialization. In this, Ricardo was the first economist to differentiate trade from other forms of economic exchange.

Ricardo further extended Smith's concept of absolute advantages by focusing on the role of comparative labor costs among areas (1817). Within nations, products locate in areas that produce the greatest volume for the least labor relative to other areas. Labor and capital gravitate away from areas with relatively higher costs toward those with relatively lower costs. Ultimately this results in specialization among areas and a spatial division of labor with corresponding economic exchanges. However, this process of spatial differentiation assumes that there are no barriers to the movement of the factors of production. Where such barriers exist, the dynamics of specialization and division of labor are altered.

Ricardo recognized that normative, political, and material barriers make it unlikely that economic activity will relocate across national boundaries. These barriers to the factors of production (labor, capital, and organization) act to create very different dynamics in the division of labor. As a result of these boundary limitations, specialization in products will center around those with the greatest value (lowest labor costs per unit volume) relative to other domestic products, regardless of absolute advantages between nations. Although one country may be able to produce two goods at *lower* costs than another country, it is the domestic good with the *lowest production* costs (relative to other domestic goods) that will be used for trade. Thus a society's specialization in international trade tends toward its domestic goods with the least costs compared to other *domestic* goods regardless of the costs of production relative to other societies. Even if a country lacks absolute advantage for any product, the domestic product produced more efficiently than other domestic products will be used for trade.

Ricardo's thesis is generally taken as the foundation of classic and contemporary trade theory. His contribution is also recognized for its reformulation of the process of international specialization in terms of cost ratios within each nation; that is, *endogenously* determined international division of labor. However, the full elaboration of a classical economic theory of trade required further advances by John Stuart Mill (1848).

Although implicit in Ricardo's theory of trade, the complete implications of a commodity's costs relative to other domestic commodities were not actually drawn out. Moreover, while Ricardo's formulation provided an explanation of which commodities would be used for export and which for import, it did not show the ultimate levels at which these commodities would be exchanged. This is critical since the theory left open the possibility that exchange would not be beneficial to both parties (nations), which as classical economics argues, is a necessary condition for continuance of division of labor.

In *Principles of Political Economy* John Stuart Mill (1848) clarified the mechanisms by which levels of trade (imports and exports) would be established. By first reformulating Ricardo's use of labor costs (comparative costs) into comparative productivity of labor (comparative advantages) he argued, following Ricardo, that mutually profitable exchange is set by the comparative advan-

tages among domestic industries, with advantageous (more efficiently produced) commodities used for export in trade for all other commodities.

Moreover, Mill extended Ricardo's formulation by showing that the ultimate levels of trading and prices of traded commodities are also influenced by the relative strength and elasticity of domestic demand for each product. Following the general equilibrium structure of (domestic) demand and supply, the levels and prices of traded commodities among countries are reciprocals, he argued. That is, the ratio of imports to exports in country A is a reciprocal of this ratio in country B. In equilibrium, then, the production of exported products precisely meets the need for imported products, and internationally, this export/import division of labor maximizes production to meet domestic demand among all nations. Mill's "Law of International Demand" is thus set firmly in the framework of supply and demand.

Moreover, while accepting Ricardo's notion of bounded economic interaction, Mill placed greater emphasis on the intrinsic limitations of distance in creating these boundaries. Distance affects international trade both in overall limitations to economic interaction and as a direct cost specific to commodities exchanged. Transport costs, according to Mill, affect terms of trade and isolate some commodities to purely domestic production.

Perhaps of greatest importance here is that classic trade theory recognizes that economic interdependence is more tightly bounded within than among economic systems. It follows that the international division of labor and economic interdependence among areas respond primarily to interdependence within, not between areas.

Classical Sociology Statements

Classical economic approaches have confronted social boundaries in formulating ideas of trade. Because their concept of the economic system is built upon a theory of individual economic interaction, social boundaries and limitations of distance necessarily comprise an outer bounds of the economic system. Perhaps because societal (national) boundaries are regarded as a noneconomic limitation on economic exchange, which exists apart from markets and economies, these boundaries were not elaborated, simply recognized.

In classic sociological formulations, the nature and characteristics of social boundaries are an as-

pect of social organization to be explained, not accepted. However, competing notions of interdependence in sociology implied different spatial boundaries to social organization. The more complex formulation of the social, spatial, and temporal cohesion of social organization resulted in a variety of system boundaries sometimes loosely intertwined, sometimes clearly bounded.

Although the sociological approach tended to generate a number of potentially important socio-spatial boundaries (such as communities, regions, or societies) the focus of early sociological approaches was on the classifications of social organization associated with these spatial units rather than on the sociospatial systems themselves. Little attention was given to interrelations among these units. For this reason, most classical theories incorporate trade as a category of social interaction rather than examining actual patterns of trade among systems.

Nevertheless, early sociological statements did deal with some elements of the interactions between trade, transportation, and spatial distribution. Perhaps the most comprehensive statements are found in the works of Herbert Spencer (1864, 1889, 1898). For Spencer, territoriality is a defining characteristic of cohesive social organization. In turn, territorial cohesion depends upon the efficiency of transportation systems. Thus transportation systems establish the spatial boundaries of society.

In Spencer's organismic analogy, social interdependence is bounded by the systemic functioning of society. Transportation systems are both a mechanism of communications and commodity distribution that define the social and spatial cohesion of the system. Correspondingly, advances in transportation technologies and growing efficiencies of system trade lead to further spatial differentiation and interdependence and thus, for Spencer, societal growth.

As a mechanism for social cohesion, transportation and its corresponding effects on economic exchange are central to his view of the social system as a territorial system. However, Spencer tended to regard transportation and exchange as intrinsically embedded in the organic nature of a society. Interactions between societies were limited by political boundaries and viewed primarily as competitive.

This competitive notion arises primarily from Spencer's view of society as an organism structured to derive sustenance from its immediate biophysical environment. Other societies are seen

as competitors for such resources and the political system the primary institution responsible for survival in this struggle for existence. Societies merge only through conquest (as in early societal forms) or through economic incorporation associated with industrial societies.

Trade, to the extent that it occurs, is simply a transitional step toward the incorporation of two previously autonomous social systems. When complete, the spatial definition of social organization is once again clearly defined and bounded. As in classical economics, the division of labor, which creates cohesion within society, is treated as an endogenous process.

The view of the division of labor as a structure generated by the internal dynamics of a social system and corresponding assumptions of strong boundaries placed between social systems is likewise found in the works of Emile Durkheim (1893, 1897, 1912). Whereas Spencer argued that the division of labor strongly links the individual to society and the sum total of structures and functions bounds society in space, Durkheim begins with opposite assumptions to arrive at a strikingly similar view regarding trade and inter-societal interactions.

Spencer's notion of interdependence is broadly consistent with the utilitarianism of Adam Smith. Interdependence arises from prior individual independence as the economic advantages of specialization are recognized and accrue. The conditions for such interdependence are intrinsic to the material circumstances confronting individuals. Society arises from individual autonomy, although individualism is inevitably superseded by dependence upon the societal mode.

Conversely, Durkheim's view of social cohesion begins with society and argues: "Collective life did not arise from individual life; on the contrary, it is the latter that emerged from the former" ([1893] 1984, p. 220). Durkheim's formulation of the individual as embedded in collective life and cultural community is the foundation for his essentially social view of the division of labor.

Social organization, for Durkheim, controls the conditions under which an economic division of labor arises and the economic basis of specialization is always preceded by conducive social conditions. In like manner, the boundaries of society confine the division of labor. As with Spencer, economic interdependence based upon the division of labor is a quality of a society; external exchanges (trade) comprise a qualitatively different type social interaction.

Transportation and communication also play a critical role in the formation of the division of labor, although the process by which this is achieved is distinctly different in Durkheim's formulation. While empirically associated with physical density (population per unit of space), social density (interactions per unit of time) increases as barriers to travel and communications are surmounted. The resulting network of communications and flows of people have the effect of increasing social density across all types of areas. Where the range and intensity of social interactions are extended, so is the spatial distribution of the division of labor, social cohesion, and collective consciousness.

