

Industrialisation

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SYNOPSIS This article (1) defines industrialisation and indicates ways in which it can be measured, (2) highlights the importance of the timing of industrialisation and the inherent limits to the proper scientific explanation of this phenomenon, (3) disentangles the often confused conceptual relation between industrialisation and capitalism, (4) explicates the causal links between industrialisation and modernisation, (5) undertakes a brief assessment of the relative costs and benefits of industrialisation, and (6) discloses the defining contours of scholarship on industrialisation in Anglo-American human geography and illustrates it with a recent attempt to integrate the field with the help of a master metaphor called ‘recursive cartographies’. Its portrayal of economic reality as interplay of legacies, rhythms, and events conveys the usefulness of spatial thinking in industrialisation research.

Key Words: *economic geography, industrialisation, recursive cartographies, capitalism, modernisation*

Industrialisation: definitions and measurement

Industrialisation is a generic name for a set of economic and social processes related to the discovery of more efficient ways for the creation of value. These more efficient ways are lumped together under the label “industry” or “the secondary sector” (the primary sector of economic activity referring to agriculture, hunting, fishing, and resource extraction, and the tertiary sector referring to services). Beginning with the late seventeenth century, industrial activity has dramatically enlarged its scope and scale, as machinofacture began to replace manufacture. Historically, industrialisation studies have concerned themselves primarily with the period known as the “Industrial Revolution” (Allen, 2007), although in geography this area of enquiry has been the focus of many economic geographers interested in the contemporary logic of the global economic landscape.

Using the criterion of the abruptness of change, one can distinguish two types of economic change: events (swift singular changes) and processes (protracted cumulative changes). Industrialisation is a process, not an event. A process is an emergent property of a system (country, region) resulting from a collection of events that share a number of similarities and that unfold over a slower timescale than that of its component events. If one entrepreneur opens an industrial plant in an otherwise agrarian region, that singular event cannot be labeled industrialisation. If a collection of events of this same kind achieves sufficient significance for the local economy, scholars and policy-makers alike are entitled to refer to it at a higher level of generalisation, i.e. they can speak of a process of industrialisation changing the face of that regional economy. Two further conceptual problems require specification in this context. *Firstly*, one must distinguish between quantitative economic growth and qualitative economic change. If an already industrial region witnesses the opening of some new industrial plants, it is inappropriate to label that set of events industrialisation. Instead, we must refer to it as simply continuing industrial growth or economic growth. The concept industrialisation should be restricted to the qualitative economic change occurring whenever an agrarian economy becomes to such an extent affected by the opening of new industrial plants that it becomes misleading to continue referring to it as an agrarian economy. In other words, industrialisation is an emergent

property of an economic system, a qualitative leap resulting from the spatially patterned aggregation of a collection of economic events.

Secondly, one must pay attention to the measurement of the threshold above which it becomes appropriate to speak of a process of industrialisation taking place. If one singular industrial event does not by itself constitute a process of industrialisation, when does it make sense to refer to such a process? Geographers, economists, historians, and sociologists of industrialisation have been rather casual in their approach to this measurement problem (O'Rourke et al, 2005), relying on common sense just as much as on specific quantitative cut-off points. There are three major ways to decide as to whether one national or regional economy is undertaking industrialisation. The first requires a comparison of the relative contribution to the gross domestic product of the secondary sector (manufacturing industry) versus that of the primary sector (agriculture, fisheries, hunting, extraction of raw materials). The second compares the percentage of the workforce employed in industry versus agriculture. The third is more subjective, but also more geographical, in that it assesses the extent of industrialisation by simply observing the landscape of a region. Since industrial activities necessitate a drastic change of the physical landscape (e.g. fixed capital in the form of built environments), they are easier to spot than more subtle social processes such as exploitation, racism, or social stratification (Minca, 2007).

