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Was there an ‘industrial revolution’, and where should we look for it?

In popular discourse today, the industrial revolution is taken for granted as a phenomenon that not only occurred but also played an instrumental role in shaping today’s modern economy, separating the 21st-century knowledge-based workforce from the agrarian one of the distant past. Politicians emphasize the distinction between states that have industrialized and those that have not, using terms like “first world” and “third world”, or now, “developed” and “developing” nations. Since the West—with nations such as Great Britain leading the process—grew wealthier through industrialization in the 18th century and onwards, scholarship and discourse grew around industrialization. Academic and political leaders today are driven to apply the same process that built Britain’s economic welfare to poorer nations elsewhere in the hopes of elevating their prosperity. Although the process of industrialization did not happen overnight, there indeed was an “industrial revolution”, which first occurred in Great Britain due to the nation’s leadership in applying science to practical scenarios and its success in creating technology that served prominent use cases.

While the term “industrial revolution” has become popularized over the past century of academic discourse, the coinage of a “revolution” may be disputed. A “revolution” implies rapid and radical change that completes in a sweeping way. However, the transition of a state from one which is developing to one which is developed involves many preconditions that oftentimes evolve over the course of centuries. As suggested by Berend, the British Industrial Revolution may indeed be “the outcome of six hundred long years of gradual progress and change inside

Europe, especially the two to three centuries of development in Northwest Europe during the early modern period” (Berend 77). In this case, the process of industrialization should more aptly be described as a gradual transition rather than a swift revolution. The buildup to the 19th-century industrialization involved preconditions set up by Protestantism, the Scientific Revolution, the Enlightenment, among other sociocultural forces. In addition, the pace of industrialization varied by region—although France experienced mercantilism and the Enlightenment alongside Britain, for other reasons such as wars, geography, political systems, and cultural forces, France ultimately stayed behind for longer, stepping into the process of industrialization only after Britain’s lead. Therefore, due to the rather gradual, and also high variance, of the pace of industrialization, the word “revolution” may have more implications than intended in its use in “industrial revolution”.

With this caveat, an “industrial revolution” still did in fact occur given a contextual understanding of the terminology. In the grand scheme of human history, the industrial revolution, on a relative scale, occurred rapidly as technological development grew exponentially starting from industrialization into the present day. Beyond pace, a “revolution” suggests a holistic transformation that clearly divides pre-revolutionary conditions from post-revolution norms. As suggested by Pollard, industrialization is a single—not a repetitive—process (preface Pollard). Surveying a developed nation today will clearly illustrate the stark contrast between the wealth and prosperity of its economic conditions with that of a developing state, and there is little possibility that the developed one will fall back into the circumstances of a developing one, unless another form of “revolution”, such as war, broke out. The industrialized world has substituted energy provided by “humans and animals” with that provided by “mechanized power” (Gaski 227), and in doing so, extracted greater efficiency and economic growth. As long

as these mechanized tools exist and are accessible for the population to use, the laws of economics will not incentivize the reversal of such industrialized conditions. Therefore, an “industrial revolution” did in fact occur, and it did so in full force in Britain starting in the late eighteenth century.

Many conditions precipitate industrialization, and it may be helpful to search for these when looking for an “industrial revolution”. For one, a sizable and ideally growing population is helpful in eliciting industrialization, as the process requires a cheap and plentiful labor force. In most cases, such a growing labor force can afford to shift some of its attention from agriculture to industry, and population growth helps promote new jobs in industry rather than traditional agrarian roles. In England, among other European nations, there was significant population growth especially after 1800 due to an increase in food supply and declining mortality rates (Satia 3-4). In other words, the Malthusian “positive checks” diminished as technology advanced. The development of various technologies bolstered agricultural productivity, which freed a large part of the rural workforce to migrate to cities and join industry (Berend 129). In contrast, low levels of agricultural productivity in areas such as northern France, Belgium, and Saxony kept most of these regions’ population in the countryside to ensure an adequate level of agricultural production. As a result, these regions industrialized much later than Britain, only when political structures (e.g., the eradication of feudalism), population growth, and technological advancements afforded them to industrialize. When searching for an industrial revolution then, one must look for the preconditions of a steady population and notable agricultural development.

Another marker of industrialization is the development of an individualist mentality, in particular one that promotes private property alongside the freedom and rights of the individual.

These liberal ideals often coincided with the dissolution or non-existence of serfdom, and the elimination of feudalism set in place a new incentive structure that instigated innovation and allowed individuals to be rewarded by the free market rather than a landlord. Such a phenomenon ultimately gave rise to a market economy, modern companies, merchant capitalism, and industrial capitalism. In accordance to Mill's theories and the political theories popularized during the eighteenth century, "a laissez-faire economy, personal liberty, and democracy were seen as prerequisites for one another" (Berend 52), ultimately all contributing to the rise of the industrial revolution.

Many historians also attribute a Calvinist mentality to the development of the industrial revolution. Calvinism heavily emphasized the doctrine of predestination, that God had unalterably set for eternity who would and would not be saved. Calvinist doctrines equated one's worldly success as a sign of heavenly salvation, which stirred anxieties that "contributed to the creation of an ethos of hard work, thrift, self-discipline, and a rejection of luxury as sin" (Berend 30). In some historians' view, it wasn't a coincidence that Germany, Switzerland, the Netherlands, and Britain—four countries all part of the Protestant Reformation—led the world's process of modernization. Oftentimes, Protestant views, consistent with thrift and hard work, elevated the social status of traders and merchants, thereby promoting society's favorable view toward business and wealth (Berend 39). These cultural and social perceptions, stemming from Protestantism or other value systems, ultimately drove a region toward capitalism and industrialization.

