

Vít Pászto

Abstract

Geography as an independent scientific branch comprises of a great variety of subjects with lots of methods, tools and approaches. For instance, when studying human migration flows, we need to be able to use pieces of knowledge from (1) geopolitics to understand the initial motives of migration, (2) (geo)demography to analytically describe, e.g. age structure of migrants, (3) behavioural geography to find out how migrants inclusion would work, (4) urban (spatial) planning to cope with unexpected migrant inflows, or (5) economic geography to model, e.g. how the labour market will react to a sudden increase of potential workforce. On this example, we demonstrate how interdisciplinary the geography is. Moreover, if we add specialised, accompanied disciplines, such as GIScience and cartography, an amazing box of geographical analyses opens.

Economic geography – geography with a focus on various economic aspects – is usually understood as a sub-branch of human geography. Definitions of economic geography are given differently by different scholars, experts and practitioners. Sometimes, we talk about

the spatial economy or spatial econometrics; sometimes, it is merely geography applied to some economic theme. In this chapter, we try to shed light on the terminology of “economic geography” in the first part. Following sub-chapter will give an overview of the basic concepts of location theories, which has been broadly used in both economic and geographical theories and frameworks.

Keywords

History · Terminology · Definitions · Location theories · Spationomy

7.1 Definitions and History in Brief

In this subchapter, we will provide a reader with the most used and common definitions of economic geography by various scholars, experts and also scientific-popular sources. We then attempt to summarise the key points from these definitions, helping the reader to understand the main subject of economic geography. We also guide the reader through the (modern) history of economic geography to imagine all the consequences leading to the contemporary state-of-the-art in this field.

7.1.1 Definitions

Taking the definitions by Barnes (2009, 2013a) the economic geography represents a subfield of

V. Pászto (✉)

Department of Informatics and Applied Mathematics,
Moravian Business College Olomouc, Olomouc, Czech
Republic

Department of Geoinformatics, Palacký University
Olomouc, Olomouc, Czech Republic
e-mail: vit.paszto@gmail.com

human geography concerned with describing and explaining the varied places and spaces in which economic activities are carried out and circulate. According to the Barnes (2009, 2013a), it was a subject that was more empirically grounded, concerned with context, less abstract, formally theoretical than economics, and it has been subject to so much change due to its empirical basis. Barnes (2009, 2013a) continue with his conceptual thoughts about the discipline and mentions that “since around 1990, after the economic geography absorbed many outer approaches (e.g. from spatial science, post-structuralism and post-Fordism as well as regional science), the topics as labour and work, financial and business services, consumption, retailing, and the firm became prominent subjects of (economic) geographical research.” In the line with contemporary issues in the World’s globalised economy, we think that together with the above-mentioned topics, the scope of economic geography can also cover transformational economies (e.g. post-soviet, post-Arab spring, Chinese economy) and their geographical context, big (economic) data analysis, multi-polarity of economic world, increasing mobility of business activities and financial flows, technological businesses, progress and online environments, which create entirely new (virtual) domain to be studied, and many more.

Back to the formal definitions. As mentioned in the introductory chapter to *The SAGE Handbook of Economic Geography* (Leyshon et al. 2011), practices in economic geography are not independent of the times and places, thus sensitive to the circumstances in which they happen and very sensitive to geographical and historical context. Leyshon et al. (2011) also note that there is a lack of economic geography canon (no core texts or seminal bodies of work) due to the interdisciplinary nature of geography. Therefore, it is rather a diversity characterising today’s economic geography. However, there can be identified two main approaches to the field of economic geography:

1. economy as a separate spatial object
2. economy as a delimiter for sub-fields in geography

For the first approach, the most general definitions are valid, i.e. those focusing on geographical aspects of economic topics with the use of a mix of (geographical) methods. One such definition is given by Aoyama et al. (2011): economic geography studies geographically specific factors that shape economic processes and identify key agents (such as firms, labour and the state) and drivers (such as innovation, institutions, entrepreneurship and accessibility) that prompt uneven territorial development and change (such as industrial clusters, regional disparities and core-periphery). Another definition by Maryáš and Vystoupil (2004) states that the primary goal of economic geography is to shed light on a spatial organisation and differentiation of social-economic system and to understand particular economic phenomena in a geographical context. However, Maryáš and Vystoupil (2004) also use the approach of individual sub-fields of geography (e.g. geography of industry, services, tourism geography) to be part of “superior” discipline of economic geography. Castree et al. (2013) define economic geography as a subdiscipline of geography that seeks to describe and explain the absolute and relative location of economic activities, and the flows of information, raw materials, goods, and people that connect otherwise separate local, regional, and national economies. Taking less scholarly approached definitions found on the internet, one of the definitions says that economic geography looks at where economic activities occur, and how they vary by location and interact between places; studies the location, distribution, and spatial organisation of economic activities across the world (Kimutai 2017). According to the Merriam-Webster dictionary, the economic geography is a branch of geography that deals with the relations of physical and economic conditions to the production and distribution of commodities (Merriam-Webster Dictionary 2019). Market Business News website (Market Business News 2019) mentions description of economic geography from the University of Washington’s Department of Geography; economic geography is as a field studying the (locational, organizational and behavioural) principles and processes associated

with the spatial allocation of scarce (human, man-made and natural) resources (which are also distributed spatially) and the spatial patterns and (direct and indirect, social, environmental and economic) consequences resulting from such allocations.

The second point of view of economic geography distinguishes several sub-fields, where various geographical approaches are applied to specific themes with an emphasis on economic aspects, such as tourism geography, transport geography, labour geography, the geography of resources, rural geography etc. These come mostly from regions with former or current centralised economies (former Soviet bloc, or China) focusing on surveys of natural resources, the selection of sites for industrial plants and railways, land use planning in agriculture, the integrated planning of industrial sectors, and spatial distribution of industry (Coe et al. 2013). As Coe et al. (2013) also noted, scholars and researches from these “geographical schools” were limited by the doctrine of respective political regimes, thus constrained by political conditions not allowing critical thinking about the economic geography. To be fair, this does not mean that the second approach is not acceptable; but quite the opposite – it confirms the statement of Leyshon et al. (2011) mentioned previously – economic geography is sensitive to the circumstances in which happens, especially to the geographical and historical context. The most common categories within the second “sectoral” approach are (to name a few):

- Geography of Agriculture
- Geography of Industry
- Transport and Communication Geography
- Geography of Leisure and Tourism
- Geography of Services, Trade and Retail
- Geography of Resources
- Labour Geography
- Health Geography
- Geography Entrepreneurship
- Environmental and Development Geography
- Rural and Urban Geography (economic aspects)
- Globalisation
- and many more

These categories are not strictly bounded and are interconnected and interrelated, which is typical of geography as such. However, it is important to emphasise that broadness of these categories does not implicitly evoke that economies are the main subject. Generally speaking, any sub-branch of geography potentially carries the “economic aspect” inside. That is why, it is always important to define, what (economic) aspect will be studied and what geographical methods and knowledge will be deployed.

Also, it is worth to show how individual courses and modules of economic geography at higher education institutions (universities) are composed. For instance, London School of Economics in its 2018–2019 course information sheet (see <http://www.lse.ac.uk/study-at-lse/uolip/Assets/documents/course-information-sheets/gy2164-cis1.pdf>) on economic geography offers pure economical topics (e.g. neo-classical, Marxist and evolutionary/institutionalist views), key concepts and theories (e.g. central place theory, urban hierarchy, core-periphery theories of economic change, agglomeration economies; divisions of labour; cycle theories, and more), economic geographies of the contemporary world (e.g. geographies of economic globalisation in agriculture, manufacturing and services, geographies of ICT and knowledge economies), and economic geography and policy challenges (e.g. uneven development and inequality in the global age, alternative economic approaches). Department of Geography at University College London on economic geography brings for academic year 2018/2019 topics to understand the spaces and spatiality of economies across the Global North, South and emerging economies, e.g. production, exchange, consumption, work, finance and emergent economic activities in connection to urban geography, political ecology and development studies (see <https://www.geog.ucl.ac.uk/study/undergraduate/current-students/modules/geog0023>). To be more specific, the course will go through lectures about Corporations and Global Production Networks, Resource Geographies, Global (and Gendered) Financial Centres, The Sharing Economies, or Digital Capitalism to name a few. By looking at the syllabus of the

English version of economic geography course at Masaryk University (Czechia), we can find topics such as Population Geography, Geography of Settlements, Geography of Trade and Services, Transportation, Tourism, Recreation, Agriculture and similar. This illustrates the less critical (in terms of thinking) and more structured sectoral approach, as mentioned earlier. On the other hand, the economic geography module offered by Department of Social Geography and Regional Development at Charles University in Prague (Czechia) does not follow this approach and contains cross-sectoral topics such as Labour Force, Natural Environment and Economics, Commodity Chains and Globalisation, Economic Geography of Consumption, Agglomeration Cluster etc.

