

Review Paper

Technological Determinism versus Social Determinism: A Critical Discussion

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Abstract

Technology influences the way human beings connect with the outside world in their day-to-day businesses. Adopting new technologies can offer opportunities. It, also, poses threats. In the last many years it has been attempted to understand the very sophisticated relationship between society and technology. There is a belief that technology develops independently and that development in technology follows a somewhat linear order. Putting an emphasis on socio-cultural factors that have a role in technological development, some theorists become reluctant to claim that technology mainly determines society. The author of this paper is motivated to look at the issue of technology from philosophical perspective. Thus, this paper is intended to critically discuss the philosophical theory of technological determinism against social determinism, the two conflicting schools of thought in philosophy, and then open a room for further investigation/debate by researchers. Qualitative research method has been used. It used critical discussion as a tool. Literatures in the topic have been used so as to make a relatively comprehensive discussion. The finding of the literatures reviewed shows that the debate between the two schools has no end. The paper contributes to showing the unsettled debate between the two schools and summarizes by recommending further investigation.

1. Introduction

Technology is a broad term that refers both to artifacts created by humans and the methods used to create those artifacts. Technology is the process by which humans modify nature to meet their needs and wants. Technology includes the entire infrastructure necessary for the design, manufacture, operation, and repair of technological artifacts. Twentieth century is marked by technological progress, though the advancements in technology brought about unintended socio-environmental effects. The German philosopher Hans (1979) gives emphasis to the need for anticipating and evaluating technology. For him, technology has impacts that extend in space and time. Paul (2007) mentions Hans' argument as, “*technological ethics must integrate science-based attempts to understand the*

systematic and distant effects of technology with ethical concepts attuned to the fact that many people who will be affected by technology will not be known to those who plan and implement a technological practice.”(Paul, 2007).

Technology has actual and potential advantages to agriculture, medicine, the food industry, and the conservation of natural environment and many more. It needs to address several issues while assessing the benefits and risks associated with the introduction and application of new technologies. Scientific and ethical issues are raised in relation to the development of technology. Science describes the world in which we live in. On contrary, ethics deals with what we ought or ought not to do. Thus, ethical principles tend to give

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standards to evaluate a given action. It is difficult to separate the achievements of technology from that of ethics. Ethics and technology are not only tightly coupled but also conflicting. An ethical understanding of the natural world is the basis for much of technological development today. Conversely, technology is the basis for a good part of ethical research. Both focus on the application of unique skills, knowledge, and techniques.

Different literatures have been reviewed to analyze the issue in question. The author used qualitative method to make a critical discussion on the topic. According to Strauss and Corbin (2008), qualitative research, which is inductive in its nature, allows a researcher explore meanings and insights about a certain discourse. Moreover, as Denzin and Lincoln (1994) stated, "Qualitative research is an interdisciplinary, trans-disciplinary, and sometimes counter-disciplinary field. It crosscuts the humanities and the social and physical sciences...." Hence, this method allowed the author to connect physical science with humanity by critically discussing the two theories. Discourse analysis is used while discussing the theories.

2. Theoretical Discussion

During previous time, technology was assumed as an external force with deterministic influence on different dimensions of an organization. Recent studies, however, come up with the human aspect of technology. As a result, technology becomes a subject of study having both positive and negative impacts on society. It is believed by sociologists or industrialists that technology lies at the center of society. What is technological determinism? The concept of technological determinism is defined by different scholars differently. Technological determinism is a view which states that technology is an external force capable of shaping the society. In this regard, technological determinists hold the view that technology is self-governing and it is the sole cause for social change. However, there is an argument that technology also causes several problems. They see technology as a dominating force which poses physical or psychological threat to human beings. One example for supporting their evidence is the use of atomic bomb during the Second World War. Technology in this respect has an adverse effect upon the human race.

Concerning the role that technology plays, writers discuss three models.

The technological imperative model sees the influence that a particular technology brings on such organizational properties as structure (Hall, 1962). This model views technology as independent with greater influence on organizations as well as humans. The second model called strategic choice sees technology as a product of human action (Child, 1972; McLoughlin, 1999). This model holds different perspectives in it. In the first place, we find the socio-technical perspective which focuses on how a certain technology is built on the basis of human choice and decision. It views technology as a dependent variable. Second is the socio constructionist perspective. This school tries to emphasize on the meaning of a certain technology in terms of its creation and sustainability. The third perspective is that of Marxian which states that technology is a tool to keep the economic as well as political interests of strong groups. According to this school, designers have the power to shape the technology while employees of an organization are endowed with little or no power to do so.