For Karl Marx, transportation and trade, as with most aspects of society, arise from its productive foundations (1848, 1857–58, 1867; Marx and Engels 1845–46). Transportation is a consequence, not a cause of the relations of production, particularly of the division of labor among areas. Likewise, trade is determined by the nature of production. Speaking of the “moments” of production (consumption, distribution, and exchange) Marx makes clear that exchange is an extension of the production process and thus rises from the economic structure of social relations found within a society:

The conclusion we reach is not that production, distribution, and exchange are identical, but that they all form the members of a totality, distinctions within a unity. Production predominates not only over itself . . . but over the other moments as well. . . . A definite production thus determines a definite consumption, distribution and exchange as well as definite relations between these different moments. (Marx [1857–58] 1973, p. 99)

Since production has a spatial division of labor, economic exchange links production to consumption over space. In this sense, trade is basically a distributive aspect of production and does not comprise a separate type of economic interaction nor is it conceptually distinct from the mode of production at any point in history. However, trade and commerce do play a central role in the formation of capital as an independent economic force in society. It is through trade that the use value of commodities is transformed to capital. During the process of exchange, money accrues interest with each transaction, thereby accruing value (interest) without further inputs of labor. Interest bearing money, or capital, is simply a later abridgement of the process of trade, where

money accrues interest without the intermediate step of circulation. The appearance of trade therefore sets the historical conditions whereby capital could become an independent economic force in society:

The circulation of commodities is the starting point of capital. The production of commodities, and their circulation in its developed form, namely trade, form the historic presuppositions under which capital arises. (Marx [1867] 1973, p. 248)

Although trade does not arise from the boundaries of a pre-existing system, per se, as an early form of capital accumulation it plays a critical role in creating such boundaries. As the geographic scope of production, the division of labor, and trade expand so does the scope of competition. This expanded geographic competition for capital drew together the common interests of capitalists within an area:

With the advent of manufactures, the various nations entered into a competitive relationship, the struggle for trade, which was fought out in wars, protective duties and prohibitions. . . . Trade had from now on a political significance. (Marx and Engels [1845–46] 1939, p. 52)

In this sense trade becomes the bounding force in differentiating civil societies from the larger economic market. However, if trade creates political economic boundaries in an early epoch, inevitably the extension of trade would break down the boundaries of society and create a single world market:

The more the original isolation of the separate nationalities is destroyed by the developed mode of production and intercourse and the division of labor between various nations brought forth by these, the more history becomes world history. (Marx and Engels [1845–46] 1939, p. 38)

For Marx, then, trade is a central economic force creating the political and economic boundaries specific to historical epochs. Trade is differentiated from domestic transactions only in that it differentiates the scope of competition among capitalist societies. It is more a cause than a consequence of either sociospatial boundaries or of transportation systems. However, trade itself is treated only as an abstraction or extension of production at any point in time.

For Max Weber, trade and transportation play a concrete role in the bounding of the common interests that underlie his conception of social in-

terdependence (1889, 1909, 1921, 1922, 1923). More than any other of the classic sociological theorists, Weber tied the coalescence of common interests both to the physical limitations of transportation and to trade relations among socially bounded areas. The concept of trade particularly is distinguished as a type of social interaction which is distinctly external to localized social activity:

In its beginnings commerce is an affair between ethnic groups; it does not take place between members of the same tribe or of the same community but is in the oldest social communities an external phenomenon. (Weber [1923] 1927, p. 195)

Because trade is conceived as a distinctly extralocal interaction, external conditions, especially transportation, control the genesis of this type of exchange:

For the existence of commerce as an independent occupation, specific technological conditions are prerequisite. In the first place there must be regular and reasonably reliable transport opportunities. (Weber [1923] 1927, p. 199)

Weber's formulation of trade and transportation as external limitations on the internal organization of forms of social organization leads him to focus on more tightly bounded spatial units than earlier social theorists. The city particularly becomes a central arena of social interaction, one that is both shaped and limited by trade relations (Weber [1921] 1978a, p. 1218–19). And while much of Weber's sociology focused on the distinct social forms associated with the city, there is a clear recognition of the spatial form of social organization. This territoriality is one that is formed by prevailing transportation conditions. For instance Weber, in reaction to assertions that trade develops from the economy of cities, argues:

It is characteristic that in antiquity there was no city of importance more than a day's journey distant from the sea; only those places flourished which for political or geographic reasons possessed exceptional opportunities for trade. . . . [S]ettlement in the city is occasioned by the possibility and the intention of employing the rents in trade, and the decisive influence of trade on the founding of cities stands out. (Weber [1923] 1927, p. 323)

Thus transportation is seen as a material foundation for trade and as an element separate from, and external to the control of localized social interests. The social organization of trade is neces-

sarily shaped by these external transportation systems, as well as by the technology of transportation:

The external conditions for the development of capitalism are rather, first, geographical in character. In China and India the enormous costs of transportation, connected with the decisively inland commerce of the regions, necessarily formed serious obstructions for the classes who were in a position to make profits through trade and to use trading capital in the construction of a capitalistic system, while in the west the position of the Mediterranean as an inland sea, and the abundant interconnections through the rivers favored the opposite development of international commerce. (Weber [1923] 1927, p. 354)

Although Weber recognized that trade required specific material conditions, he believed that transportation systems were not in themselves a sufficient condition for the rise of capitalism. Ultimately changes in the normative order were needed to complete this transition. However, this ideological transformation rests firmly on social and religious preconditions found in Europe and not elsewhere. Trade plays a central role in generating these preconditions. It is the social form of trade and its effect upon social interests and associations within communities that created many of the social preconditions for capitalism.

Reliance on trade requires new social arrangements. These new social arrangements underlie the social foundation of capitalism. First, trade provided an impetus toward the formation of capital intensive organizations. The uncertainty involved in trading created an impetus toward formal economic organizations to share financial risks. These associations (*commenda*) linked trade to capital and provided one foundation for the rise of capital enterprise (Weber 1889).

Second, the organizational arrangements of trade created extralocal political ties. Risks in trade were reduced by banding together in caravans. Since caravans were not free to leave at any time it became necessary to establish fixed times for markets. For protection, compulsory routes and systems of taxation were established. The nobility responsible for protection and maintenance of these routes necessarily were drawn into social and political interaction with distant areas. These early trade treaties created tighter political and economic ties among cities.

Third, reliance upon trade necessitated new organizational arrangements within cities. In-

creased individual interaction across communities necessarily required new legal arrangements, which applied to nonresidents and residents alike, as well as standardized weights and coinage across areas. The periodic influx of commodities required new types of organizations, such as the merchant hanse, which took on the job of warehousing goods and selling them after the trader left (Weber [1921] 1978a).

If increased dependence upon trade goods created new alignments of interests it also acted to break down pre-existing social arrangements. The rise of exportation undermined power of the guilds as craftsmen became dependent upon the trader's specialized knowledge of market operations. Additionally, conflicts of interest between resident retailers and consumers increased. Ultimately these conflicts led to the realignment of power within cities toward those groups oriented toward extralocal economic activity (Weber [1921] 1978a). In association, in orientation, and in economic structure, trade restructured relatively autonomous social systems into a system of interdependent communities. Trading companies based primarily upon capital replaced both the itinerant trader and the local retailer. Capital from trade was used to establish factories, employ free labor, supply external markets, and establish an interlocal and international system of relations. Ultimately trade and transportation incorporated independent communities into a system of interdependent communities, each partially bounded in space and partially penetrated by the social actions of other communities.

While trade was viewed as the economic foundation for the territorial division of labor, Weber stopped short of explaining the rise of systemic or multihierarchical territoriality. The examination of hierarchical position and functional relations among territorial units awaited the neoclassical works of regional economists and human ecologists.