To illustrate how colourful and diverse the economic geography is, it is the best to list all the topical entries from the International Encyclopedia of Human Geography (Kitchin and Thrift 2009) that are contained in the “economic geography” theme. This variety of 96 entries in Table 7.1 speaks for itself.

All in all, common denominators for most of the economic geography definitions are:

- It is a sub-field of geography with the focus on location and distribution of human economic activities,
- it studies not only immediate geographical manifestations of such activities but also their interplay with other social-political phenomena,
- it is an open discipline, very flexible to ongoing changes and development, with no distinct paradigm,
- there exist space and time dependence of theories and approaches.

Krugman (1991b) states that economic geography is the study of the location of factors of production in space. Although it is probably the most straightforward definition of economic geography, the author Paul Krugman (awardee of 2008 Nobel Prize in Economic Sciences) can be treated as a guarantee of its validity. To conclude this part, it is the best to quote Barnes’s

notes (Barnes 2009, 2013a) – that still, economic geography has not its own shaped and bounded orthodoxy or paradigm to be typical for. It is rather the discipline that is intellectually open, eclectic, pluralist and very flexible in terms of “breath in” various temporary trends and notions.

7.1.2 Historical Overview

This historical overview of modern economic geography is fuelled mainly from the extensive books authored Coe et al. (2013) and Aoyama et al. (2011). The authors mention that the modern economic geography started after World War II, when the colonial tradition of major countries (especially the United Kingdom), established for several centuries, started to shatter. This is an important moment since the colonialism geographies and history strongly influenced leading geographical schools. Aoyama et al. (2011) describe that the early history of economic geography was formed and defined by various approaches. Firstly, it is in line with Coe et al. (2013) that economic geography was closely related to British colonialism with a focus on commodities, transportation modes and trade routes (Barnes 2000). Secondly, a very influential stream was linked with German location theories formalised by notable persons such as Heinrich Von Thünen, Alfred Weber, Walter Christaller, August Lösch, and Walter Isard from North American geography (see more about the theories in Sect. 7.2). Later on, these theories were the basis for a new geographical approach called regional science. Another understanding of economic geography can be represented by Alfred Marshall, who formed a concept of industrial agglomerations and emphasises so-called economies of scale. His work continues to influence some of the current economic research on agglomerations and clusters. The last lineage of economic geography, as Aoyama et al. (2011) mentions, had its root in North American geography. The main concerns of American researches at the time were connected with their human-environment approach in geography – with human adaptations to natural resources in the process of industrialisation. On

Table 7.1 Topics in the economic geography theme listed in the contents of international Encyclopedia of Human Geography (2009)

Topic			
Agglomeration	Environmental regulation	Information technology	Professional services
Business services	Ethnic economies	Innovation	Public policy
Capital and space	Export processing zones	International financial centres	Radical political economy
Capitalism	Feminism and work	International organizations	Regional integration
Commodity chains	Feminist political economy	International trade	Regional production networks
Competitiveness	Financial exclusion	Internationalization of education	Relational economic geography
Consumption	Financial knowledge	Investment promotion	Resource and environmental economics
Corporate responsibilities	Financial risks and management	Knowledge communities	Resource industries
Creativity	Firms	Knowledge economy	Retail geographies
Cultural economy	Food networks	Knowledge intensive business services	Spatial division of labour
Cultural turn	Food regimes	Labour control regime	State theory
e-business and e-commerce	Fordism	Labour flexibility	Technological change
Economic crises	Fordism, post-Fordism and flexible specialization	Labour geography	Technology and regional development
Economic geography	Foreign direct investment	Labour market	Technology industries
Economic geography and the internet	Global commodity chains	Labour unionism	Telecommunications
Economic geography, quantitative	Global production networks	Local economic development (politics of)	Trade blocs
Economies, alternative	Globalization and transnational corporations	Locality debates	Transitional economies
Economies, borderland	Governance, corporate	Location theory	Transnational corporations in developing countries
Economies, branch plant	High-tech industry	Migrant workers	Transnational elites
Economies, imagined	Industrial location	Natural resources	Transnational ethnic networks
Economy, informal	Industrial organization	Neoliberal economic strategies	Transnationalism and labour geography
Embeddedness	Industrial parks	Networks	Transnationalism and technological transfer
Enterprise discourse	Industrial restructuring	Offshore finance	Uneven development
Entrepreneurship	Industrialization	Privatization	Venture capital

top of it, as a universal discourse, there has been and will be contradictory methodologies – deductive scientific approach leading to abstraction and universal applications (we can call it “nomothetic”), and descriptive approach gathering evidence and concrete information “outside a laboratory” with strong emphasis on humanity (we can call this approach as “idiographic”).

Coe et al. (2013) divide the modern era of economic geography with regards to the most influential post-war philosophical and geographical trends of the twentieth century – positivism, structuralism, and post-structuralism. All three trajectories are too complex to be described in detail here; however, the most important remarks will be mentioned.

7.1.2.1 Positivism

In the era of positivism, a scientific approach in which the emphasis is put on the universal (nature) laws and quantitative methods, the systematic and deductive methodologies were developed and also applied in economic geography. Typically, as mentioned in Coe et al. (2013), economic geographers were looking for universal principles lying under spatial patterns of economic activity and using quantitative data and methods (statistics in particular) to find and proof such spatial patterns. According to Scott (2000), these quantitative methodologies were used in two ways – (1) spatial analysis using mathematical models (with the advances in computer science), and (2) integrating space and location into neoclassical models of economic theory. During this era, scholars were following the famous German location theories, applying them and building new concepts on these classical works. Typical applications included searching and evaluating optimal sites for various facilities, urban system models (e.g. with the use of physical concepts such as entropy, chaos theory and fractal geometry), accessibility of urban functions, innovation diffusion models, or optimisation of land use patterns (Coe et al. 2013; Aoyama et al. 2011). Although this positivistic approach was not universally used throughout the whole economic geography community, it certainly helped to encapsulate and specify by then not really bounded research agenda of economic geography. Widespread enthusiasm about new opportunities in spatial and regional science and economic geography led to attracting new young scientists who are nowadays called as a “young cadets” (Aoyama et al. 2011), such as Brian Barry, William Bunge, Waldo Tobler, or Arthur Getis. Their “father”, William Garrison, is treated as the central quantitative (economic) geography figure after World War II. Considering that the generation of quantitative geographer was significantly influencing the field (they become a new classics from today’s point of view), their heritage is still present in contemporary approaches in economic geography, in its quantitative branch respectively.

According to Coe et al. (2013), quantitative methodologies are evident and needed in research where large datasets are analysed to find and describe hidden patterns of studied phenomena represented by the data.