For the third model called technology as a trigger for structural change, technology is perceived as interference. The relationship between organizational structure and human agency is intervened by technology. It is the stand of this school that the physical form of a given technology remains permanent even if its meaning might change overtime. The models discussed above are applicable in either similar or different situations. Moreover, changes in society are implicitly or explicitly related to the advancement in technology.

How is technological determinism then imaged? Some discussion of technological determinism might create a pessimistic image while others optimistic. For example, according to Ellul (1964), human beings become helpless unless technology supports them. For him, the rejection of a technique involves the application of a new technique. How could human freedom be controlled and oppressed by technology? Ellul's image towards technology looks harsh.

Determinism views everything as being determined by a mere sequence of earlier events that operate with predictability. Technological Determinism (TD in short)

holds the view that technology is determined to develop in a particular pattern. It considers the historical development and autonomy of technology. Determinism looks associated with the issue of free will. If everything is determined by previous conditions, then how could human beings owe enough choices? By the same token, technological determinism implies that human choices are controlled by technology. This view seems that it stands against human freedom and dignity. Human beings have the freedom to influence technological direction. They direct, order and influence it.

Technological Determinism is an influential theory of the relationship between society and technology. TD tries to describe social and cultural phenomena in terms of a single determining factor. It was an American sociologist called Veblen who coined the term (Ellul, 1964). According to TD, technology is seen as the mover of society. It is the main cause of social changes. It is technology which controls the pattern of social organization. Technology is the foundation of society, according to technological determinists. They argue that it is technology which changes society and society is being determined by it. Moreover, technology is capable of transforming society. That is why the proponents of this theory insist that technology is primary, followed by human factors.

Is society a product of technology or is technology a product of society? It is argued that technology gets separated from the influence of human beings. It is clear that technology has an impact on our lives. Technological determinism holds the view that no technology is directed by man. Rather, it follows its own course. Moreover, technology is something outside of human control. Technological determinism is aimed at dissociating humans from the role they play in the design and use of technology. Though technologies mirror human values, they might bring undesirable effects. According to TD, technological progress is inevitable.

Unlike TD, social determinism views society as independent force which can alter technology (Green, 2001). Technological determinism has hard and soft forms (Chandler, 1995). Let me take a simple example to make this idea clear. If I say, "mobile phone will improve my life", I mean that mobile phone, being a force, is dominant. It implies the hard form of TD. But,

if I say, "mobile phone will help me improve my life", it means that there are other factors which determine my life. Hence, I am using the soft form.

The soft version of technological determinism holds the view that not only technological change derives social change, but also responds to social pressures. But, for hard technological determinism, development in technology is independent of social barriers. Hard technological determinists argue that cause and effect relationships allow people to know with certainty about future consequences. Some of them say that humans are not free to make choices. But, this view is against humanity. In my view, technology could not be the only determinant of change. It functions within a social structure. I argue that humans create technology. By so doing, they create their future. How could creations of their hands determine their destiny or future? For Postman (a technological determinist), every use made of technology is determined by the structure of the technology itself. Winner (a social determinist) comes up with a counter argument. For him what matters most is not the technology itself. Rather, socio-economic systems, in which a technology is embedded, determine it. Society controls technology. Technology is shaped, for instance, through the influence of culture. To what degree is the development of technology determined? So far as a technology is socially constructed, its development is determined by socio-cultural as well as political factors. For example, politicians argue about how a certain technology is designed, developed and used. Related to this, Pinch once said, "what the social constructivist work points to is that the design and adaptation of technology should be part of the political agenda. In other words, these issues should be opened up for debate among wider constituencies than at present. There is no inevitable logic of development. There is choice. And this draws attention to the technology we never get." (Pinch, 1996).

The hard version of technological determinism stresses that technology is a determinant factor for social existence. In this connection, Marx once said, "In acquiring new productive forces men change their mode of production, and in changing their mode of production they change their way of living- they change all their social relations. The hand-mill gives you society with the feudal lord, the steam-mill, society with the

industrial capitalist" (Marx, 1847). A particular technology, according to hard technological determinism, is a necessary condition for determining social organization. The soft version, on the other hand, considers technology as a facilitating factor which leads to social changes.