Neoclassical Economic Theories and Regional Economics

The transition from classical to neoclassical economic approaches rests primarily on a reformulation of a labor theory to a price theory of value. In trade theory this transition lagged behind general economics, relying on a labor theory of value until the early twentieth century. Bertil Ohlin (1924, 1933) was the first to reformulate

international trade in a general equilibrium model of prices (rather than labor advantages). The subsequent analytic models derived from this work (formalized in the Heckscher-Ohlin theorem) provides the foundation of contemporary approaches to international trade theory. While this change in the conception of value is critical to twentieth century methodological reformulations, the notions of exchange and trade remained firmly embedded in the classic ideas of comparative advantage and the endogenous determination of international economic interdependence:

The result of focussing on a consistent mutual-interdependence price theory is to emphasize the effect of changes in *internal* economic circumstances on *international* economic relations. (Ohlin 1979, p. 2)

Of greater importance is the reformulation of what constitutes system boundaries. The socio-spatial boundaries in classic economic trade theory are clearly national boundaries. However, neoclassical economics recognized that the transition from exchange to trade exists wherever social and spatial factors limit the mobility of production factors. Trade may exist within nations as well as across national boundaries. Thus, Ohlin's work is presented as a theory of both interregional and international trade:

Only some natural resources can be regarded as absolutely immobile. Other factors, on the other hand are partially mobile, that is to say, transfer from one location to another is possible, although it encounters some friction. Due to this friction such transfer takes place only to a limited extent. In its place we get interlocal commodity trade induced by the differing endowments of factors of production: this trade, despite transportation costs, takes place more easily than a change in the spatial distribution of factors. (Ohlin [1924] 1991, p. 84)

Despite the central role that interlocal trade played in Ohlin's neoclassical trade theory, this more complex formulation of trade and market boundaries was never incorporated in mainstream economic trade theory. Ohlin himself identified this oversight as a major flaw in current trade theory and argued for an integration of regional economics with more general trade theory, giving specific importance to the role of transportation in interregional trade:

Attention must be given to the incomplete internal mobility of labor, to the influence of agglomerations

inside each country, and to the expensive internal transportation of certain commodities. (Ohlin 1979, p. 6)

Nevertheless, mainstream economic models of trade, such as the Stolper-Samuelson model retain the assumption that factor mobility is unencumbered within nations and nonexistent between them (Stolper and Samuelson 1941; Flam and Flanders 1991). In regional economics no such assumption is made:

Traditionally, great stress has been placed upon the differences between international and domestic trade. . . . This seems quite unjustifiable when it is realized that the only difference between the locational relations within a country and those applying between countries is that in the latter case political boundaries lie athwart the path of commerce. (Hoover 1948, p. 215)

While rejecting national boundaries as intrinsically limiting, regional economics remains firmly embedded in the classical economic formulations of trade as arising from division of labor. The earliest regional approaches applied Adam Smith's concept of absolute advantages to the distribution of resources within a nation. These specialized resource theories stressed the relationship between uneven distribution of natural resources and specialized industrial development. Ullman (1941), Harris and Ullman (1945), and Heberle (1954) pointed out that city and regional economies were often founded on concentrations of primary resources such as coal, ore, and recreational land; factors of production in which an area had an absolute advantage. Such areas developed specialized economies based upon these absolute advantages and trade resulting from these products provided an economic foundation for the local economy. Secondary industrial development is highly dependant on the fortunes of these primary industries. In this formulation, the bounds of a local economy are constrained by the immobility of resources as a factor to production.

As with classic trade theory comparative advantage quickly replaced the concept of absolute advantage in regional economics:

The complete or partial immobility of land and other productive factors . . . lies at the heart of the comparative advantage that various regions enjoy for specialization in production and trade. (Hoover and Giarrantani 1984, p. 4)

As in Ricardo's and Mill's formulations of trade, limitations to factor mobility inevitably create a drive toward specialization and exchange, regardless of absolute advantages. However, regional economists focused on factors not generally incorporated in mainstream economic trade theory; the effects of agglomeration, costs of transportation, and effects of distance in creating comparative advantages.

Alfred Marshall (1890, 1919) was one of the first economists to note the tendency for firms to concentrate in space, sharing common factors of production (for example, infrastructure, specialized labor pools, access to capital). Agglomeration economies involve local cost sharing of commonly held external resources used by individual producers. The presence of these external resources drives down unit costs of production within the firm by substituting for internal scale economies. In turn, this growth attracts larger pools of labor and capital, further reinforcing agglomeration effects for firms. This upward spiral between growth in production factors and local productivity creates greater economic specialization and diversity in production, which also creates external economies for firms. Thus advantages of within firm scale economies are attained by the aggregation of a large number of small firms into one area. Ultimately, these agglomeration effects result both in the externalization of production functions produced within the firm and the substitution of local production for goods and services once imported from outside the community. Marshall argued that the industrial district, based on a diversified and flexible network of specialized firms, is more adaptable to rapidly changing industrial requirements than spatially dispersed production networks (1919, pp. 285-87).

The relation between agglomeration effects and trade is most notably developed in economic base theory. Economic base approaches begin with the assumption that the immobility of production factors will lead to comparative advantages and create patterns of specialization among areas. This division of labor will create patterns of trade among localities, with the economy of each area dependent upon these basic exporting industries. Income generated in the export sector gives rise to supportive industries. Thus, two economic sectors develop—trade oriented industries (basic) and secondary domestic industries (nonbasic). Growth in a locality is determined first by its export industries. This growth is then transmitted

to the nonbasic industries (Alexandersson 1956). Localities become tightly linked through trade.

However, unlike mainstream trade theory, export base approaches hypothesize that agglomeration effects create spatial biases in trade relations. Development of the export sector increases the size of the locality's market, while generating income which leads to growth of the supporting industries. Growth from all sources create agglomeration economies which in turn attract further economic activities (Noyelle and Stanback 1984). The development of agglomeration economies provides a comparative advantage which, in turn, continues to provide incentives for new export industries. In this scheme, growth itself has a reinforcing feedback loop creating further growth and a diversity of export industries (Alexander 1954).

Wilbur Thompson (1965), perhaps the best known proponent of the economic base approach, argues that agglomeration and increased industrial diversity tend to protect larger communities from economic declines. Conversely, in times of economic upswings, the same factors increase the competitive advantage for growth. This "urban ratchet effect" develops a momentum in large communities. The failure to grow, or the experience of economic stagnation, is most likely to occur in smaller communities where diversity and corresponding ratchet effects are not so pronounced. The end result of this process is to create a spatial concentration of exportation. Larger communities tend to develop export functions across all industries, thus dominating the spatial economy. Smaller communities tend to remain specialized in a relatively few number of export industries.

The role of transportation in creating agglomeration economies and comparative advantages is more fully developed by Edgar Hoover (1948, 1968). Building on the work of Alfred Weber (1909), Hoover argued that comparative advantages of areas are shaped by the costs of moving materials for production. In this, the nature of transportation interacting with the production process shapes the location of economic activity. Central to his arguments is the concept of "point of minimum transfer": the location which strikes an optimum balance between access to the input materials into production, and the output of products for distribution. In the case of a single market and single material site, the ideal location is generally located either at the market or at the material site since total transfer costs are a net

of distribution and procurement costs (Hoover 1948, pp. 29–31). Activity will accrue at intermediate points only when "there is a peculiar conformation of the gradients of procurement and distribution cost that makes the total transfer cost least at some intermediate point, usually where two different mediums of transport, e.g., water and rail, meet. . . . [B]y locating the production process at the transshipment point, the total transport costs will be minimized." (Hoover 1948, p. 39) Thus, the nature of the commodity shipped (material oriented vs. market oriented commodity) determines the spatial distribution of an industry (Hoover 1948, pp. 31–38). In any production network then, the nature of transportation will act to create a comparative advantage for specific industries. However, when many markets and materials are involved the advantages accrue proportionally. Further, these points of modal interchange provide economies of scale for: transfer, terminal operations, and specialized facilities for handling and storage of commodities (Hoover and Giarrantani 1984, pp. 42, 64–65).

While Hoover argued that distance and transportation act to create a spatial distribution of production, central place theory shows that both distance and transportation have similar effects on the provision of consumption (von Thünen [1826] 1966; Christaller 1933; Lösch 1938). These theories of central place hierarchies indicate that development and specialization among places is a function of distance limitations relative to consumer markets.

According to central place theory, the actual price of a consumer good (the term *good* includes both material products and services) includes both the direct cost of the good, and the indirect costs of travel to receive that good. Each consumer good has a maximum geographic range beyond which a consumer will not travel. This "range of a good" determines the geographic market for a given product. From the suppliers point of view, there are certain minimum market requirements, or the "threshold of a good," which must be met before profits can be maximized. High threshold goods, for example medical services, require locations that have access to larger consumer markets. Lower threshold goods, fresh food products for example, maximize profits in smaller consumer markets. The location of a function is determined by the interaction of the range and the threshold of a good.