Explaining and timing industrialisation

The fundamental question geographers have to ask is whether the concept industrialisation has contributed in any substantive way to furthering scientific enquiry into how our social world works. There is probably no easy way to answer in any meaningful form such a question, because the answer given would depend on the level of explanation at which the concept industrialisation is being deployed. I argue that industrialisation has been particularly fruitful in helping geographers and social scientists operate at the higher levels of explanation, or, at what might be termed "big picture" thinking. Scientists and lay people alike relate to the world by building a more or less detailed and accurate model of what the world consists in and of how it works. At a very general level, it becomes fertile to have an understanding of how the history of the world has unfolded, and such an understanding would need to include the saga of industrialisation. As an illustration of "big picture" thinking, we can consider Alvin Toffler's depiction (1980) of the course of history as a succession of three waves. The first wave refers to the shift from hunter-gatherer societies to agricultural, sedentary societies. The second wave refers to the relative decline of agriculture and the growth of industrial activities. Finally, the third wave designates the shift from industry-based economic growth to service-based economic growth, and the relative decline of blue-collar workers in favor of white-collar workers.

Historians of industrialisation (Kemp, 1989, Allen, 2007) have pointed out the fact that the timing of this process is crucial for understanding its nature. In particular, they identify three periods of industrialisation: the first refers only to England and pertains to historical contingencies between 1763 and 1846. The second includes countries such as USA (Licht, 1995), URSS (Davies, 1980), Germany, and Japan, which became industrialised in the 19th century and the beginning of the 20th century. The third refers to the countries that have started their industrialisation after the Second World War (e.g. the tigers and dragons of South-East Asia). The important observation in this context is that all other countries except England have had at least some other model of industrialisation which they could imitate and emulate. England is unique in that there industrialisation appeared spontaneously, unplanned, from scratch, through a set of economic initiatives that only in retrospect have been labeled "industrialisation". The theories invoked to explain the English Industrial Revolution have not ceased to proliferate and to take into account hitherto ignored factors such as genes (Clark, 2007). Since for all other cases of industrialisation the imitation factor has played a role, it follows that the geographical study of innovation

diffusion (Hägerstrand, 1952, Simandan, 2006) is a required step in any serious attempt to make sense of this process.

Geography pretends to be a scientific endeavor and the hallmark of a scientific endeavor is the attempt to explain and predict phenomena. To explain something means to uncover the law-abiding mechanism that caused it (Bunge, 2006). Scholars of industrialisation have fallen short of this task, even though their work has converged on admitting the complexity of this process. There are several inter-locked problems that together keep industrialisation in the clouds of ambiguity. At the most general level, industrialisation is a social process, and epistemologists of the social sciences have cast doubt over the feasibility of explanation in the social realm (Carr, 2008). The innumerable variables that contribute to social outcomes do not seem to allow the social sciences to aspire to the same level of explanatory rigour as the natural sciences. Therefore, a more modest goal would be to understand rather than explain the process of industrialisation. Understanding results from describing and comparing the various historical and contemporary contexts in which industrialisation has occurred, without assuming that there is a law-abiding mechanism through which industrialisation necessarily emerges. The description and comparison of the aforementioned contexts allow researchers to detect both the nomothetic and the ideographic components of industrialisation. The nomothetic components refer to those general facets of industrialisation shared by all the various contexts in which it has occurred, whereas the ideographic components capture the unique, particular features that have stamped industrialisation in a specific context (see Burt, 2005).

A related insurmountable obstacle to the explanation of industrialisation is that it is not possible to experimentally test and refute the various theories attempting to account for this phenomenon. Karl Popper (1935) made a forceful case for the idea that theories are scientific only to the extent that they are refutable. The problem with the scholarship on industrialisation is that one can always invent a plausible “just-so” story (Carr, 2008) and propose it as the explanation for this process, without having to subject it to the risk of experimental refutation.

There is no single cause of industrialisation. The process can emerge from a variety of causes. Similarly, the consequences of industrialisation vary widely across geographical regions and historical times. In order to grasp these ideas in all their complexity, it is worth disentangling and studying the relations between the often confused concepts of capitalism, modernisation, and industrialisation.