Winner gives two hypotheses on TD. In his words, "technological determinism stands on two hypotheses: (1) that the technical base of a society is the fundamental condition affecting all patterns of social existence and (2) that changes in technology are the single most important source of change in society" (Winner, 1977). The notion of technological determinism is also discussed by some anthropologists. For instance, the anthropologist Leslie White, once said, "we may view a cultural system as a series of three horizontal strata: the technological layer on the bottom, the philosophical on the top, the sociological stratum in between. These positions express their respective roles in the culture process. The technological system is basic and primary. Social systems are functions of technologies; and philosophies express technological forces and reflect social systems. The technological factor is therefore the determinant of a cultural system as a whole. It determines the form of social systems, and technology and society together determine the content and orientation of philosophy" (White, 1949). Does technology determine society? In my view, it is society which has the capacity to influence every single pattern of technology. Human freedom will be diminished if technology becomes the primary determinant of society.

Social construction of technology approach argues that humans shape technologies and vice-versa. Technology is shaped and reshaped by humans to satisfy their needs. The focal points of social constructivism are social groups and flexibility in technological development. Social constructivists, such as Bijker et al. (1987), argue that there exists flexibility in the design of technology. It is believed that the relationship between humans and the natural world is complex. For social constructivists, the cause and effect sequence of technology is necessarily not linear. They come up with an effective multi-directional model as the best alternative. The model they suggest is believed to integrate social groups and technological artifacts. Social constructivism emphasizes on the relevance of

social groups, the multi-directional nature of technological design as well as social conflicts on values. It gives an insight that we use as a basis for understanding the role of technology. It also explains what factors make technological developments achieve, how values are embedded in its development process and how society is linked to technology. Social constructivists reject technological determinism. For them, no technology has a logical order of development. Technological development is contingent on various factors. In my opinion, technologists are capable of looking at the natural world through human interests lens and make things that are suitable for socio-cultural contexts. Social constructivism puts emphasis on values in technology. The material outcomes of technological development are shaped by values. Thus, technology becomes value-laden. According to this approach, technology is constructed socially. Humans in different walks of life engage themselves in demanding, making, using and regulating technology. When humans design technology, they are designing their way of life. The transformation of society is created in the technological design process. We need to understand what the implications of a technology are because it is not easier for us to know a lot about how a technology functions, its environmental and social impacts. We should examine technology. In my belief, examined technology is worth having. Before we accept a new technology, we need to question how it influences our day-to-day life activities since technology is part of human interaction. Technology is an element of culture. New technologies get integrated into societal practices through diffusion. Societies adapt themselves to new technologies. But, when new technologies come into conflict with interests of different groups, ethical questions arise. The impact that a technology has on society and the need for ethical reflection depends on who is affected by it.

The concept technological determinism is used to show the relationship between technology and human activity. Moreover, technological determinism ranges from the explanation of autonomous technology to the view that technology is the most dominant factor in social change. According to Bimber (1994), there exist different approaches, what he calls Accounts, to the concept of technological determinism. Firstly, Norm-based Account tends to interpret technological

determinism as a cultural phenomenon. While Unintended Consequences Account views technological determinism in terms of unpredicted social effects of technology, Logical Sequence Account sees technological determinism as a natural universal law. How Marx views TD? For Marx (1847), humans are the main factors in the development of forces of production. The role of technology for him is facilitating the process. Different writers advance their arguments about Marx and technology. For example, Winner (1977) argues that it was Marx (1847) who designed the coherent theory of autonomous technology. It seems that Marx gave technology a central place in the area of human development. On the other side, Marx is believed to be no technological determinist. For instance, Rosenberg (1976) argues that Marx viewed historical change in terms of a social process rather than a technological one. MacKenzie (1984) strengthens this idea by arguing that Marx forces of production should not be equated with technology. For Marx, technology as a productive force has a role to play. However, the link between technology and productive forces remains the central problem or issue of discussion. Although several interpretations are given by scholars concerning why and how technology is influential, the main point is the importance of it in bringing about social changes. Bridging the gap between the two camps would seem difficult, but not impossible. The concept TD is beyond this debate. Marx should be acknowledged for laying the foundation.