7.1.2.2 Structuralism

The second major trend in economic geography identified by Coe et al. (2013) is called structuralism. Generally, structuralism represents a theoretical concept based on a presumption that various phenomena and processes visible “on a surface” have their causations hidden deep in their (invisible) structure (Daněk 2013). Therefore, for structuralists, the key research task is to unveil and understand these structures. It is also worth to mention two (other) important subsets of structuralism that penetrated economic geography, such as dependency theory (Frank 1966) and world system theory (Wallerstein 1974), which were then mostly applied in social sciences (Aoyama et al. 2011). One of the most important structures linked with people’s actions were a social class, race, or gender (Coe et al. 2013), which raised general and scientific awareness of social issues. Since the social aspects of humankind and their spatial (geographical) manifestations and consequences were barely possible to be grasped by the quantitative approach, a new trajectory had to be found. As Coe et al. (2013) noted, quantitative geography and location theories reacted to the economic expansion of late 19th, and up to the mid-twentieth century, in the late 1960s and early 1970, the economies (at least in the West) were starting to decelerate. This resulted in slowly emerging social problems and new issues (e.g. urban segregation, gender inequalities, international deindustrialisation, changing labour markets), which required the understanding deeper structure of ongoing economic processes. It is one of the most important (economic) geographers – David Harvey – who shifted geographical research interests from its quantitative approach to Marxism and political activism (Harvey, 1974). As noted by Barnes (2011), this Harvey’s twist took only 3 years. While in 1969

he celebrated quantitative geography in his book *Explanation in Geography* (Harvey 1969), in 1972 Harvey (1972) began by attacking the usefulness of the theory and statistical techniques (Barnes 2011). Under the umbrella of Marxist theories, Harvey and his students were convinced that economies based on capitalism and class-inequalities would lead to the crisis. The Marxian concept was not “comfortable” for many geographers, however, identification of class-based power relations in economic processes, and to a conceptualisation of uneven development became acceptable in geographical mainstream (Coe et al. 2013). Another approach, rather positive in terms of preventing economic crisis, is known as regulation theory focusing on the role of institutions or state itself in order to avert a crisis. A wide range of topics within the structuralism is summarised by Coe et al. (2013), i.e. Marxism, institutionalism, feminism and anti-racism, by identifying a common denominator – the existence of underlying structures of power.

7.1.2.3 Post-structuralism

The last major sub-field of modern economic geography described by Coe et al. (2013) is influenced by philosophical concept post-structuralism, which generally allows the existence of multiple “truths” depending on the researcher’s circumstances (the knowledge is time and place-specific). Taking the explanations of post-structuralism from Daněk (2013), we can say that it is an approach of several “small” theories considered as toolboxes which can geographers select to achieve their goals. Post-structuralism denies its predecessor - structuralism – i.e. complete rejection of “hidden essence”, fully scientific representation of the world and one universal truth (Daněk 2013). Coe et al. (2013) identified several ways of how post-structuralism approach penetrated economic geography:

- Economic geographers started to think about how they understand and represent economic processes. This lead to a proposal to imagine

alternative and diverse forms of economic life (Gibson-Graham 2006),

- questions about the power of representation and discourse in economic life were raised,
- studies about the individual identities in economic processes were conducted in order to “pull out” individuals from existing structures (e.g. worker, immigrant, woman),
- and realisation of the importance who has the power to produce knowledge. Questioning the Western understanding of economic development and poverty has been one of the main issues for post-structuralist studies in economic geography.

Coe et al. (2013) summarise that post-structural approaches to Economic Geography ask how we are constructing our knowledge about the economic world and what are the consequences of understanding things in that way.

7.1.2.4 Future Directions

Even though the economic geography is a subdiscipline with no exact border and with a great ability to absorb knowledge and methods from other disciplines, several future trajectories can be found. These future pathways presented in this part is a fusion from the books by Coe et al. (2013), Aoyama et al. (2011) and chapter in *International Encyclopedia of Human Geography* by Barnes (2013a). Starting with Coe et al. (2013), authors identified following topics which will resonate in the next few years: (1) a shift in global economic power (although there is uneven distribution of global wealth, its reorganisation is underway – e.g. with significantly rising economies of China, India and other developing countries in Asia); (2) new forms of global integration (in terms of migration and adaptation to new conditions and labour force, and also in terms of increasing mobility of financial capital. This will lead to new forms of regulations and collective control on this issues); (3) continued dynamism in the development of new technology (information and communication technologies significantly changed how we consume, what

titles which speaks for itself. At first glance, the most visible words are “global” and “development”, which is interesting since it is in line with some of the future directions mentioned in the previous text. The umbrella topic of the conference was “Dynamics in an Unequal World”, so the issues such as Poverty, Inequality, and the Global South were intensively discussed. To provide a bit more complete picture of the flagship conference on economic geography, the topic of the fourth GCEG held in Oxford (UK) in 2015 was “Mapping Economies in Transformation”.

7.2 Location Theories

It is hard to select a topic following the part with definitions and historical development of economic geography. There are so many exciting issues from economic geography (historical or contemporary), which could be discussed and analysed in this part. So why location theories? The inclusion of this part was mainly driven by the author’s liking for their beautiful artistic representation of a landscape-economic pattern, however, based on geometrical assumptions, therefore unrealistic when applied to real-life situations. This is by the purely subjective notion of the author. However, there is also an objective reason why to present location theories – they and their authors are meant to be one of the foundation stones of economic geography. Without understanding the fundamental basics of economic geography, it would be like building a house from the top. As Aoyama et al. (2011) note, every student who claims to know something about economic geography must know its disciplinary roots. Some of the principles of location theories remain true today, several decades after they were proposed. Moreover, location theories can also be inspiring for the creation of new concepts, or a modification of existing ones – those theories that come from other disciplines (e.g. physics or biology) to be infiltrated into economic geography.

As a synthesis of a various sources (Aoyama et al. 2011; Barnes 2013b; Leyshon et al. 2011; Murray 2009) a term “location theory” in

economic geography stands for a concept that (in its simplest definition) works with two spatial-economic features – distance and area (e.g. transportation costs, the cost of overcoming distance, affect the price of products, the location of production facilities, the geographic extent of markets) – that are put into formal and abstract models in order to set ideal patterns of the space economy, and to develop a generalisable framework explain industrial localities. All with the assumption that the actors are rational and maximising their economic gain, and decisions are made regardless of social, cultural and environmental factors. Location theories try to answer the questions of ‘why’ and ‘how’ spatial patterns of (economic) activity have evolved. Approaches that strive to build idealised patterns of whatever socio-economic issue are called general equilibrium analysis (Ponsard 1983).

In this part, we briefly introduce basics of the four major location theorists – Heinrich von Thünen (1783–1850), Alfred Weber (1869–1958), August Lösch (1906–1945) and Walter Christaller (1893–1969); interestingly, all of them were Germans. We also name a few other theories and their authors, mostly build upon the classical ones, but this will serve more as a reference for self-study of those who are interested in the topic.

7.2.1 Von Thünen Location Theory

Heinrich von Thünen is treated as the author of the first spatial economic theory *Der isolierte Staat* in 1826. He was dealing mainly with land-use functions of a city defining their particular usage based on distance from the market. The market itself was located in the centre of the modelled area (city). He worked with three assumptions (Aoyama et al. 2011): (1) an isolated state with a single central city (market) surrounded by agricultural land on a uniform plain, (2) farmers are rational profit maximizers who all face the same production costs and market prices, and (3) transport cost is proportional to distance. He developed the main notion for such spatial organisation, which is an economic/

location rent (net profit). This rent should be maximised, and from the farmer's point of view (and based on assumptions as mentioned earlier) it generated a zonal land-use model (Fig. 7.2a). It differentiates the land use into four main categories based on the consumers' needs, and distance – dairying and basic food gardening was placed closest to the market (city centre) since its products spoil quickly; forests as a source of wood for construction and heating is another layer; extensive farming producing “long-growing and long-lasting” products (e.g. wheat) is the third general land-use; and extensive area used mainly for livestock and grazing was the last. This idealistic model was to be then used in comparison with reality. Generally, the model assumes land-use functions as it was seen to ideal in the nineteenth century; thus, the model is not applicable in today's reality. Throughout the description of Von Thünen model including geographical and historical context is given in Leyshon et al. (2011). However, after more than a century, Alonso (1964) developed a bid-rent model applied to urban areas (Fig. 7.2b). This was somehow a more suitable model for cities at the time and is with some limitations applicable to specific urban systems today as well. It separates city zones into four

main categories based on their accessibility/bid rent - retailing (shopping), commerce/industry (manufacturing/offices), apartments (high-density residential), single houses (low-density residential). Again, this zoning is based on a distance from a city centre, or it is better to say, in this case, from Central Business District (CBD).