Industrialisation and capitalism

Capitalism is a mode of production. A mode of production is a particular way of organizing the economy and of allotting the costs and benefits of economic activities. Economic historians have identified modes of production other than capitalism (primitive communism, slavery, feudalism, socialism, and advanced communism) and economic geographers (Gibson-Graham, 1996) have aptly noted that elements from these other modes of production can coexist, somehow “etched” in the fabric of the dominant mode of production today – capitalism (cf. Peck & Theodore, 2007). There is no relation of logical or causal necessity between capitalism and industrialisation. This means that the two concepts do not entail one another either logically or causally. In plain language, capitalism does not necessarily lead to industrialisation (although it has often been considered as a favoring factor for industrialisation, especially in the scholarship on the first Industrial Revolution in England; see Kemp, 1978). Furthermore, industrialisation can and has happened in non-capitalist regions (e.g. Stalin’s Soviet Union, 1924-1953, see Davies, 1980; Mao’s China, see Andors, 1977; Ceausescu’s Romania, see Simandan, 2004). To look at these relations the other way around, it is worth noticing that industrialisation does not necessarily lead to capitalism (see the cases of Cuba, China, or North Korea today) and that industrialisation is not a necessary condition for the emergence of capitalism (for example, third world countries may have a capitalist economy based on agricultural export-oriented monocultures or on tourism).

Statisticians' urge to remember that correlation does not imply causation is therefore particularly relevant when studying the relation between capitalism and industrialisation: both across historical times, and across geographical spaces the two economic processes tend to go together (Bottazzi et al, 2007). At first glance, one could speculate that they are mutually reinforcing processes, although counter-arguments to this hasty speculation can also be easily conceived. To understand the issues involved, note that the most prominent argument for the virtues of capitalism consists in the neoclassical economic theorising of free-markets as best means for the efficient allocation of scarce resources to many needs. That argument, in turn, depends on the assumption of atomistic (innumerable) economic agents forced to coexist and fight with one another in a condition of perfect competition (i.e. none of them is powerful enough to be sheltered from competition). In other words, the alleged virtues of free-markets collapse if the assumption of perfect competition is severely put into question by economic realities (Plummer et al, 1998, Peck, 2008). And the process of industrialisation systematically does exactly that: on one hand, technologies (one type of fixed capital) for the industrial process become yet more expensive (because they embody more and more knowledge), and this need for larger initial investments of capital encourage the concentration of capital in fewer hands (monopolies or oligopolies); on the other hand, the need for economies of scale acts as a catalyst for the further integration and concentration of capital.

However, it is not only the case that the logic of industrialisation can subtly move capitalist realities far away from their idealised virtues: as Marxist geographers have amply documented (Massey, 1995, Harvey, 1999, Swyngedouw, 2000, Hudson, 2005), the logic of capitalism renders industrialisation a very fragile achievement. Just as the logic of industrialisation favors concentrations of capital, which in turn undermine the free-market conditions of healthy capitalism, so too the logic of capitalism favors the geographical relocation of capital, which in turn undermines industrial activities in old industrial regions. In the initial stages of the industrialisation of a new region, the prospects of continuous growth seem safe and sure. Nevertheless, as time goes by, there is a tendency for the rate of profit of local capitalists to fall because of factors such as exhaustion of raw materials, new competitors entering the market, saturation of the market, increasing rent, new taxes (e.g. green taxes to internalise environmental externalities), increasing cost of labour because of unionization, etc. Since the logic of capitalism is the making of profits for profits' sake, the local capitalists can choose to close the now-unprofitable local plants and reinvest their money elsewhere, in regions where they can make higher rates of return on their investment. These new regions benefit from industrialisation, whereas the older ones suffer the costs of the opposite process – deindustrialisation. In a long term perspective, three observations become self-evident: the first, is that any apparent beneficiary of capitalist industrialisation has its prosperous days counted before turning into one of capitalism's victims. Sometimes, these victims, because they are victims (i.e. high unemployment, therefore oversupply of labour, therefore cheaper labour) might attract new rounds of capitalist investment (Storper & Salais, 1997; Sadler & Thompson, 2001). Second, from a spatial perspective, industrialisation and deindustrialisation are processes that together express the historical geography of capitalism, its highly dynamic and uneven nature that so much impressed Marx and his followers (see also Castree, 2007; Peck & Theodore, 2007). Third, from a political perspective, it becomes clear that the state has a crucial regulatory role to play in deciding the fate of industrialisation. Many of the contemporary struggles over economic globalisation emerge precisely because of the conflicts of interest between states and capitalists: the former care for economic development, high employment, national flourishing, whereas the latter obey the different (trans-national) logic of capitalist competition (see also Yeung, 2005, Painter, 2000).