In a geographic region, places most central to

the total population are able to support a full range of services, from the lowest threshold goods to the highest threshold (most specialized) goods. These areas, in turn, develop larger populations to staff the expanded economic base. Less central places are limited by access to larger consumer markets and will not support higher threshold goods, nor larger populations. The interplay between range of goods and market thresholds creates a system of places stratified by distance, population size, interaction, and functions. Central place theory posits that any economically self-sufficient region must be comprised of geographically grouped, functionally incomplete cities and towns oriented toward a single functionally complete dominant center.

Exchange occurs up and down the functional hierarchy, with little interaction among cities of similar functions. Consumers and money flow toward the dominant centers, while goods flow down the hierarchy. The resultant hierarchy assumes a symmetrical pattern of function, exchange, and size. In this hierarchy, the total region is tightly bounded, and each subregion is bounded for a given good. Specialization and exportation are directly related to the size of the consumer market that a place (e.g., town or city) monopolizes. Higher order goods, such as services and government, locate in the dominant cities, centralizing access to consumers.

Transportation and spatial distribution emerge as salient features of trade common to all these regional economic approaches (location theory, economic base theory and central place theory). Space limits factor mobility and provides the basis for the spatial distribution of interdependent but distinct economies. This more complex formulation of the division of labor among economies represents a significant extension of classic economic formulations. However, the regional economic approach remains embedded in mainstream economic assumptions. System boundaries form where mobility costs preclude factor mobility and trade is substituted for the movement of labor and capital. Transportation is simply a cost factor in production and consumption. Finally, while the outcome of spatial limitations creates territorially bounded but interdependent economies, these macroeconomic interrelationships are firmly based on the economic rationality of individuals, which is the basis for division of labor. Thus, trade relations in regional economics remains embedded in individual economic behavior.

Social-Historical Perspectives

In classic sociological statements, transportation tends to be viewed as the internal properties of social systems. Even Weber, although recognizing transportation's role as an external factor, placed more emphasis on categories of social systems rather than on the role which trade and transportation play in creating linkages among different sociospatial systems.

The earliest approach emphasizing trade and transportation as instrumental in the formation of territorial systems is found in the works of social historian Henri Pirenne (1915, 1925, 1937). Trade and transportation are construed as both the basis of socioeconomic structure within each society and as a pattern of external exchanges which links societies into a larger interdependent system. His argument centers on two revolutions in European economic history; the transition to feudal economies and the transition to commercial economies. Each revolution involves a reorientation among separate societies, a reorganization of system boundaries, and a transformation of socioeconomic structure.

Pirenne argued that the trade and transportation networks linking the Roman empire maintained economic cohesiveness despite the loss of inclusive political control following the fall of Roman governance. The social and economic structure of societies in this "Mediterranean Commonwealth" maintained the same form until the rise of Islam effectively undercut and destroyed the transportation system upon which the Mediterranean economy was based. With the severance of long-distance trade social, political and economic interdependence atrophied. Effectively, with the loss of transportation, the geographic scope of socioeconomic systems was curtailed and Europe fragmented into a number of simpler feudal societies based on a direct extraction of resources and local barter economies.

In Pirenne's historical analysis then, transportation is the central concept explaining fluctuations in trade. In turn, trade is a primary economic factor shaping the social and political structure of societies. However, transportation is regarded as more than simply the physical possibilities for movement. Instead transportation is the presence of external transactions involving social as well as technological factors. This is seen clearly in his analysis of the rebirth of commerce in Europe.

According to Pirenne, population increase coupled with the prevailing inheritance system (primogeniture) increased the number of unattached, highly mobile individuals, many of whom turned to trade as a way to survive. These traders, excluded from feudal society, developed laws and institutions formed by the exigencies of trade and travel. They settled in cities bringing with them new social arrangements which, as their economic power increased, eclipsed prevailing forms of social structure and gave rise to an economy integrated by commerce. With the rebirth of urban markets and rising importance of the merchant class came a corresponding reorganization of social structure. As with the shifts in economic structure, these social transformations have their foundations in elements external to the social systems rather than an internal morphogenesis:

[M]edieval commerce developed from the beginning under the influence not of local but of export trade. It was this alone which gave birth to the class of professional merchants, which was the chief instrument of the economic revival." (Pirenne 1937, p. 143)

Without any changes in the prevailing transportation systems, the movement of people and goods across the land increased. Population mobility acted as an external force upon societies and in turn increased trade and commerce.

Pirenne's historical analysis of the relationships between trade, transportation, and distribution presents a grounded formulation of these factors. However, Pirenne was less concerned with the theoretical implications of this analysis than with an accurate analysis of the events leading to market rebirth in Europe. Over the years his substantive depiction of these events came under increased criticism by historians (e.g., Havighurst 1976). Perhaps because of the deficiencies in Pirenne's analysis of the historical evidence in this specific time period, social historians did not pursue the theoretical implications of his hypothesis in other times and other places.

In economic anthropology, however, Karl Polanyi did provide a theoretical extension of Pirenne's approach (1944, 1957, 1971, 1977). Perhaps no single writer more directly attacked the economic market concept than did Polanyi. He argued that the basic assumptions of individual economic rationality are fundamentally misguided (Polanyi 1944, p. 44). Building on Durkheim's notions of the division of labor arising from social integration, Polanyi argued that

economic systems are embedded in and arise from the social system rather than the individual (Polanyi 1944, p. 46).

Central to his formulation is a conceptual division between formal economies associated with modern markets and substantive economies that underlie both market and premarket economies. The concept of formal economy "springs from the logical character of the means-ends relationship, as in *economizing* or *economical*" (Polanyi 1977, p. 19). This form of economic cohesion is characterized by exchange relationships: two way exchanges based on gain. This form, however, is simply one historically specific pattern of interdependence pre-dated by two other forms of economic relations: (1) reciprocity, distribution among similar groups based on institutionalized transference of economic surplus and (2) redistribution, the collection and reallocation of surplus by the political, economic, or spatial units.

Polanyi argues that the basic incentive underlying the division of labor cannot arise from individuals since socioeconomic relations based upon reciprocity and redistribution are not based on individual incentives (Polanyi 1944, p. 251). Further, Polanyi rejects notions that ideology and norms shape economic structure (Polanyi 1977, pp. 36-37). Instead, economic relations arise from the basic material conditions confronting social systems, with the economy evolving from the interaction of a social system with its environment (Polanyi 1977, pp. 19-20).

The central orientation of Polanyi's work was to explain how markets and modern economic behavior arose from earlier forms of socioeconomic cohesion (Polanyi 1977, p. 96). Trade, as a distinctly different type of economic interaction, is central to this explanation. In Polanyi's conception trade is a type of interaction which is partially external to social systems. Influenced by factors outside of daily social interaction, trade overlaps social boundaries, linking internal to distant economies:

The market institution has its origins in two different sets of developments: one external to the community, the other internal. The external is intimately linked with the acquisition of goods from the outside, the internal with the local distribution of food. (Polanyi 1977, p. 126)

As such, markets are never simply embedded within one society but overlap boundaries across societies. The most important external determi-

nant of markets is the nature of long distance trade: "Markets are not institutions functioning mainly within an economy, but without. They are meeting places of long distance-trade" (Polanyi 1944, p. 58). From this conception, Polanyi argues that the division of labor does not rise from either individual or from the institutional structure of a social system. Trade and market are engendered by the external exigencies of transportation and spatial constraints affecting inter-areal interactions (Polanyi 1944, pp. 260-61).

While influenced by classic sociological theories, Polanyi's approach embodies several important breaks with classical statements. As with Durkheim, economy is firmly embedded in society. However, one vital aspect of the economy—trade—is a distinctly external element and one that shapes social structure. In this Polanyi draws from the conceptions put forth by Weber. However, far from the motivational and normative orientation proposed by Weber, Polanyi proposes that trade and the economy are shaped by transportation, spatial, and environmental conditions. This materialism is broadly consistent with Marx's formulations of relations of production; however, Polanyi reformulates such relations as a basis of social cohesion rather than conflict (1977, p. xxxii). Polanyi's stress on the effects of external factors (space, environment and trade), in particular, differentiates his approach from both the internal economic determinism of Marx and the morphogenesis through individual rationality of economists. Never rejecting the empirical observations of the latter discipline, Polanyi's concept of substantive economies provides an alternative causal factor—systemwide adaptation to external conditions. In this, Polanyi's approach parallels conceptions of the spatial economy developed by early human ecologists. Work by these classic ecologists integrated social theory with the empirical observations of turn of the century economists and economic geographers. From this blending, a theoretically coherent economic sociology emerged which highlighted the role of space, transportation and trade.