7.2.2 Weber Location Theory

After more than 70 years after the first location theory, a new concept was developed by another German scholar – Alfred Weber. He elaborated the theory about the optimal placement (most profitable) of a firm/factory based on so-called “factors of production” or “Standortfaktoren” (Weber 1909). These factors are composed mainly of the three production items - land (as a resource factor), labour, and capital (Smith 2013). His theory on industrial production also takes the accessibility or transportation costs into account in the sense of their minimising. As a result, Weber came out with a location triangle, nowadays known as Weber's triangle, calculating transportation costs as a product of Euclidean distance (i.e. straight line) and the amount of material transported (Murray 2009). According to Leyshon et al. (2011), Weber

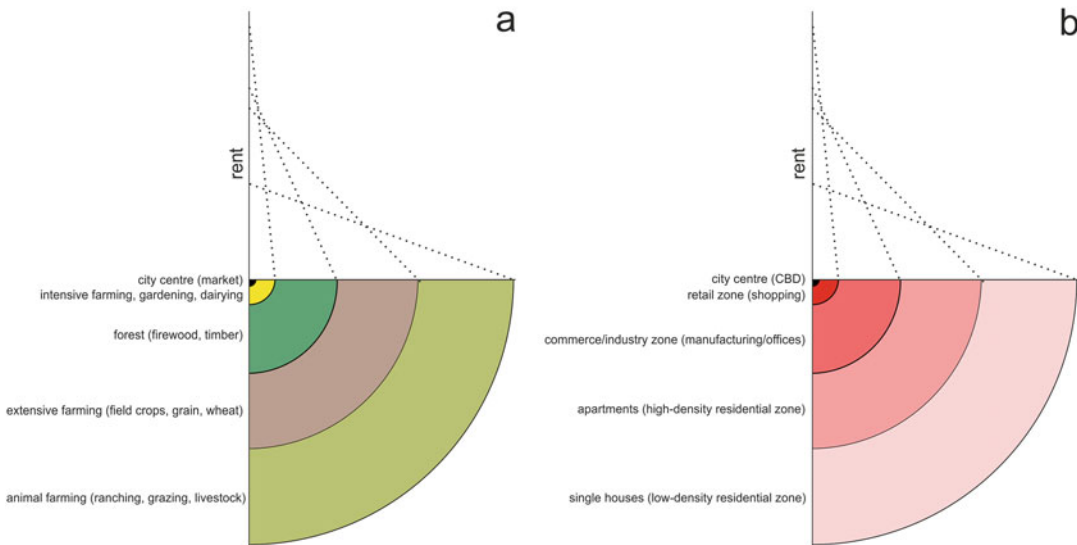
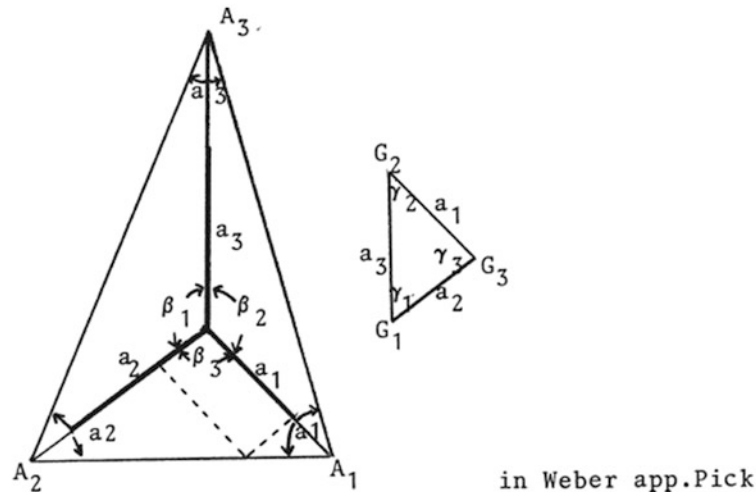


Fig. 7.2 Von Thünen location model (a), and modified Alonso's version (b). (Source: Author)

employs assumptions such as rational decision-makers endowed with perfect information, perfect competition and a flat surface, to keep intervening forces constant. Although Weber was aware of cultural factors that might influence prices, he did not consider them in theory. It is interesting that Weber was trying to develop a theory too complex, so he needed to ask for help from mathematician Georg Pick, who assisted Albert Einstein in formulating relativity (Barnes 2013b). Figure 7.3 illustrates the complexity of the whole concept and shows that the theory was not only conceptual or “philosophical”.

Generally, Weber assumed to place a factory between sources (raw material) and market (agglomeration) considering wages (i.e. costs of

the labour force) and transportation costs (of both raw material and final product). In other words, a spatial equilibrium of a factory has to be found (Murray 2009); see Fig. 7.4. Transportation costs play an essential role in his model because we need to consider weight loss or gain of the product. It is favourable to place a factory closer to a source of, e.g. iron ore deposits as the material itself are processed in the factory for example into metal plates; thus the input material loses the weight. At the same time, the new product will bring some added value. It is then profitable to transport the final product on longer distances (rather than to transport input raw material). In the case of weight gaining, e.g. when a factory produces (army) tanks which are more expensive



We obtain in this manner "the triangle of weights" $G_1G_2G_3$ whose angles γ_1 , γ_2 and γ_3 are the supplements of the angles β_1 , β_2 , β_3 and whose sides are determined by a_1 , a_2 and a_3 by virtue of the theorem of the parallelogram of forces.

P_0 is determined when the position from which the lines connecting it to A_1 , A_2 and A_3 form the supplementary angles of γ_1 , γ_2 and γ_3 is known: that is, the position of P_0 from which A_2A_3 is seen subtending the angle β_1 , A_3A_1 , the angle β_2 and A_1A_2 , the angle β_3 .

Now, the angles $\widehat{A_2P_0A_1}$ and $\widehat{A_1P_0A_3}$ will be respectively equal to β_3 and β_2 when P_0 is at the intersection point of the arcs passing through A_1A_2 and A_1A_3 (see Figure 2).

Fig. 7.3 Mathematical foundations of Weber's triangle. (Example from Ponsard 1983)

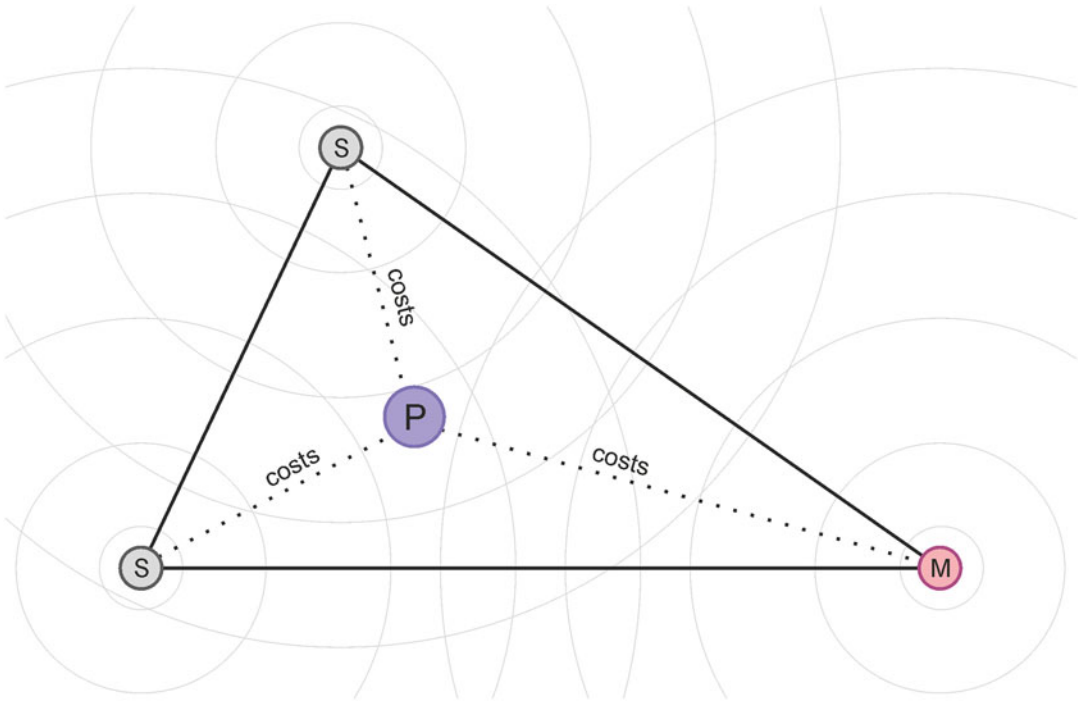


Fig. 7.4 Weber's triangle, where P is a factory (production), M stands for the market, and S represents sources. (Source: Author. Adopted from Weber 1929)

to transport, it is better to find a location of the factory closer to the market. Apparently, in a real-life situation, it is not that straightforward – we need to take multiple inputs into account (and not even counting with heterogeneity/variety of the inputs), and the transportation costs have been slowly losing its significance with the rapid development of transportation industry. However, as Aoyama et al. (2011) notes, Weber's work remains important as many principles of his location theory largely still hold today and broadly explain why firms locate their operations where they do. More about Weber's location theory can be found in Aoyama et al. (2011), Leyshon et al. (2011), or Ponsard (1983).