Industrialisation and modernisation

As for the relation between modernisation and industrialisation, their conceptual knot is more difficult to untie. Modernisation is the historical process whereby the social relations governing a human community have shifted from being based on kinship, tradition, collectivism, and magic/religion, to being based on rule of law, rationality, individualism, and scientific knowledge. The trick is to understand that modernisation can be one of the unplanned effects of spontaneous industrialisation, but also that political leaders keen to modernise their countries can deliberately use industrialisation as a very potent means to that cherished end.

To give an example, Erving Goffman's account of the moral career of stigmatization and his discussion of 'tribal' (i.e. collective) stigma (Goffman, 1990), together with Karen Horney's work on collective neuroses (Horney, 1950) have recently been deployed by geographers to shed light on the political performance of inferiority complexes and on their role in constituting marginal territories as 'in need of industrialisation'. Specifically, Simandan (2006) showed how Romanian and Norwegian intellectuals educated in Paris in the 19th century, upon their return back home, put their countries on the path of industrialisation and modernisation by attempting to copy what they saw in France. Industrialisation played the role of a difference-reducing engine between a deplorable economic backwardness and an intense longing for modernisation. The positive stories of industrialisation have played a major role in the invention of the modern nations (Anderson, 1991), as an analysis of media and of general education school texts would clearly reveal. They have occupied a privileged position in the 'spaces of constructed visibility' (Gregory, 1998) where the imaginary geographies of the nation are fabricated (exhibitions, museums, textbooks, traditional and electronic media, public ceremonies). Nevertheless, and of paramount significance, these stories have helped fabricating *the modern* fiction of the nation, and not just some timeless collective identity.

Until recently, the parties concerned with the development of the third world countries have encouraged their industrialisation as a way out of backwardness and poverty and towards civilisation, modernity, and prosperity. The problem with this encouragement is that it is value-laden (Massey, 2005): it implies that the values of modernity (which happen to be the values of Western culture; Scott, 2005) are superior to the values of traditional cultures in the third-world, which is akin to saying that the Westerners are superior to the "primitives". Since Western scholars and politicians alike have publicly rejected the older assumptions of Western superiority and have embraced an egalitarian worldview according to which all cultures are equally valuable (for exceptions see Sowell, 1998; Rindermann, 2008), the ongoing advocacy of industrialisation as a solution for the third world appears deprived of its most entrenched rationale. To propose a solution implies that there is a problem, and if backwardness is not the problem, than what is it? I will leave these thorny questions to the pondering of critical geographers and post-development studies scholars and turn instead to the weighting of the overall costs and benefits of industrialisation.

Costs and benefits of industrialisation

Industrialisation's legacy of delegation of responsibility for environmental problems has been well documented by geographers and industrial ecologists. The internalisation of its negative environmental externalities remains an inconsistent and poorly enforced practice in many parts of the world. Furthermore, the deeper question of the limits of natural resource substitution has received sustained attention only from a few specialists (Ayres, 2007), despite the fact that the fate of industries is written in the answer to that question.

Unlike the developed countries who became industrialised before the second world war (England, USA, URSS, Germany, Japan), the third world countries who are currently trying to start or speed up the process are confronted with the lack of sufficient local capital. This means that for them

industrialisation can come only at the cost of increasing dependence on foreign capital. If they choose to specialise in export-oriented industrial production instead of import-substitution industrial production, this foreign dependence for capital is further amplified by a dependence on volatile and competitive foreign markets. Furthermore, given that current international economic policies set by the World Bank, the International Monetary Fund, and the World Trade Organization implicitly or explicitly support national economic specialisation (Ricardo's principle of comparative advantage writ large; Weiss, 2002), the least developed countries in the world are pressured to participate in a global economic gamble in which their odds of winning are very long indeed (Harvey, 2003).