Sociological Human Ecology and Location Theory

Like Polanyi, C. H. Cooley's (1894) theory of city location views transportation as an external factor shaping the space-economy. His analysis of early American patterns of urban development

demonstrates that breaks in transportation create a need for storage, services to equipment, and other functions which provide the initial impetus for city economies. This early development of a transportation and trade oriented industry provided labor and consumer markets for subsequent economic development.

Three salient points of location theory are worth noting here. First, city growth is primarily determined by exogenous forces, usually resource concentrations, transportation flows, and trade flows. Second, the initial growth in resource production, trade, or transportation provides secondary growth in industry, and in the hinterland surrounding the trade city. This creates an impetus for a system of small city dependence on large city economies. And third, specialization among dominant cities is eventually minimized as initial dependence on a few industries gives way to a more diversified economy.

Current location theory approaches stress the role of trade in the formation of local economies. Settlement and growth depend upon location relative to long-distance trade routes. Cities develop in locations which optimize distance between areas of resource production. Such locations maximize access to resources while minimizing transportation costs, thus providing competitive advantages for the growth of wholesale trade, manufacturing, and capital investment. These industries form a base from which a full range of economic functions develops. Growth is then monopolized in such locations and these cities dominate later urban system development.

Human ecology encompasses and extends location theory, with transportation likewise treated as a pivotal variable to understanding trade and spatial relations. Unlike earlier location approaches, however, ecological approaches stress that organizational linkages are inextricably interwoven with both transportation and trade. One of the earliest examples of this is Adna Weber's (1899) demonstration that as transportation systems increased, consumer accessibility to the urban market, agglomeration advantages, and scale economies concentrated retail activity in the central city. However, organizational centralization eventually superseded the advantages of spatial concentration. Under single corporate control retail branches could diffuse spatially while maintaining economic and organizational advantages of scale and agglomeration. Such spatial deconcentration, however, was predicated on the

centralization of organization in central cities as well as sufficient technological developments in transportation and communications.

Likewise, transportation and communications systems underlies N. S. B. Gras's (1922) urban centered explanation of economic development. Cities, lying at the confluence of these systems, were the points of convergence for commerce and trade. The nature of trade (wholesale vs. retail) determined the scope of influence for each city with some oriented primarily to local markets and others to national and international markets.

Weber and Gras laid the foundation for early ecological conceptions of sociospatial hierarchy. These notions were especially compatible with the concept of species dominance in biological ecology and were readily integrated by Park, Burgess, and McKenzie (1925). Drawing from the notion of "biologic economics" (see Wells, Huxley, and Wells 1934), classical human ecology was offered as a social economics with specific reference to the territorial aspect of the division of labor (Park 1936). The melding of "biologic economics" and sociology provided an alternative conception of economic interdependence to that proposed by economics. Rather than rising from individual motivation, the division of labor was seen as a consequence of population adaptation to material conditions confronting society. In this, ecology rejected the underlying theoretical basis of economics, applying instead sociological notions of cohesion and the individual's embeddedness in group processes. Similarly rejected were purely biotic notions of the economy: "The interrelations of human beings and interactions of man and his habitat are comparable but not identical with other forms of life" (Park 1936, p. 13).

Central to the human ecological conception of the social economy were (1) cultural attributes of society, (2) technology, particularly as it involved transportation and communications, and (3) commerce (Park 1936). However, the Chicago School ecological paradigm focused specifically on local (intrametropolitan) sociospatial patterns where issues related to transportation and trade were less prominent. As a result, despite their theoretical importance, concepts of trade and transportation were not central to the Chicago School.

R. D. McKenzie (1924, 1926, 1927a, 1927b, 1933, 1934, 1936) was the notable exception in classical human ecology. Drawing on the works of Cooley, Adna Weber, and Gras, McKenzie argued that transportation and communications

networks, more than the exigencies of proximate physical resources, shaped local organization:

The functional or ecological region differs from the geographic region in that it is a product of contact and the division of labor rather than of unity in physical environment. . . . The basic elements of its spatial pattern are centers, routes and rims. It is composed of a constellation of centers, the interrelationship of which may be described as that of dominance and subordination. ([1934] 1968, p. 45)

Since trade comes to replace direct extraction as the productive basis for socioeconomic systems, external transportation networks are central factors determining social organization:

[I]t is by virtue of the exchange of products and services of the basic institutions that intercommunity division of labor is achieved and that large-scale economy comes about. This economy is based primarily upon the interchange of physical objects and has become extended to almost worldwide dimensions. ([1936] 1968, p. 111)

As the proximate environment is superseded by such external interdependencies, places become less bounded in space, and more influenced by position in trade and transportation flows:

As the agencies of communication improve and as the impediments to movement are overcome, the world becomes organized on the pattern of a spider's web. . . . All the old boundaries, both local and national, are gradually losing their significance; routes, rather than rims, are becoming the subject of stressed attention. (1927b, p. 34)

McKenzie's emphasis on social interaction across space and upon hierarchical interactions among communities (rather than on the spatial organization within community) represented a significant departure from the main research thrust of the Chicago School. However, this theoretical reorientation toward inter-areal relationships held little sway in sociology, and human ecology remained firmly embedded in an internal oriented urban sociology. It was not until Hawley's (1950) reformulation of human ecology that trade and external relations emerged as theoretically central concepts.

Strongly influenced by McKenzie, Amos Hawley's neoclassical ecology (1950, 1981, 1986) retains the "biologic economic" formulation of social organization while shifting the emphasis from the biophysical to the social environment. The

state of transportation technology has direct effects on the scope, regularity, and number of interactions between a population and the (social) environment, and is a vital factor determining the limits of organizational development of society. As Hawley states: "Efficiency of transportation and communication technology sets the limits to complexity of the ecosystem" (1986, p. 60). Discussing the effects of transportation specialization and interaction on urban places, he argues that:

A continuation of interaction between systems leads them to cultivate their respective location advantages and specialization and ultimately to establish relations of superordination and subordination. In the end, a hierarchical system, in which each urban complex is reduced to a subsystem, envelops the entire territory. (Hawley 1981, p. 253)

In essence, the position of an area in the transportation network determines the regularity of its contact with the broader social environment. Increases in interaction brought about by changes in transportation technology alter social structure and create functional interdependence. The specific types of functions developing in a social system are determined by its position within the transportation network and changes in network structure which alter those functions. Functional specialization, however, is divided into two dimensions: (1) division of labor of productive activities associated with trade, and (2) the organizational control over this division of labor.

Although treated as distinct types of networks, organizational and production transactions are intertwined and inter-areal interdependencies develop in terms of position in both networks. Position in transportation and communications networks shapes the spatial location of both dimensions. Organizational functions locate in areas which provide maximum access to, and control of, inter-areal flows of products and information. Overlapping these organizational transactions, however, are trade flows organized along the transitive production sequences linking each area to a larger economic system (Hawley 1950, 1986). Within areas, the local economy is dominated by those production functions (key functions) involved in the inter-areal system.

In this, unlike classical ecological approaches, system boundaries vary according to the degree these external organizational and trade transactions interpenetrate the local system. In the situation where external linkages are many, interaction

across systems increases and spatial boundaries become less distinct. Where there are few linkages among systems, boundaries are definite. The technology of transportation and communications determines the extent to which a system is bounded, as well as the structure of interaction among systems.

In sum, the view of social and spatial hierarchy put forth by Pirenne, Polanyi, and human ecologists is an essentially external view. Trade and transportation systems develop outside individual social systems, interpenetrate local economies, and then reorganize the socioeconomic structures into a loosely confederated system tied together by the division of labor.

An alternative view is given by social historians and sociologists building on the notions of economy and society developed by Marx (1848, 1857-58, 1867; Marx and Engels 1845-46). This viewpoint, while incorporating external elements in their analyses, posits that trade and social system boundaries rise from class interests and relations of production. In this, it is a return to an essentially internal view of the morphogenesis and continuance of trade (in this context refer to our previous discussion of Marx).