7.2.3 Christaller Theory of Central Places

Central place theory is probably one of the best-known theory on urban settlements in geography and related field. Paradoxically, neither in

geography as a discipline nor in his professional life, Walter Christaller became a recognised person for this theory. First, according to Leyshon et al. (2011), Christaller's work was never truly appreciated among German geographers, that time very much concerned with idiographic and chronological analysis. Second, while Christaller's theory of central places was popular amongst American geographer (especially during the quantitative revolution in the 1960s), in his home country he was reintroduced during 1960s and 1970s through English-speaking textbooks, Christaller was never appreciated in geography during his own time (Leyshon et al. 2011). It might also be caused by his "controversial" political engagement – during Nazi era, he joined the National Socialist Party (and authored a work where he applied the theory on reorganisation of Poland), after the war he joined communist party ending in social democratic party in 1959 (Leyshon et al. 2011). Nevertheless, this has nothing to do with his theoretical contribution to (urban) geography and economy.

According to Johnston (2013), Christaller in his work (Christaller 1933) about central places describes a theoretical statement of the size and distribution of settlements within an urban system in which marketing (especially retailing) is the predominant urban function. In other words, the theory describes a relationship between central places (cities and towns) and hinterlands they served (Murray 2009). Christaller identified two main concepts (Johnston 2013) – (1) the range of good (maximal distance consumers are willing to travel for it), and (2) the threshold for good (minimum volume of necessary sales to maintain selling that good). A clear example is given by Murray (2009): A good, say clothing, is produced and made available in a city, as an example. The demand for this good will be a function of its price and the travel cost for a consumer to purchase it. Thus, retailers locate their businesses to be as near their customers as possible, and at the same time, customers visit the nearest available centre (Johnston, 2013). From a customer perspective, this results in minimum spending on travel and maximum on services and goods themselves.

Assuming a uniform plane with equally distributed population, the principles as mentioned above (range and threshold) cause to form a hexagonal structure from a “normal” settlement structure (Fig. 7.5a), where each hexagon is treated as a “hinterland” (or market area) of a central place. Moreover, this hexagonal grid representing central places is organised further into different levels of hierarchy (Fig. 7.5b). Higher-level cells (e.g. larger cities) offer more services and goods, and lower-level cells (medium and small cities/towns) offer less variety of such goods and services and focus on more regularly used goods and services (e.g. bakery) (Murray 2009). It is evident that larger cities also offer such regular goods and services but is not economically viable for consumers to travel such distance (from their lower-level settlement). On the contrary, typical examples of higher-level services and goods that are worth to travel for are governmental functions, higher education, health services, insurance services or big sports venues. In general, these are mainly quaternary or quinary services.

In addition, Christaller identifies three basic principles based on nesting logic of the hinterlands (hexagons) (Johnston, 2013):

1. Marketing principle – minimises the number of settlements so that each is at the junction of three hexagons at the next hierarchical level up (Fig. 7.5c),
2. transport principle – minimises the length of roads joining adjacent places. Each settlement is located centrally on the boundary line between the hexagons of two places in the next hierarchical level (Fig. 7.5d),
3. administrative principle – every single lower-level settlement and its hinterland is nested within the higher-level hinterland (Fig. 7.5e).

On top of it, we also have two options for how to depiction of the Christaller’s central places – using hinterlands mode, and routes mode (more in Johnston 2013). To sum up central place theory, Leyshon et al. (2011) quote Christaller that he wanted to build “theory of location... to correspond with Thünen’s agricultural production and Weber’s theory of location of industry... derived deductively, by pure reasoning.”

7.2.4 Lösch Location Theory

The fourth classical location theory comes from August Lösch and his work *The Economics of Location* from 1940 (Lösch 1940). He built his theory on Von Thünen’s and Weber’s models and also merged these ideas with Christaller’s findings. Lösch tried to include agriculture and production locations to form a general equilibrium framework of the spatial economy (Leyshon et al. 2011). According to Aoyama et al. (2011) and Leyshon et al. (2011), Lösch sets the optimal location as places where the difference between total revenue and the total cost is the largest, while at the same time each producer maximises its market area. Similarly to Christaller, he ended up with hexagons representing that market area. The size of hexagons will vary across industries dependent on the range and threshold of industry-specific products, and this abstract space divides

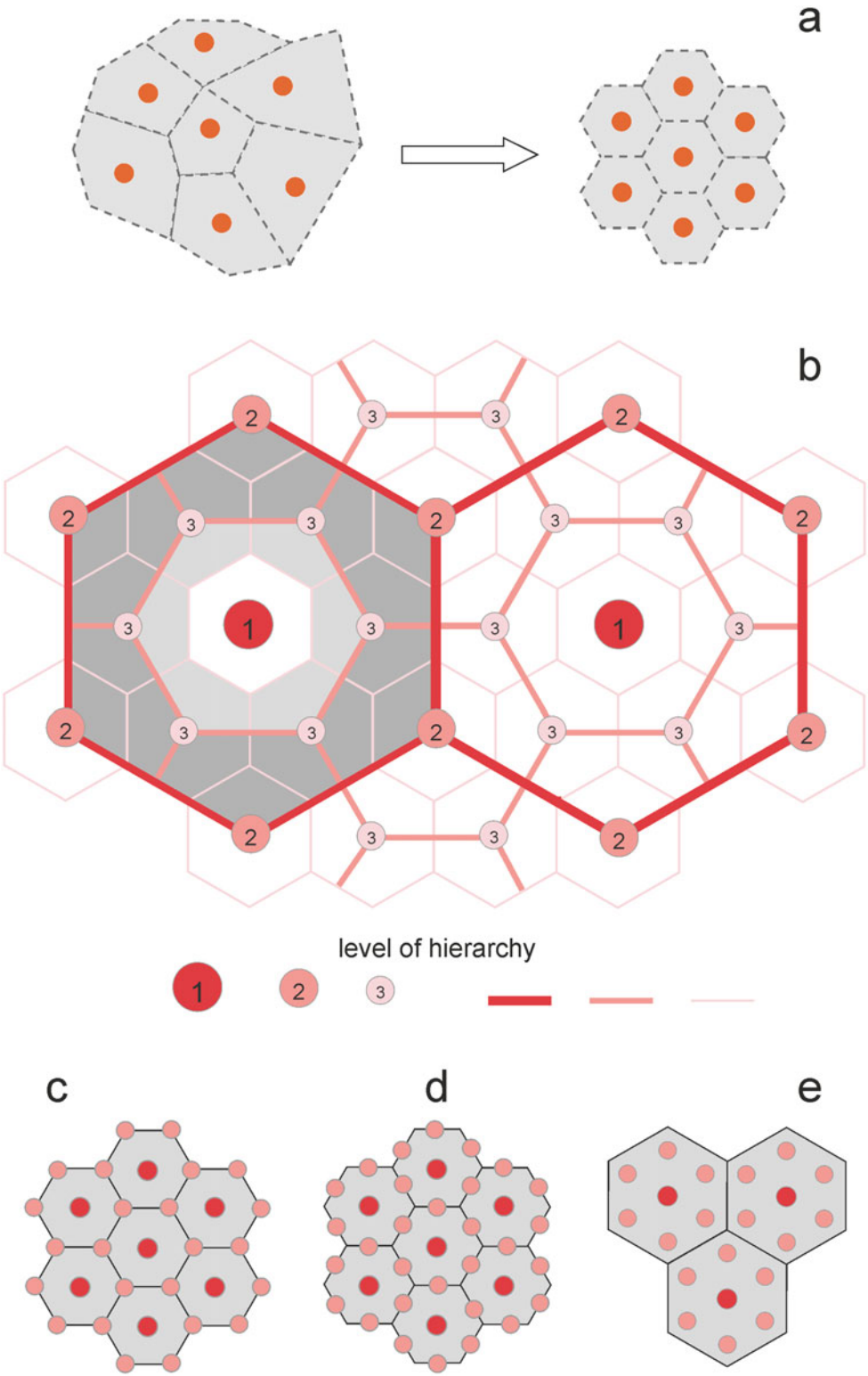


Fig. 7.5 Christaller's central place theory. (Sources: Author)