Is technology autonomous? According to some philosophers such as Ellul (1964), technology is seen as something outside of society. It is presented as independent, self-governing and self-determining force. Furthermore, technology is not considered as a product of society. No human can control it. One of the renowned theorists who adopted this perspective is Ellul (1964). He declared confidently that 'Technique has become autonomous; it has fashioned an omnivorous world which obeys its own laws and which has renounced all tradition' (Ellul, 1964). For him, no society is able to shape technology and every technological system is being shaped by technology itself. Postman also argues that "Technique tends to function independently of the system it serves" (Postman, 1993). Denying the inevitability of

technological effects, Postman (1993) insisted on the unpredictability of such effects. Autonomy, being a Western liberalism idea, gives persons the ability to govern themselves. But, it is seen that social conditions restrict individuals' autonomy. Ellul (1964) does not agree with such an idea. For him, there can be no human autonomy in the face of technical autonomy. My question here is does technology have its own will? It is true that technology has a purpose. But, its purpose is designed by humans. It is being shaped by society. Technology is subject to human control since it could easily be turned off by humans without its consent. Although some theorists such as Pitt (1987) consider technology as a self-generating force, they fail to present it as a conscious being having a desire. Technology is incapable of being explained and its autonomy is confined within some limits. According to Habermas (1970), technology is not an independent force. It is society which exercises sovereign power over technology. For him, societies are capable of employing ethical conceptions to control the norms of practice in technological advancement. Habermas's (1970) conception of TD puts emphasis on norms of practice. In my view, it is possible to consider technology autonomous when these norms are removed from ethical discussion. Heilbroner's (1961) view of TD is incompatible with that of Habermas's (1970). For Heilbroner (1961), technology is independent of cultural and social factors. He is describing a fixed sequence of technological developments. I also believe that it is not by chance that the steam-mill follows the hand-mill. The sequence is given by nature and it is capable of deriving social changes independently.

For Heilbroner (1961), the rise of capitalism and its demand led to technological innovation. As a result, technology has started to be seen as impersonal force. According to Winner, it is possible to manipulate individual developments. But, technological evolution cannot easily be controlled. Technological change is an accumulation of unanticipated results. Thus, we adapt such a technological drift rather than controlling it. The system embeddedness of technology might have a constraint on our cultural system. This, in turn, might result in the loss of human agency. Ellul (1964) views technology as something which has replaced nature. Technique, for him, is the home in which human beings

live. His technique is something artificial, autonomous, that is, self-determining. Moreover, technique is not goal-oriented, but it is known for its growth. The parts of a technique are inseparable. Technique is capable of encompassing every social phenomenon. Because technique comprises psycho-social patterns, it forces human beings to adapt themselves to it. Technique dominates our values and ideas, according to him.

Technological determinism as a theory pays due attention to a cause and effect relationships. It attempts to differentiate a cause from an effect. Moreover, as an explanation of change, it gives a single cause. Being monistic, TD involves a kind of reductionism aiming at reducing a complex whole to a part. Reductionism is not far from criticism since it is hardly possible to isolate a single cause from any social process.

Technological determinists attempt to see everything in terms of technology. Determinists consider human beings as *Homo Faber*-users of tools. In this connection, Thomas (1841) said that, "without tools man is nothing; with them he is all." It is true that technology has been contributing its part to the success of human activities. Whenever we develop a certain technology, we are directly or indirectly shaping ourselves. Writers on technological determinism argue that technological system is primary and any type of social system is a function or product of technology. It is the technological factor which solely determines the form of social system. TD is a mechanistic mode of explanation. A machine serves a designated function. It operates according to cause and effect. A machine is autonomous which can run. It can run independently of human intervention. A machine, however, fails to select its own goal. Application of sophisticated technology might have an implication which is not wholly protected. But, we need to take in to account that to what degree we the users become part of a technology when utilizing it.

Technological determinism is also associated with what is called reification, treating an abstraction as a material thing. While reifying, we treat technology as a single tool with a homogenous character. Such philosophers as Heidegger treated technology as a monolithic phenomenon and Ellul (1964) referred technique as "the totality of methods rationally arrived at and having absolute efficiency in every field of human activity". Moreover, technique is "the ensemble

of practices by which one uses available resources to achieve certain valued ends" (Ellul, 1964). One shortcoming of Ellul's (1964) definition of technique is that a technology has different manifestations in different social contexts. The flexibility of technology might vary according to different services it provides. In this regard, technology remains non monolithic.