Approaches to the World Economy

For Fernand Braudel (1949, 1967, 1972, 1977, 1981) daily economic life, cities, regions, and nations are integrated through complex sociospatial hierarchies into territorially distinct world economies. Braudel's concept of the economy begins with daily material life. Braudel posits that "material life" arises from the exigencies of everyday life and thus involves economic transactions qualitatively different from market exchanges. Although Braudel places greater emphasis on the nature and control of production, "material life" parallels Polanyi's concept of "substantive economies." For both authors material life precedes market exchanges. The rise of market transactions reorganizes rather than supersedes material life. Based upon exchange and competition, the market economy extends economic transactions beyond the daily community, linking production to consumption across areas, and the conditions of daily material life to the spatial structure of exchange. Transportation systems are central to Braudel's analysis since they not only link spatially dispersed markets, but the material life of the countryside to town life in urban cen-

ters. Position in the transportation system delimits possible market relations among places and delimits the conditions of material life by determining the scope of exchange among markets (Braudel [1973] 1981a, pp. 415–30).

Ultimately these factors lead to economic hierarchies across space. Daily material life is embedded in market relations, and markets link city economies into regional and national economies. While nations maintain definite political and social boundaries, however, trade between nations extends the scope of economic interdependence internationally. Spatial limits to trade determine the territorial scope of these world economies:

These coexisting economies, which carried on only an extremely limited number of exchanges among themselves, divided up the population areas of the planet, creating rather vast frontier regions, which, with very few exceptions, commerce generally saw little advantage in crossing. (1977, p. 83)

Although external to political systems, trade shapes the internal structure of each world economy. Position in this trade network determines the role of national economies within each world economy. Thus it is only by taking each world economy as an analytic unit that the full range of political and economic activity can be understood as a system.

As in human ecology, transportation delimits the geographic scope of world economies and the functions of subsystems nested within the larger economy (i.e., nations, regions, and cities). However, unlike ecological approaches, the importance of transportation is found in its limitations to interaction rather than in its interpenetration into local systems. For, Braudel contends, it is the inefficiency of transportation which plays a vital role in transforming market economies into capitalist world economies.

The market of exchange and competition exists separately from capitalism, which, he argues, inherently attempts to limit and control competition. Braudel says that capitalist economies (as distinct from market economies) rose out of the interstitial trade in these spatial market hierarchies. The more complex these spatial hierarchies became the more distance allowed the main economic actors to be free of both formal and informal controls on exchange (Braudel 1977, pp. 53–54). In this sense, sociospatial hierarchy and the distribution of markets were both a precondition for capitalism and a continuing factor shaping it.

Nevertheless, if space, society, and economy are key elements in the formation of capitalism they are not sufficient elements to explain the continued development of capitalist world economies. The state is the key element. As the power of capitalists increased, the state became the mechanism used to create monopolies and limit competition. The intertwining of local capitalist interests with state political structure confined economic control to national boundaries. Competition in the world economy becomes competition among nations, and political/economic power becomes associated with position in the world economic division of labor.

The power of nations in this division of labor is in part shaped by political strength and in part shaped by the uneven distribution of natural resources. Those areas with absolute resource advantages—in the sense developed in economics—and the political cohesion to control those resources are the central points dominating the world economy. Geographic location relative to the center is the primary determinant of this spatial division of labor. The final structure of this world economy is one of spatial concentric zones, each associated with specific economic functions:

A world-economy can be described as having three facets: 1) It occupies a given geographic space; thus it has limits that mark it off . . . 2) A world-economy always has a pole or a center, represented by one dominant city . . . 3) Every world-economy is divided into successive zones. There is the heart, that is, the region about the center . . . then come intermediate zones about this central pivot. Finally, there are the very wide peripheral areas, which, in the division of labor characteristic of the world-economy, are subordinates. (Braudel 1977, pp. 81–82)

Trade, in this conception arises out of this hierarchy of nations. Thus while external to political systems, trade is internal to the world economic system, and the spatial limits of trade constitute the spatial limits of the larger economic system. While shaped in part by distance, resources and political control, ultimately Braudel links all processes to daily material life and the question of who controls the means of production. For Braudel, these relations of production created not only markets and national economies but international structures as well ([1973] 1981a, pp. 560–63).

Building on Braudel's work, Immanuel Wallerstein's dependency/world-systems approach gives a much more central role to national political

structures than transportation in the formation of a world economic system (1974, 1980, 1989). Yet, the spatial boundaries of economic and political action are viewed as essential to creating a world division of labor exhibiting unbalanced trade relationships. Wallerstein's thesis posits that there are essentially three types of nations in the capitalist world system: core, periphery, and semi-periphery. Each of the three types is typified by specific economic activity. The peripheral nations provide the raw materials for production. They tend to be, due to dominance and control of the other types, sectorally specialized; that is, they usually have only one or two commodity exports with concentration of industry in cash crops produced for larger estates within the nation and in primary products.

Core nations dominate this resource flow and are involved in secondary processing of these primary products as well as a total complex of other economic activities. Core nations, according to Wallerstein, are not necessarily dependant upon periphery nations for goods and supplies, but evidence their own highly developed primary processing, in particular in agriculture. This ability to produce the entire complex of economic activity allows them internal control of their economies as well as external control over other nations.

Semiperipheral nations are not assigned specific economic tasks in as much as their position is as much political as economic. In general, however, these nations are involved in resource transfer as well as some secondary processing, while relying upon both peripheral and core nations for the bulk of necessary economic tasks. Such division of labor and trade provides both maximum stability in the economic system and increased profitability from the system as a whole.

Wallerstein contends that the ability of one nation to dominate another rises from a series of idiosyncratic factors involving ecology, demography, and accidents of trade. For example, he states that "if at a given moment in time, because of a series of factors at a previous time, one region has a *slight* edge over another in terms of one key factor, *and* there is a *conjuncture* of events which make this slight edge of central importance in terms of determining social action, then the slight edge is converted into a large disparity and the advantage holds even after the conjuncture has passed" (1974, p. 98). These accidents of historical circumstance are often, but not always transportation developments and locational advan-

tage. Regardless of the type of initial advantage that determines a nation's position in the world-system, it is the structural position itself that determines further advantages.

While the current world-system positions were achieved for a variety of reasons, as Wallerstein seeks to demonstrate, this position is determined within a particular type of economy—that of capitalism. Advantage in such a system is derived from capital accumulation. Dominant nations are those that could accumulate capital and continue to accumulate capital at a rate relatively higher than other nations. Such capital accumulation is only possible by using surplus value created by exploiting the labor of other nations. Here Wallerstein follows Marx's conceptualization of profit and applies it to nation-states. Where Marx saw capital as the accumulated labor over and above that necessary for an individual's subsistence, Wallerstein sees national capital accumulation as the ability to accumulate labor-produced value over and above population needs of the nation, or more simply, to maintain favorable balance of trade.

CONTEMPORARY NETWORK APPROACHES

Traditional approaches in economics and sociology stressed the spatial boundedness of the relevant socioeconomic systems. Trade is viewed as a type of transaction that transcends these system boundaries. Transportation enters into consideration as a factor fixing the internal boundaries of a system. Trade is approached from the inside out; that is, trade and trade relations are examined from the point of view of each system. Even for Weber and Polanyi, where trade and transportation were viewed as external elements, the effects of these external relations are examined relative to internal structure.

Contemporary approaches have shifted from a focus on a system and its trade relations, to a focus on the organization and structure of these external connections themselves. Effects on spatially bounded systems are approached from the outside in, arguing that position within transaction networks affects internal structure. Irwin and Hughes, discussing network concepts underlying macro-urban approach, argue that concepts of structural position in external transaction networks are emerging as a central theoretical issue across all sociospatial approaches (1992). While noting that this network conception has always

been an explicit theoretical basis for ecological theory, they show that this conception underlies work across a variety of positions. All current approaches are incorporating this network view.