regions into activity-rich (core) and activity poor (periphery) (Leyshon et al. 2011). As Leyshon et al. (2011) mentions, Lösch's ideal landscape has the following characteristics:

- The greatest number of locations coincide,
- a maximum of purchases can be made locally,
- the sums of distances and consequently shipments between industrial locations are least,

- and that transportation costs and transportation lines are minimised.

In Lösch's model, he assumed that the market areas as overlaid one over another, which implies a certain type of competition amongst producers. For various goods and services, the model uses grids (market areas) with different size, while these grids are gradually overlapped into a regular shape – hexagons. Figure 7.6a demonstrates the

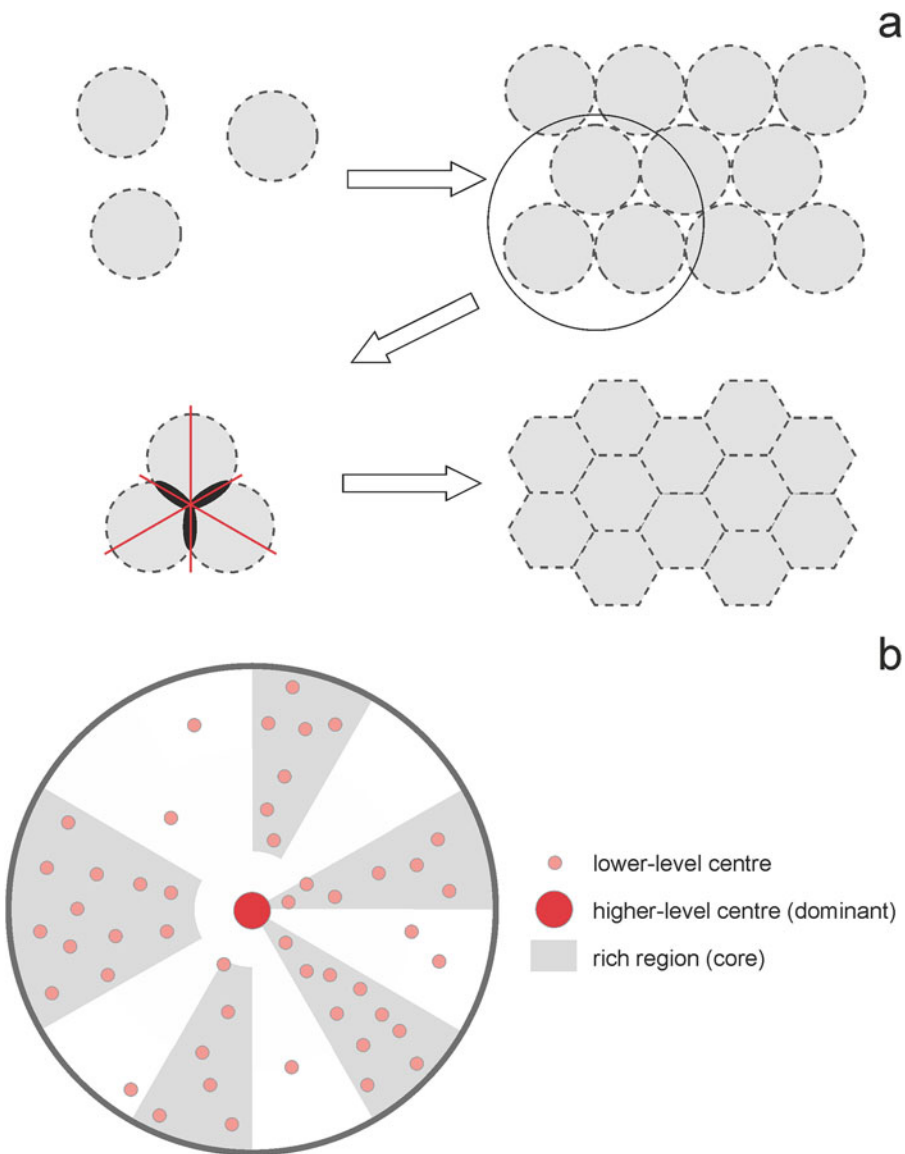


Fig. 7.6 Example of Lösch's location theory. (Source: Author)

process of how market areas fill the space gradually to form a new regular structure based on overlaps. According to Lösch's theory, central places do not necessarily have to offer all the goods and services as at the hierarchical lower-level places (on the contrary to Christaller's theory). As a result, there are special areas (regions) formed with/by the different structure of production and demand. These regions form radial arrays going out from one dominant centre (Fig. 7.6b).

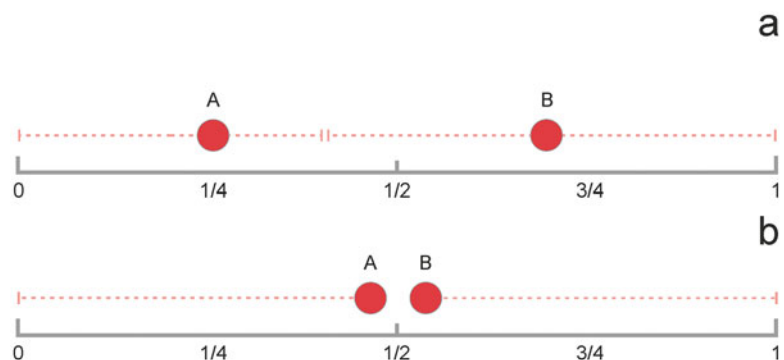
As noted by Aoyama et al. (2011), Lösch recognised the presence of various important factors that shape regional growth, such as regulations, migration and entrepreneurship, these elements remained mostly outside his model. Lösch was also aware of the limitation of such (artificial) modelling. Thus he admitted a need to study the historical evolution of real places as well as he desired to model and improve a future reality, not to describe existing patterns (Leyshon et al. 2011). A sad history about the life of August Lösch depicts the historical and geographical context, in which he lived and died. He was pushed by Nazi party to work for the establishment by developing a "suitable" theory for the regime; however, he despised Hitler (as did Alfred Weber) and died from deprivations he suffered in maintaining his values (Barnes, 2013b).

7.2.5 Other Location Theories and Concepts

In the last part of this chapter, spatial economic models and theories that do not belong to "big four" concepts will be briefly mentioned, with

Hotelling spatial competition model to be described broadly. Starting with quite known spatial competition introduced by Harold Hotelling, American mathematician and statistician, in 1929 in his "Stability of Competition" (Hotelling, 1929). Hotelling draws a model where on a line of a certain length (e.g. street), two sellers A and B offer a homogeneous product, with zero production cost. They might be located at certain distances from the ends of this line. Customers are supposed to be evenly distributed along the line, and each customer consumes exactly a single unit of this commodity, irrespective of its price (which is also assumed to be uniform). Then, a customer will buy from the closest seller (assumed linear transportation costs). The question was – where is the best position for sellers to be placed along the line (street). One should guess that they will divide the street evenly, standing in $\frac{1}{4}$ of the line length; thus, each seller covers half of the street. But as Murray (2009) noted, this would lead to a situation that if one seller moves towards the other, then he could gain additional demand purely by locational advantage (Fig. 7.7a). Also, the pricing of a product will (in real life) cause changes in market share – e.g. by reducing the cost of the product, one can increase the market share (Murray, 2009). However, this factor is to be set uniformly in the model. With the use of complex mathematical formulas, Hotelling concluded that the best position of both sellers is exactly in the middle of the street. Furthermore, they should be oriented back to back (Fig. 7.7b). This ensures that both sellers will have exactly half of the total market.