Aside from modernisation, the other most frequently invoked benefit of industrialisation is economic development. The problem – as some third world countries have found out – is that industrialisation does not necessarily lead to massive economic development. Let me clarify the concepts involved. Economic growth refers to a quantitative increase in the gross domestic product of a country. Economic development refers to a qualitative structural change in a given economy. If a given country or region has some industrial plants specialised in the production of consumer goods and/or is totally export oriented, it runs the risk of witnessing economic growth without economic development. The respective industries are not organically embedded in the regional or national economy and play the role of the cherry on the cake instead of playing the more ambitious role of the yeast that makes the whole cake grow. This latter role usually is performed by capital goods industries, i.e. those industries that produce equipment needed for the development of other industries. The lesson to be gleaned from this brief analysis of economic growth versus economic development is that whether industrialisation is beneficial or not critically depends on what kind of industrialisation one is speaking about (O'Rourke et al, 2005). Scholars and policy makers have also argued that industrialisation is the best way to fight excessive population growth in the third world (Weeks, 2005). Rural dwellers tend to have very large families partly because they are less educated than urban dwellers, and partly because for them children are a source of wealth and security in old age. The process of industrialisation leads to increased urbanisation, increased general level of education, and increased income, all of which contribute to changing cultural and demographic patterns in the direction of massively reduced fertility rates. In statistical parlance, the impact of industrialisation on fertility rates is mediated by the variables urbanisation, education, and income.

Geography and Industrialisation

The relation between the study of industrialisation and the discipline of geography can be decomposed into: a) an analysis of how the tools of geography enhance our understanding of industrialisation, and b) an analysis of how the interdisciplinary research of industrialisation can add depth and context to the traditional concerns of economic and historical geographers. Geography is a generic name for a set of various scientific practices loosely held together by a common concern for the big themes of “space” and “society-nature relations”, as well as by the networks generated through its having a distinct position in the academic division of labour (Simandan, 2005). In other words, various texts count as geography to the extent that they emphasise the use of concepts such as “space”, “place”, “distance”, “region”, “territory”, “landscape”, and “environment” as entry points into the investigation of the social world. To study industrialisation from a geographical point of view amounts to embracing a style of thinking that is biased towards the aforementioned spatial categories. Is this bias justified? Instead of arguing that the geographical point of view is indispensable to the study of industrialisation, I would make the more modest claim that geography provides a conceptual toolbox for qualifying the sometimes crude accounts of this process. Industrialisation unfolds in space and produces space (Murdoch, 2006), and so do the related phenomena of de-industrialisation (Hudson, 2005), modernisation (Scott, 2005), globalisation (Massey, 2005), dependency (Harvey, 1999), and

pollution (Bickerstaff & Walker, 2003). The recognition of the spatial dimension of industrialisation becomes significant only to the extent that geographers can extract the actual regularities, patterns, or “laws” of the operation of this process. It is at this level of analysis that old and new challenges keep the geographical conversation open. One of the *old challenges* comes from the fact that different political economic worldviews force divergent interpretations of the same economic processes (see Scott, 2000, for a review). Thus, a geographical perspective indebted to neoclassical economics (e.g. older style industrial location analysis; Barnes, 2003) brings with it a more or less tacit endorsement of the beneficial effects of industrialisation, whereas a Marxist perspective carries with it a strong normative baggage that urges sensitivity to issues of social justice (e.g. Harvey, 2003, Castree, 2007). Rather than trying to endorse one view and to discard the remaining views, it might be preferable to think of these different approaches as theoretical resources with complementary roles to play. Each school of thought is a constellation of gains and losses (Simandan, 2005): each take on the spatial logic of industrialisation may be particularly insightful in one respect, and appallingly silent in other respects.

Once with the turn to culture in the Anglo-American human geography of the 1990s, the geography of industrialisation has witnessed, among other revampings (Barnes, 2001, Scott, 2000, Thrift, 2000), an orientation towards institutional (Amin, 1999, Rutherford, 2004, Yeung, 2005, Rodriguez-Pose & Storper, 2006) and evolutionary (Grabher, 1993, Grabher and Stark, 1998, Boschma & Frenken, 2006, Hassink & Dong-Ho, 2005, Bottazzi et al, 2007) approaches to the analysis of the spatial dynamics of the industrial sector. These new directions have enriched the explanatory power of economic geographies, by showing how path dependency, institutional cultures, and geographical relations complicate the fabric of pure economic logic. Nevertheless, more quantitatively minded geographers (Martin, 2001) lament the lack of clarity, rigour, and empirical support that the new vocabularies of these recent schools brought about.