In regional economics, Isard argues that ideas of agglomeration economies and economic base theory should be best reconceptualized as position in trade flows: "To be able to fully explain what exists at a set of interacting locations, we must come to know and simultaneously explain the flow of goods, factors and ideas among these locations" (1977, p. 159). Central place theorists have likewise come to concentrate not on places but transactions:

The recent literature suggests that a need exists to view the interaction process as an integrated phenomenon, composed not only of the usual mass and distance effects, but also of the elements of accessibility and competitiveness in flows. (Fik and Mulligan 1990, p. 527; see also Fotheringham 1984; Fotheringham and Webber 1980)

Likewise, dependency approaches argue that:

"New technologies allow the emergence of a *space of flows*, substituting from a space of places, whose meaning is largely determined by their position in a network of exchanges. (Castells 1985, p. 33)

While retaining their distinct theoretical conceptions, the increasing emphasis on transactional position, rather than on the sociospatial units themselves, has led to a convergence in substantive concerns. Although not exhaustive of current issues, five interrelated areas are emerging as central research issues across all paradigms. First, research is increasingly concerned with describing the structure of transactions. Second, research across all paradigms has centered on delineating the scope of transactions, particularly in respect to relevant territorial boundaries. Third is a focus on the relationship of different transactional networks to one another. This concern is specifically oriented toward the relationship between economic flows and organizational transactions between firms, functions, or classes. Fourth, research has focused on the role of transportation and communications systems as physical conduits for goods, information and organizational transactions. Finally, there is a central concern with interrelationships between different sociospatial systems, particularly between urban systems and international systems.

Regional economics, as it has expanded into

trade theory, has reformulated the concept of agglomeration economies into a network approach:

We define an industrial complex as a set of activities occurring at a given location and belonging to a group (subsystem) of activities which, because of technical, production, marketing and other linkages, generates significant economies to each activity when spatially juxtaposed. (Isard 1977, p. 166)

Similarly, mainstream economists are no longer taking national boundaries as unequivocal spatial units, focusing instead upon interactions between flows of products and flows of production factors as two processes creating economic integration of areas (e.g., Machlup 1977, p. 211). Likewise, input-output analysis has been a methodological impetus to reconceptualize economies in terms of multidimensional transaction flows rather than as emerging from the domestic economy. Wassily Leontief, for instance, combines flows of investment income, capital movements and commodity movements to analyze interrelations between regional, national, and international production networks (e.g., 1977, p. 533).

Although reconceptualized in network terms, recent economic research remains based in the primarily internal conceptualization of division of labor associated with classical economic thought. Relevant network transactions involve two types of transactions; commodity exchange and the movement of production factors (e.g., labor, capital, and economic organization). The spatial distribution and boundaries of economic systems are delineated by the breakpoint between unencumbered mobility of production factors and partial immobility of these factors. The degree of spatial friction to factor movement determines the degree to which trade substitutes for integration into a single economic system. Where factor movement is relatively unencumbered, production moves to areas of comparative advantage. Where barriers to factor movement occur, commodities are traded and domestic production is boosted.

At this breakpoint, agglomeration economies (domestic/nonbasic production) develop around export industries. Production of commodities in other local sectors declines, and these commodities are imported from other areas that produce those commodities more efficiently than other domestic products. The specific export sectors which develop are determined by costs relative to other domestic sectors. Trade occurs between this pair

of areas; the resulting trade network is seen as a series of direct transactions among economies.

The relationship between each pair of economies is established through the balance of trade and comparative advantages in production. In this sense economic trade approaches focus on dyadic trade flows among economies. Position in the trade network relates directly to volume of exportation. Economies with more export industries interact with a larger number of external economies and are more influential in the trading network. Additionally, increases in the volume and scale of export industries create agglomeration effects reinforcing growth across all sectors.

The wedding of regional economics with mainstream trade theory has also acted to refocus the units of analysis from nations to systems of cities, "since contemporary international trade to a very great degree consists, in effect, of the exchange of goods and services between the metropolitan units of different advanced economies" (Pred 1977a, p. 128). Similarly Isard has argued "that 'realistic' trade theory and 'realistic' location theory are one and the same" (1977, p. 159).

Allan Pred has conducted research analyzing the interplay among economic development, location, and information. His major thesis is that economic development is a cumulative process, dependent upon both early advantages and continued development relative to technological changes. His work extends economic base theory and stresses the role of control hierarchies in city system development. Pred pays particular attention to the effects of technological change on the spread of information networks. Pred argues that the agglomeration effects of the largest cities create spatial biases toward concentration of control and command functions (1977b, p. 174).

Such spatial biases give rise to asymmetric network linkages among cities. This is particularly true in the development of job control among production units. Due to this spatial bias, intraorganizational growth is transmitted differentially according to branch plant locations. Interorganizational interdependence develops because of technological advances and changes in the organization of production. Transportation advances lower the costs of shipping products, which, in turn, create more elaborate spatial patterns in transitive linkages. The development of airline linkages and telecommunications networks have facilitated the movement of specialized information and give rise to information based industries.

These rapid changes in the organization of production have increased reliance on coordination occupations within the organizational structure and on external provision of services to production (producer services):

Given the increasing number of intra and interorganizational economic linkages being formed between variously sized metropolitan units . . . it may even be possible to speak of an emerging system of cities which spans all of the world's advanced capitalist economies. (1977a, p. 144)

The resulting network of organizational linkages creates an international contact network that may affect trading linkages, the flow of capital, and international locational decisions (Pred 1977a, p. 144). However, while the element of organizational control is important in the social organization of trade, it is predicated on efficient and effective transportation and communications systems.

A similar approach is used by regional economists (Stanback 1979; Stanback and Knight 1970; Stanback et al. 1981; Stanback and Noyelle 1982; Noyelle and Stanback 1984) and economic geographers (Borchert 1978; Brunn and Wheeler 1980; Keinath 1985; Wheeler 1986; Wheeler and Brown 1985). These scholars stress the rise of the large corporation and inherent organizational linkages as vital in understanding inter-areal networks. They argue that the rise of this corporate form has broken down regional and national economies and changed the functional structure among areas. The key process in this change has been the change of corporate service from the plant level to the firm level. Such a movement allows the separation of once integrated functions:

[T]he rise of the large corporation, with its increasing emphasis on service-like activities carried out in its central offices, the opening of nation wide consumer markets, the rising importance of nonprofit and public sector services as well as postwar changes in transportation and technology have been major factors in bringing about such a fundamental transformation. (Noyelle and Stanback 1984, p. 25)

The work of Pred and of Noyelle and Stanback suggests that changes in the spatial economy have resulted in the rearrangement of both occupational structure and of industrial structure. In addition, these authors argue that the rise of air transportation is of key importance to the creation of inter-areal linkages. Their research supports the idea that face-to-face contact and pro-

duction linkages are intertwined in interurban and international systems. These authors also stress that the rise of producer services is of fundamental importance to economic development. This assertion is supported by the work of British geographers and regional economists.

Marshall (1982) and Marshall et al. (1985) argue that producer services provide a critical export base for an economy:

Producer services are part of the supply capacity of an economy: they influence its adjustment in response to changing economic circumstances. They help, for example, to adapt skills, attitudes, products, and processes to changes or to reduce the structural, organizational, managerial and informational barriers to adjustments. (1985, p. 5)

Marquand (1983) also assigns producer services a key role in the social and economic change of economies: "In an age of rapid technological change, what is particularly important about certain producer services is that they provide the source (of change) and are mediators of that change" (1983, p. 24). Massey (1984) argues that producer services are increasingly taking on a spatial dimension, one concurrent with national and international urban hierarchy. This finding is supported by Gillespie and Green (1986), who show that producer services have become increasingly concentrated in the dominant metropolitan areas in Great Britain. In this, trade in services has replaced trade in goods for major urban areas in the spatial economy.

Although the content of trade networks and the concepts of trade structure are quite different in dependency/world systems approaches, these approaches share a similar concern with the interaction between international city systems, transportation, and the organizational component of international trade patterns. For example, Armstrong and McGee's model (1985) explains the world economy in terms of three spheres (contents) of transaction: production, circulation, and consumption. Central to their model is a focus on access to resource flows and exclusionary control of such resources, often through political control. Dominant groups and nations control access to resources and exclude them from networkwide circulation. This structure of the trade network is a result of political/economic power and exclusionary control of these resources. Transportation and communications systems emerge as critical factors in the organization of trade since they act to spread a single organizational structure and

create increased convergence across nations (Armstrong and McGee 1985).

While this organizational dimension is in part associated with national political structure, a variety of dependency/world system research views cities as critical linking nodes. Urban systems are both theaters of accumulation and centers of cultural (Western) diffusion (Armstrong and McGee 1985, p. 41). Likewise, Castells argues that the international division of labor links cities, not nations together in a trade network (1985, p. 29). Such world cities are divorced from proximate regions. The resultant international system of cities acts to create flows of immigrants cutting across spatial proximity and national boundaries: "[T]he interpenetration of economies and societies at the international level, facilitated by new communications technologies, has laid the ground for the 'immigrant city'" (Castells, 1985 p. 32).