Fig. 7.7 A simplified example of Hotelling model of spatial competition. (Source: Authors)



Besides the spatial composition of two sellers, Hotelling also defined the principle of minimum differentiation. In short, he assumed that there is a tendency of sellers to make the new product very much like the old, applying some small changes which will seem an improvement to as many buyers as possible (Hotelling 1929). However, this was questioned by d'Aspermont et al. (1979) by giving a counterexample to Hotelling's conclusions, i.e. there is a tendency for both sellers to maximise their differentiation, and one should intuitively expect that product differentiation must be an important component of the oligopolistic competition. Although the Hotelling model seems to be quite artificial and not really to correspond with reality, we can find interesting examples of its principles, i.e. sellers with similar products tend to be co-located. This is typical for shopping malls, where product categories are

usually concentrated or spatially organised in order to be adjacent. We cannot simply assume that shopping mall managers apply the Hotelling principle as regards placing new shops, but the analogy with the Hotelling model is interestingly precise. However, right reasons could be more prosaic - shops are concentrated in certain places in order to help customers to orient themselves in a mall, their placement might be driven by technical conditions of a mall's construction, marketing and customer behaviour can be a reason, manager wants to guarantee the fairness of shops placement, or it is simply beneficial for all clustered shops (which is the closest to what Hotelling identified). On a higher level of a hierarchy, on an example of supermarkets, there also exist a distinctive spatial agglomeration of such commercial units. In Fig. 7.8, there is an example of two supermarkets placed just across the river.

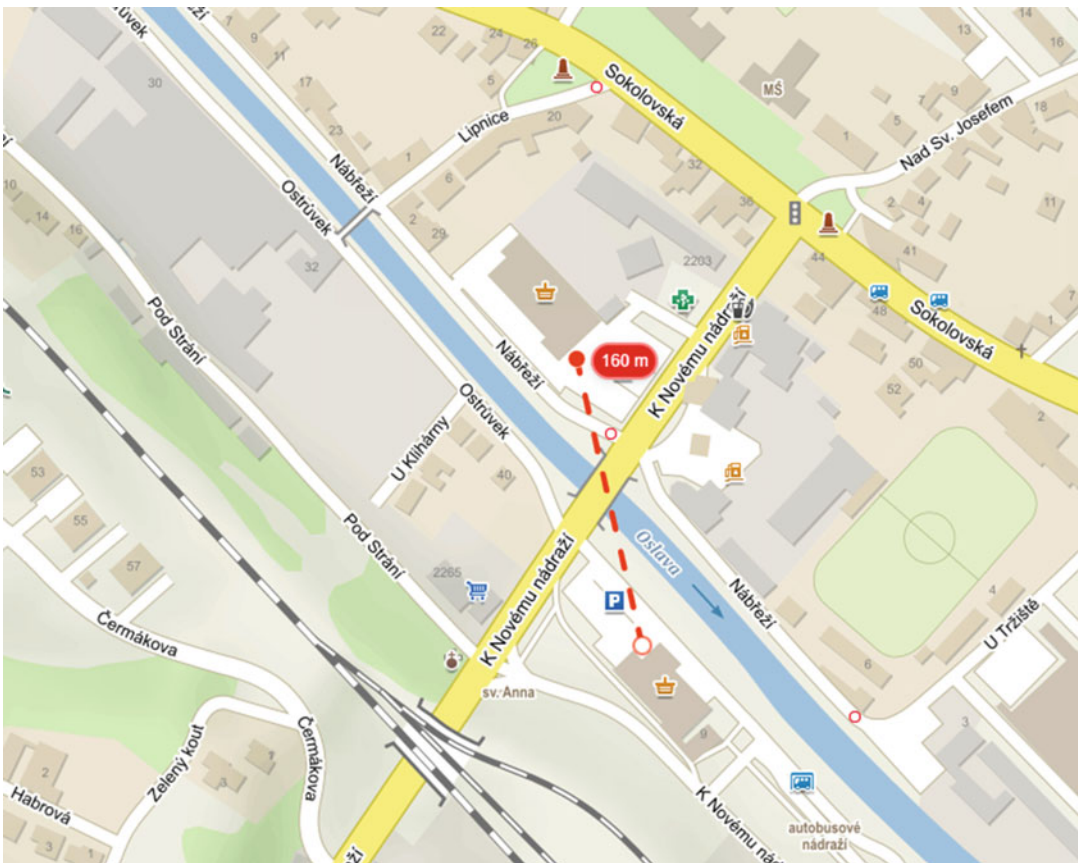


Fig. 7.8 Two supermarkets under the same brand co-located in a neighbourhood of the small-sized town of Velké Meziříčí, Czechia. (Source: Mapy.cz)

Using the Hotelling model, we can assume that one supermarket serves customers on one side of a river, and the other serves the second side. Both of them are profiting from this spatial composition. On top of it, one supermarket chain was acquired by the other, so nowadays (in 2018) these supermarkets belong to the same chain while their distance is around 160 m.

There exists several extension of classical location theories, some of them dealing with a particular problem, some of them tries to investigate its real applicability. However, most of these works are connected with the quantitative revolution in science (generally) after World War II. Inspired by Murray (2009), well-recognised names with research agenda about location theories are (listed by alphabetical order, not by importance):

- **Walter Isard** – one of the fathers of the “regional science” movement, and author of the seminal book – *Location and Space-Economy* (Isard 1956),
- **Melvin Greenhut** – dealing with the economics of space, spatial and location (micro)economics (e.g. Greenhut 1995), or industrial location theory (Greenhut 1956),
- **Brian Berry** – Vautrin Lud Prize holder (the highest award in geography); one of the most cited geographer at the time, dealing with quantitative methods and urban/regional planning and economics (e.g. remarkable publication Berry 1967; Berry and Garrison 1958),
- **Martin Beckmann** – he worked in the field of location theories (Beckmann, 1968), competitive spatial market equilibrium, relationships in a central place hierarchy and the distribution of city sizes (e.g. Beckmann and McPherson 1970), and other topics,
- **William Garrison** – one of the leaders of the quantitative revolution in geography, he dealt with functional bases of the central place hierarchy (Berry and Garrison 1958), and transportation economic geography (e.g. Garrison and Levinson 2014),
- or **Doreen Massey** – she is one of the most important persons from (British) human geography school, with public engagement (she

regularly contributes to media debates) and social theory. Her main contributions cover spatial differentiation, uneven development, and historical and geographical change (e.g. Massey 1995, 2005).

As Murray (2009) further mentions, also works dealing with predictions with formalisation and mathematical abstractions must not be omitted – the work from **Alan Wilson** (spatial interaction), **Leon Cooper** (multiple facility location extending Weber’s model), **Louis Hakimi** (transportation networks, optimal location associated with networks), and **Charles ReVelle** (coverage modelling). Also Nobel Prize holder, **Paul Krugman**, must be mentioned as he re-introduced the importance of spatial component (geography) of the economy into the field. He established the so-called “New Economic Geography”. Aoyama et al. (2011) note that Krugman combined trade and allocation theory (e.g. Krugman 1991a) leading to spatial consequences of increasing returns, instances where more than a proportional increase in output is observed from a proportional increase in inputs (Krugman 1991b). Krugman identifies this fact as a cause of specialisation that affects trade and location of industries. Coe et al. (2013) describe four main processes connected with transportation costs identified by Krugman: (1) a firm location is beneficial in proximity to the others (reducing transportations costs), (2) goods produced are less expensive (due to lower transportation costs), thus wages can be higher, which leads to increased attractivity of the place to work, (3) location of a firm(s) should be as close to market as possible (to reduce transportation costs, and the workers become part of the market), and (4) when transportation costs are low enough, it will create a core region/area with concentrated production.

