

Technological Determinism

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Overview

Technological determinism (TD), simply put, is the idea that technology has important effects on our lives. This idea figures prominently in the popular imagination and political rhetoric, for example in the idea that the Internet is revolutionizing economy and society. TD has also had a long and controversial history in the social sciences in general and in organization studies in particular. Critics of TD argue variously that technology itself is socially determined, that technology and social structures co-evolve in a non-deterministic, emergent process, or that the effects of any given technology depend mainly on how it is implemented which is in turn socially determined. Given the proliferation of new technologies in modern capitalism, the TD debate is continually renewed.

Key elements in TD

TD invokes the ideas of determinism and technology as well as their conjunction. Each poses several conceptual and empirical challenges.

Determinism stands opposed to several other possible doctrines. First, that of free will: Even if we put aside the deeper philosophical issues at stake, social scientists must assess the extent to which social changes can be said to be determined by anything but human will in individual or aggregated form. Second, determinism stands opposed to the idea that social structures and technologies co-evolve in unpredictable, emergent patterns. Finally, in a more post-modern vein, some argue that determinism bears the burden of convincing skeptics of the very possibility of objective knowledge of causal structures.

Determinism comes in “harder” and “softer” variants. In debates over TD, this distinction characterizes views of both technology’s effects and its causes. In its assessments of technology’s effects, soft TD argues that technology is one important force amongst others, while hard TD argues that technology is the main or the only significant driver; anti-TD views assert that technology is “neutral,” and that its effects are a mainly or entirely a function of social context. As concerns technology’s causes, one form of soft TD allows that social factors may shape technology even though, once shaped, technology’s effects are (weakly or strongly) determinate; hard TD argues that social influences have little effect on the nature of technology; anti-TD views highlight the social forces that shape the design and development of technology.

Technology. Different determinisms highlight different drivers: alongside technology, other social scientists have highlighted economics, culture, geography, biology, and language. TD and the resulting debates focus on technology as tools and equipment. By extension, previously-processed raw materials should also be included. More rigorously, technology is the knowledge that is embodied in these artifacts. Arguably, we should also include the knowledge that is required to use to such artifacts, and by extension, include also the principles of productive organization. Conventionally, workers' skills – the complement to equipment in the Marxist concept of forces of production – are excluded from this family.

Some technologies are intrinsically less “flexible” than others and thus might be expected to have more determinate effects: large complex hard-wired systems can be contrasted on this dimension with more decentralized, flexible, malleable computer-based technologies. For some scholars, such interpretive flexibility renders the whole TD enterprise suspect. On the other hand, “Information society” TD theorists argue that computer-based information technologies have deep effects precisely because of their malleability.

Technological determinism has been asserted at several levels of analysis. At the broadest level, TD has informed many analyses of changes in socio-economic configurations: the transition from feudalism to capitalism, changing occupational and skill structure of the labor force in the 20th century, the emergence of post-industrialism in the post World War II era, the subsequent emergence of the “information society,” “post-Fordism,” and globalization. For some, technological progress represents the promise of the gradual emancipation of mankind from the burdens of unnecessary sickness and labor. For others, this same path represents a loss of our very humanity, ensnaring us in ever more elaborate, alienating, and dangerous technological webs.

Another family of positions on TD argues that technology does indeed determine much -- too much -- in contemporary society, but that this power is characteristic of only a specific historical period. This is determinism by default: “capitalist” or “industrial” society has unleashed technological innovation, but has yet to put into place the mechanisms needed to give it the requisite social guidance.

One prominent variant of TD takes inspiration from Marx. On this orthodox reading of Marx, the “forces of production” (technology plus workers' capabilities) form the infrastructure for both the structure of relations of production and the superstructure of politics and culture; the productivity of the forces of production tends to develop over time; the overall direction of this change is largely independent of the social structure, although the latter can accelerate or retard the rate the change; and over time, the relations of production and the superstructure are forced to adapt to accommodate further technological change. (Note that other scholars, relying on other passages in Marx's oeuvre, read him as a powerful anti-TD theorist.)

At a more micro level, a rich tradition of organizational studies starting with Woodward and Burns and Stalker has highlighted the role of technology in shaping organization structure. This so-called “contingency theory” has been the object of numerous challenges to its underlying TD. More recent work in the transaction costs economics tradition imports into organizational theory the technological determinism of mainstream economics in the guise of exogenous, technically determined “asset specificity.” TD can be also be found in much of micro organizational behavior/social psychology research on the effects of a given technology on psychological functioning and interpersonal relations.

It is sometimes argued that TD becomes more plausible the longer the time frame and the broader the aggregate in question. Softer versions of TD may allow that in shorter time-frames and smaller-scale contexts, technology's effects could be swamped by social forces. However, we should note that such an assumption reflects a materialist view of history, and idealists see things in exactly the opposite terms: for those who prioritize ideas, culture, or the role of great individuals, the scope for TD is restricted to the local and short-time horizon.

Problems, Debates

Where does technology come from? Any but the weakest form of TD must have a theory that locates the dynamic of technological change within technology itself (or perhaps in science) rather than in the social structures that TD aims to explain. Many TD proponents allow that capitalism (or some other feature of the social structure) stimulates the rate of technological change; but to preserve the causal role of technology, they must reject the "strong social constructionist" thesis that would explain technology's overall direction of development by reference to social structures.

Social construction can certainly explain some features of many technologies (see the various strands of research in the social studies of science and technology as reflected in journals such as *Science, Technology, & Human Values*, *Social Studies of Science*, *Science as Culture*, in particular Actor Network Theory). However, it has proven far more difficult for social constructionists to show that the broad direction of technological change is entirely or mainly a function of the constellation of social forces. Technological constraints and opportunities simply weigh too heavily in the work of technological change to be pushed so far into the background. Perhaps the biggest problem for TD is posed by the historical evidence of long periods of technological regression, periods during which whole societies moved through technological "dark ages."

Recent research has considerably enriched our understanding of the dynamics of technological change and the intertwined effects of science, technology, and social influences. Particularly prominent has been the idea that technologies develop through distinctive trajectories; but there is debate over whether these trajectories represent the weight of social determinants ("path dependence") or on the contrary, represent the contours of an objectively given space of technological opportunity.

The social factors shaping technology's effects. Clearly, any given technology's effects depend to some extent on the social context. The context will encourage or discourage the technology's adoption, and, if the technology is adopted, the social context will have important effects on how the technology is used and thus on its ultimate impact. Feminist research has been particularly eloquent on these themes. Strong versions of TD are difficult to sustain in the face of evidence showing that both these moments of social determination are important. On the other hand, the idea that technology has no causal impact is equally difficult to sustain.

Ideology. Some scholars worry that TD makes existing organizational and social structures appear inevitable, naturally given. Clearly, TD has been used in such an ideologically manner by some writers. It is less clear that this should encourage critically oriented scholars to reject all forms of TD. TD in various forms has served a broad spectrum of political views. Many critically oriented scholars (and activists) have enrolled TD to argue that "history is on our side."

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