While the importance of trade, transportation and immigration flows are emerging as critical variables in the dependency approach, most dependency researchers maintain that such transactions are primarily endogenously generated from the relations of production within society:

[T]he primary basis for understanding the nature of a society's evolution and its potential for change must centre on its current internal situation set in the context of historical experience. (Armstrong and McGee 1985, p. 37)

Work by Smith, Nemeth, and White provides a notable exception to this purely endogenous view. They argue that the focus of dependency analysis should shift to a more relational view of international exchange (Smith and White 1992; Nemeth and Smith 1985; Smith and Nemeth 1988). Their external orientation to world systems arises in part from the authors' close analysis of theoretical statements, but in part from the adaptation of ecological theory into the dependency approach.

This external priority of transactional networks underlies many of the theoretical tenets of human ecology (Irwin and Hughes 1992). Dominance, hierarchy, and functional differentiation rise from the relationship of areas to the broader sociospatial network (Hughes 1993). Unlike the dependency approaches, external conditions for interactions are seen as creating patterns of production and social organization among areas. Transportation and communication systems play a central role in creating both the organizational and productive aspect of networks. Increased efficiency of

transportation and communications systems decreases the importance of propinquity and expands the geographic scope of interdependence. If the structure of economic interdependence owes less to geographic proximity, however, structural position in developing transportation and communications networks becomes more important. Consequently, economic growth of any one area is less self-contained and more tied to economic growth in the nationally and internationally integrated economy and the competitiveness of any one socioeconomic system is more affected by distant economic conditions.

Changes in transportation and communications alter the structure of both networks and in turn affects trade and exchange among areas. Increases in accessibility allow an inter-areal spread of production linkages and increasing territorial integration of economic activity. With decreasing spatial constraints there is a corresponding increase in number of trade and exchange linkages as well as an increase in the volume of transactions. Once peripheral cities, regions, and nations are integrated into a spatially diffused economic network, linked through key functions to a broader interterritorial production network, this expansion of linkages will, by itself, decrease the predominance of previously core areas in the trade network without any change in the location of production (Irwin and Hughes 1992, p. 41). Coterminous with decreasing frictional constraints, however, is a reorganization of economic location that further erodes position in trade (Kasarda and Appold 1988, 1989).

Decreased costs of shipping and changing value to weight ratios have altered locational advantages once associated with large core areas. These changes in transportation and communications combine to create a new locational flexibility for industry, which results in continued deconcentration from the core and the rise of new agglomeration economies in peripheral areas. Additionally, the shift in the nature of economic activity from industrial to postindustrial production has restructured the content of trade itself, with economic interaction increasingly oriented toward trade in services and information exchange over product exchange. Correspondingly there has been a shift in the concentration of jobs from production to information intensive work that has undercut the production base of core areas.

The factors that have diffused the production network, however, are centralizing the organizational networks in core areas. The elaboration of

trade structure coupled with the geographic diffusion of production increases the need for organizational contact. Thus these organizational ties overlay production networks and create a distinct network linking economies through coordination, control, and information transactions. These coordinative and control functions locate in areas that minimize contact constraints and maximize control of the expanding trade network. Further, as the nexus of growth has shifted from industrial to postindustrial production, locational advantages are shaped by new competitive factors associated with core areas.

Social ecologists have long argued that modern advances in transportation and communications have reduced the locational advantages of traditional center cities and have allowed industries to decentralize continuously outward from dense cities to suburban rings and lower-order metropolitan areas with newer infrastructure (Kasarda 1980; Kasarda, Hughes, and Irwin 1991; Hicks 1982). However, contact intensive activities are less affected by the diseconomies of scale that force product oriented activity from core areas. Land costs are offset by intensive land use through high-rise construction. Density, although a barrier to the movement of goods, can be an economizing factor for contact intensive industries. By increasing the potential for face-to-face interaction, social density in core areas facilitates personal contacts vital for nonroutinized business activities.

Additionally, information exchange has been enhanced by the development of state of the art communications infrastructure. In recent years, modern telecommunications technology—such as fiber optics, broadband cables, and satellite and microwave wireless systems—have been developed. Such telecommunications advances, which have been concentrated in larger metropolitan areas, increase the capacity of central offices and specialized firms to receive, process, and transmit information. Consequently, core areas increasingly are associated with the organizational control of spatially dispersed production, sales, services, and flows of capital (Ross 1982, 1987; Lincoln 1977, 1978, 1979; Marshall 1982; Stricklin and Aiken 1983; Stephens and Holly 1981). As a result “telecommunications is creating a new urban hierarchy in which certain cities will function as international interaction capitals, with more extensive electronic infrastructure and richest opportunities for human interaction” (Moss 1987, p. 35).

Though less often treated as a mechanism for communications, air transportation is vital in linking production and management functions. As production has diffused, management has maintained control and coordination of the diffused production process through regular face-to-face contact accomplished through air travel (Törnqvist 1962, 1968, 1970, 1973). Thus, air travel links production with control activities across space, and position in the airlines network provides locational advantages to such contact intensive activities. Air travel not only increases accessible territory, allowing a wider scope of organizational contact, these daily trans-spatial movements of people also reflect flows of information exchange across space as well. Areas central in these flows provide the greatest breadth and diversity of potential contacts, thus, national and international locational advantages for contact intensive industries and occupations (Irwin and Kasarda 1991).

As ecological researchers have turned to actual measures of interactions (flows of people, capital, information, and production) the structure of and position in such networks have emerged as critical theoretical and empirical determinants of inter-areal relations. (Eberstein 1982; Eberstein and Frisbie 1982; Eberstein and Galle 1984; Hughes 1993; Irwin and Hughes 1992; Irwin and Kasarda 1991; Meyer 1984, 1986). Most analyses have focused on the relationship between a single type of network and areal socioeconomic structure, rather than examining interrelations among networks. At minimum, trade relations are best described as overlapping networks of production and organizational exchange involving flows of people, products, information, capital, and power (Kasarda and Appold, 1989).

CONCLUDING REMARKS

In this chapter, we have attempted to review and systematize the scholarly literature in economics and sociology apropos theories linking trade, transportation, and spatial distribution. A problem of comparability and generalizability arises from the multiplicity of analytical units addressed in the two disciplines as well as difficulties defining system boundaries, which have become blurred functionally, if not politically, under advanced transportation and communication technologies.

Transportation is seen by both disciplines as an

enabling or facilitating technology for an expansion of the scale and scope of exchange within and among markets, economies, and societies. Space is typically conceived as a time-cost friction, which, if reduced, increases access and lessens the costs of transactions resulting in a wider range and higher level of economic interaction. Improvements in transportation (and communications) infrastructure reduce spatial frictions, thereby enabling the disagglomeration of activities while fostering economic exchanges (trade) over wider distances. These improvements result in the territorial spread of sociospatial units, expanded resource and transaction ranges, and the integration of activities at increasingly dispersed and distant sites.

Perhaps nowhere is this territorial spread and integration more concretely manifested than in the dramatic rise of component sourcing. Just a decade ago, Ford introduced the world car, assembled in Detroit from parts produced on each of the major continents. Today, global sourcing is commonplace, with advanced telecommunications and transportation technologies allowing wide geographic dispersion of component manufacturing sites and places of final assembly, depending upon raw material availability, labor costs, labor skills, and markets.

In this globally networked economy, speed to market, agile manufacturing, strategic alliance, international joint venture, and the virtual corporation (where international firms band together to meet specific market opportunities) dominate contemporary corporate action. New theories and models in economics and sociology will be needed as regional trading blocks expand and as networks of firms rather than individual firms become the key competing actors (see chap. 9 in this *Handbook*). With business and international business becoming inseparable, additional research will be needed to understand the culture, legal, political, and economic systems in which trade and international transactions occur.

Concepts and models in sociology and economics will likewise need to be merged in the form of synthetic theories of transnational corporate activity that simultaneously encompass such factors as efficiency, equity, participation, and political risk. Discussions about who wins and who loses in the new globally networked economy will escalate as national borders are increasingly supplanted by commercial borders formed by cross-cutting urban hierarchies, regional alliances, strategic alliances, and virtual corporations.

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