As the previously noted, the economic geography is very flexible discipline and is changing all the time. Location theories can serve as an usher in theatre – introducing upcoming performance to the audience. In this sense, location theories should be a starting point in learning/teaching economic geography; however, it is hard to

follow complex mathematical concepts, abstractions and formulas. One should be at least aware of location theories existence and should be able to take them into account when dealing with spatial aspects of the economy (especially when dealing with manufactures, firms, and industries together with a socio-demographic aspect of certain geographical extents, let's say a region).

References

- Alonso, W. (1964). *Location and land use – Toward a general theory of land rent*. Cambridge: Harvard University Press. 206 p.
- Aoyama, Y., Murphy, J. T., & Hanson, S. (2011). *Key concepts in economic geography*. London: Sage. ISBN:978-1-84787-894-6. 278 p.
- Barnes, T. J. (2000). Inventing Anglo-American economic geography, 1889–1960. In E. Sheppard & T. Barnes (Eds.), *A companion to economic geography*. New York: Blackwell.
- Barnes, T. J. (2009). Economic geography. In R. Kitchin & N. Thrift (Eds.), *International encyclopedia of human geography*. Boston: Elsevier.
- Barnes, T. J. (2011). The quantitative revolution and economic geography. In A. Leyshon, R. Lee, L. McDowell, & P. Sunley (Eds.), *The SAGE handbook of economic geography*. London: Sage. ISBN:978-1-84860-114-7. 411 p.
- Barnes, T. J. (2013a). Economic geography. In D. Gregory, R. Johnston, G. Pratt, M. Watts, & S. Whatmore (Eds.), *The dictionary of human geography*. Chichester: Wiley.
- Barnes, T. J. (2013b). Location theory. In D. Gregory, R. Johnston, G. Pratt, M. Watts, & S. Whatmore (Eds.), *The dictionary of human geography*. Chichester: Wiley.
- Beckmann, M. (1968). *Location theory*. New York: Random House. 132 p.
- Beckmann, M. J., & McPherson, J. C. (1970). City size distribution in a central place hierarchy: An alternative approach. *Journal of Regional Science*, 10(1), 25–33.
- Berry, B. J. L. (1967). *Geography of market centers and retail distribution*. Englewood Cliffs: Prentice Hall.
- Berry, B. J., & Garrison, W. L. (1958). The functional bases of the central place hierarchy. *Economic Geography*, 34(2), 145–154.
- Castree, N., Kitchin, R., & Rogers, A. (2013). Economic geography. In *A dictionary of human geography*. Oxford: Oxford University Press. Retrieved 21 January, 2019, available from: https://researchguides.dartmouth.edu/human_geography/economic.
- Christaller, W. (1933). Die zentralen Orte in Süddeutschland: Eine ökonomisch-geographische Untersuchung über die Gesetzmäßigkeit der Verbreitung und Entwicklung der Siedlungen mit städtischen Funktionen (Mit 7 Fig. im Text und 5 Kartenbeilagen). Gustav Fischer. Jena: Gustav Fischer.
- Coe, N., Kelly, P., & Yeung, H. (2013). *Economic geography: A contemporary introduction* (2nd ed.). Hoboken: Wiley-Blackwell. ISBN:978-0-470-94338-0. 541 p.
- d'Aspremont, C., Gabszewicz, J. J., & Thisse, J. F. (1979). On Hotelling's stability in competition. *Econometrica: Journal of the Econometric Society*, 47, 1145–1150.
- Daněk, P. (2013). *Geografické myšlení: úvod do teoretických přístupů* [Geographical thinking: An introduction to theoretical approaches]. Masarykova univerzita. 171 p. <https://doi.org/10.5817/CZ.MUNI.M210-6694-2013>
- Frank, A. G. (1966). The development of underdevelopment. *Monthly Review*, 18(4), 17–31.
- Garrison, W. L., & Levinson, D. M. (2014). *The transportation experience: Policy, planning, and deployment*. Oxford: Oxford University Press.
- Gibson-Graham, J. K. (2006). *The end of capitalism (as we knew it): A feminist critique of political economy* (1st ed.). Minneapolis: University of Minnesota Press. 348 p.
- Greenhut, M. L. (1956). *Plant location in theory and in practice; the economics of space*. Chapel Hill: University of North Carolina Press. 338 p.
- Greenhut, M. L. (1995). *Spatial microeconomics. Theoretical underpinnings and applications*. Aldershot: Edward Elgar Pub. 561 p.
- Harvey, D. (1969). *Explanation in geography*. London: Edward Arnold. 521 p.
- Harvey, D. (1972). Revolutionary and counter revolutionary theory in geography and the problem of ghetto formation. *Antipode*, 4(2), 1–13.
- Harvey, D. (1974). What kind of geography for what kind of public policy? *Transactions of the Institute of British Geographers*, 18–24.
- Hotelling, H. (1929). Stability in competition. *The Economic Journal*, 39(153), 41–57.
- Isard, W. (1956). *Location and space economy – A general theory relating to industrial location, market areas, land use, trade, and urban structure*. Cambridge, MA: MIT Press.
- Johnston, R. (2013). Central place theory. In D. Gregory, R. Johnston, G. Pratt, M. Watts, & S. Whatmore (Eds.), *The dictionary of human geography*. Chichester: Wiley.
- Kimutai, K. (2017). *What is economic geography? Worldatlas – Economics*. Retrieved 21 January, 2019, available from <https://www.worldatlas.com/articles/what-is-economic-geography.html>
- Kitchin, R., & Thrift, N. (2009). *International encyclopedia of human geography*. Boston: Elsevier.
- Krugman, P. (1991a). *Geography and trade*. Cambridge, MA: MIT Press.
- Krugman, P. (1991b). Increasing returns and economic geography. *Journal of Political Economy*, 99(3), 483–499.

- Leyshon, A., Lee, R., McDowell, L., & Sunley, P. (2011). *The SAGE handbook of economic geography*. London: Sage. ISBN:978-1-84860-114-7. 411 p.
- Lösch, A. (1940). Die räumliche ordnung der wirtschaft: eine untersuchung über standort, wirtschaftsgebiete und internationalen handel. G. Fischer.
- Market Business News. (2019). What is economic geography? Definition and meaning. *Market Business News*. Retrieved 21 January 2019, available from <https://marketbusinessnews.com/financial-glossary/economic-geography/>
- Maryáš, J., & Vystoupil, J. (2004). *Ekonomická geografie* [Economic Geography]. 1. vyd. Brno: Masarykova univerzita.
- Massey, D. (1995). *Spatial divisions of labour: Social structures and the geography of production*. Basingstoke: Macmillan International Higher Education.
- Massey, D. (2005). *For space*. London: Sage. 232 p.
- Merriam-Webster Dictionary. (2019). Economic geography. *Merriam-Webster Dictionary*. Retrieved 21 January 2019, available from: <https://www.merriam-webster.com/dictionary/economic%20geography>
- Murray, A. T. (2009). Location theory. In R. Kitchin & N. Thrift (Eds.), *International encyclopedia of human geography*. Boston: Elsevier.
- Ponsard, C. (1983). *History of spatial economic theory*. Berlin: Springer. 231 p.
- Scott, A. J. (2000). Economic geography: The great half-century. *Cambridge Journal of Economics*, 24(4), 483–504.
- Smith, D. (2013). Factors of production. In D. Gregory, R. Johnston, G. Pratt, M. Watts, & S. Whatmore (Eds.), *The dictionary of human geography*. Chichester: Wiley.
- Thrift, N., & Olds, K. (1996). Refiguring the economic in economic geography. *Progress in Human Geography*, 20(3), 311–337.
- Wallerstein, I. (1974). The modern world system I. Capitalist agriculture and the origins of the European world economy in the sixteenth century. With a new prologue. Berkeley/Los Angeles/London 2011.
- Weber, A. (1929). *Theory of the Location of Industries*. University of Chicago Press. Translated by C.J. Friedrich from Weber, A. (1909). *Über den Standort der Industrien*.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