One of the *new challenges* that confront the geography of industrialisation comes from poststructuralism (Yapa, 1996, Murdoch, 2006), feminism (Gibson-Graham, 1996, Massey, 2005), and non-representational theory (Thrift, 2007). These approaches share a reluctance towards grand theories and criticise both neoclassical and Marxist perspectives on industrialisation for their illusionary beliefs about an objective economic reality governed by laws about to be “uncovered”.

This line of criticism alerts us to the limitations of a nomothetic study of industrialisation within a presumed global space-economy and brings attention, at least indirectly, to the possibility of using other entry-points to industrialisation research. To illustrate this latter point, a recent attempt to integrate the field with the help of a master metaphor called ‘recursive cartographies’ (see Simandan, 2006) starts with the simple but powerful idea that the world is the result of the interplay and mutual metamorphosis of *three* elements: rhythms, events, and legacies. A short quote from the industrial geography literature is very helpful for understanding this model (Hassink and Dong-Ho, 2005: 572):

...the historical process of industrialisation in North America and Europe is marked by stories of *small accidents* leading to the establishments of one or two *persistent centres of production*. Thereafter *cumulative processes* can generate a geographical structure of production which may be stable for long periods of time (italics added).

I emphasized in the text three words. The first is ‘small accidents’ and in recursive cartographies this would be translated as ‘events’. Anything that abruptly disrupts the pre-existing order of things qualifies as event. The outstanding features of events are that they bring genuine novelty and they perturb the state of affairs, though in largely different extents. The discovery of electricity, political elections, a bankruptcy, a strike, a merger, a foreign investment, etc., are all events.

The second word emphasized is 'persistent centres of production', which in recursive cartographies would be labeled as 'rhythms'. Anything that regulates a place, bringing constancy, predictability, and structural identity to it, constitutes a rhythm. Five decades of communist rule in Cuba, the production of chocolate in Birmingham, the four seasons of the temperate climate, the urban timetabling of the transportation network, the legal system of a country, are all rhythms. They weave the fabric of a place, while being from time to time wounded by events that challenge their hegemony in processes of place formation. The advent of industrial activity to a rural area is an event; it its wake, that industrial activity becomes a rhythm that begins to re-constitute that area as 'industrial' (e.g. workers going to work at 8am and returning at 5pm, the schools adapting their curricula to prepare the new workforce, the streams of income in that local community becoming dependent on those industrial plants, etc).

The third word emphasized is 'cumulative processes', which in recursive cartographies would be classified under the heading 'legacies'. Anything left in the world that is not either 'event' or 'rhythm' qualifies as 'legacy'. Put simply, the legacy of a place is the coagulation of its past events and past rhythms, with the critical observation that this does not mean that legacy is 'dead', lacking agency. Quite on the contrary, it contributes to place formation extensively: our actions are often guided by lessons learned from past actions, the stereotypes that produce the 'image' of a place come from past knowledge (and that image significantly influences present decisions – e.g. to invest or not to invest in a given regional economy), and a rhythm (e.g. the petrochemical industry) might rest on regional legacies (petroleum).

The many types of cartographies of industrialisation to be found in contemporary geographical scholarship make research into this area reach a level of vibrancy and sophistication rarely found outside geography and promise to contribute to broader questions and critiques of our present condition.

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Glossary

Nomothetic: epistemological perspective that focuses the research process on the uncovering of universal patterns, regularities, or laws. It perceives reality as the interplay of “surface characteristics” and “deep structure” and attempts to explain the former in terms of the latter.

Ideographic: epistemological perspective that focuses the research process on the detection of the uniqueness of each geographical location. It denies the nomothetic belief in the existence of universal patterns, and thus portrays reality in descriptive rather than explanatory terms.