The development of a modern financial system also lies crucial in the conditions for an industrial revolution. In Britain in particular, financial modernization began early, especially when compared to continental Europe, a large portion of which remained in a feudal society as

Britain modernized. In 1688, the British parliament began controlling state finances (Berend 360). As a result, the state collected revenue through consumer, poll, and property tax. Parliament could guarantee securities that began trading in the 1660s, and the Bank of England could support public debt financing. The contribution of debt to the national GDP grew significantly, from 6 percent of the GDP in 1690 to 220 percent in 1815 (Berend 36). Debt financing in turn stirred long-term borrowing, which boosted the economy further. Ultimately, fiscal centralization bolstered a credit system that directly led to the capitalist spirit necessary for innovation and greater consumerism at the foundations of industrialization.

Of course, the development of an economy wouldn't be possible without growing supply and demand conditions. Scholars such as Jan de Vries emphasized the importance of demand conditions in determining the course of industrialization. Specifically, Vries outlined the consequences of the division of labor, which promoted both higher productivity of the workforce as a whole, as well as a suppression of individual personality that, over time, created the alienated worker who exhibited a "voracious appetite for goods and an insatiable need for fantasy, distraction, and ostentatious display" (Vries 41). This desire for consumption, fueled by advertising, stirred the individual's need to work more in order to obtain a greater capacity to consume. At a household level, more time was dedicated to market-oriented activities over the course of the eighteenth century (Vries 122), as households specialized to reach higher levels of productivity, and in turn relied more on the market for goods they couldn't produce themselves. In this cyclical pattern, the economy multiplied in its production and consumption, setting up for a revolution of economic growth.

An expanding market also boosted demand for more goods. With waterways and steamboats, Britain could export easily to the rest of Europe, the United States, and beyond. In

addition, the nation's abundance of coal allowed the country to "advance from a high-level organic economy to a mineral-based energy economy", and accordingly move into an era of industrialization ahead of the Dutch (this occurred even though Britain's economy was less advanced—with its income 50% less than that of the Dutch—at the turn of the eighteenth century) (Berend 36). All in all, supply conditions such as natural resources cannot be underestimated in importance when considering the broader landscape of industrialization.

Yet, while there exist necessary conditions for the industrial revolution, they alone are not sufficient. For example, a region such as Africa may uphold a steady or growing population, a necessary condition for industrialization, but the growing population alone does not instigate industrialization. Rather, science applied to the real world, as described by Mokyr and rephrased by Gaski as the ability to create technology, is the sufficient condition which, when occurring in tandem with other necessary ones, produces industrial societies. According to Mokyr, Britain had more technical human capital than the European continent at the eve of the Industrial Revolution, which allowed the nation to leap ahead of others. The English were known for their practical applications of science and implementation expertise, which Mokyr attributes to the country's apprenticeship model. While many countries produced scientists who published new inventions, Britain upheld the comparative advantage in highly skilled labor, with an army of artisans, technicians, and industrial experts that countries such as France looked up to (Mokyr 235-36). In line with Mokyr's thesis, Gaski's "single-factor" argument also propounds the importance of the *application* of science—precisely, that the ability to produce technology was the paramount cause for industrialization (Gaski 233). The invention of machines may be relevant, but it is only in the manifestation of them in physical space through the human capacity to build such machines, that the inventions matter in the process of industrialization. Gaski also suggests that

the ability to build relevant technology is the “single factor” necessary for industrialization, as the existence of technology alone engenders other necessary conditions, such as agricultural advancement, consumer demand, etc (Gaski 231-32). Therefore, in looking for an industrial revolution, not only must a steady population, agricultural development, liberalism, Calvinist values, centralized finance, and supply and demand markets be present, but ultimately, the human capacity to produce technology causes industrialization. Oftentimes, this factor of technological innovation alone creates all other necessary conditions for the progression of industrialization. Therefore, in looking for an industrial revolution, one should look for the creation of machines vital to industrialization.

Finally, in examining the existence of an “industrial revolution”, one might question whether there was just a singular instance of “industrial revolution” worldwide, or multiple instances of revolution occurring in separate locales. Many scholars believe Britain to be the revolutionary force—that the “industrial revolution” was British in nature, and other countries simply modeled off the conditions exemplified by Britain to induce their own process of industrialization. Yet, even though the French Revolution took inspiration from the American one, the French Revolution is still predominantly a French one, distinct from the American War of Independence fought less than a decade earlier. In this sense, no matter how one region mirrors or copies another in their effort to industrialize, every locale—with its own defined jurisdiction and population—upholds an internal process of industrialization. Within each territory, a “revolution” from an agrarian to a machine-based economy can occur, therefore offering the world multiple regional instances of an “industrial revolution”.

Not only was there an “industrial revolution”, there were multiple, and there still exists the potential for more to come. In looking for an “industrial revolution”, the capacity for

implementing new technology is the necessary and sufficient condition for instigating industrialization, often engendering other necessary conditions for such a revolution.

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