Is technology a means or an end? According to Ellul (1964), technology is an end in itself rather than a means to some other ends. Some critics, however, argue that technology serves as a means to meet societal demands. In this sense, if technology is a means then it would be hard to stop its developments. It is also difficult to avoid such technological developments.

Is technology neutral? Some theorists propose that technology is neither good nor evil in itself. It rather remains neutral. They say that what matters most is not the technology but the way in which we prefer to use it. Moreover, technology is not either moral or immoral. It is ethically neutral. Standing against the neutrality of technology, Ellul (1964) claims that whether or not technology has good or evil outcomes mainly depends upon the way how it is utilized. According to him, "technique carries with it its own effects quite apart from how it is used. No matter how it is used, it has of itself a number of positive and negative consequences. This is not just a matter of intention". Technology seems somehow neutral in the sense that its use might have a role in molding our activities.

Commentators on technological determinism argue that technology is non-neutral. They say that the technology we use determines our world view. For Postman, technology is not neutral. He argues that, "the uses made of technology are determined by the structure of technology itself." (Postman, 1993). In addition to this, Winner is tending to see the political non-neutrality of technology in the sense that technology is designed to open some social options and to close others. I also argue that technology is not-neutral. It is associated with its social usage. We cannot detach technology from social context since technology itself is a social product.

Technological determinism can also be manifested in terms of universalism. Technology could be outside the framework of specific social, cultural or historical context. It does not, however, mean that a particular technology is universally associated with identical

social patterns. Technological determinism is also associated techno-evolutionism which is a type of developmental determinism and the theorists endeavor to interpret change in terms of progress. Progress is defined by such theorists in terms of successive developmental stages. There is a link between social progress and that of technological since development in technology is an important precondition for societal development. Technological change produces certain social changes. Thus, society and technology are related.

Is technology creating problems or solving them? It is true that human beings have been benefiting from technology. Humans are living in a world of technology. Thus, ethical issues should be included together with the advancement of technology before the moral fabric of the society is eroded and civilization is collapsed. Human values must be taken into consideration. Some writers argue that although humans are eager to exploit technology, it remains autonomous. The main point is that for human beings to remain subjects of technology, they need to accept the common value of technology. It is believed that society and technology shape with one another. They are interconnected. The point I need to underline is that socio-cultural as well as political factors have an influence on the development of technologies that are existing now. In this connection, Winner, in his work, "*Do artifacts have politics?*" tries to address the relationship which exists among systems of power, authority and that of technology. His argument is that no particular artifact exists without a distinctive type of social arrangement. Thus, whenever we adopt a particular technology, it means that we are also adopting a particular social order. According to Winner, artifacts are capable of enforcing social agenda. It is subtle that technology is a collection of artifacts and socio-cultural practices and no technology has a meaning by itself. A technology becomes meaningful when it is attached to social practices. It can never exist and be used independently of social relationships. Similarly, social practices may fail to exist without

technology. Can man-made material objects come into being in a vacuum? Do they have meaning in a vacuum? Or can they be used in a vacuum? Technology as a material object is created in a social context. It functions in complex social arrangements. When we recognize the inseparability of technology from society, it would become vivid that no technology remains as an independent entity. Focusing only on autonomous technology is not only an attempt to separate it out from the context it was made, but also from the socio-cultural meaning attached to it. A technology accomplishes designated tasks when members of a group work together. Let me take an example. These days, computers in an automobile industry are helping mechanics during automobile repair. The introduction of computer system helps mechanics' task of diagnosing cars. But, computers do not know how to interact with clients. They function with the help of humans. Do computers feel responsibility and accountability when we assign certain tasks to them? As far as humans design technologies, they are responsible. Though technology is a dynamic force having an impact on society, we need to interpret technology in the context of society.

3. Conclusion

Technological determinism and social determinism have answered some questions concerning the independence, design and use of technology. However, several issues remained unanswered because of the complexity of the two perspectives. Technology has penetrated all spheres of human existence. Ethics of technology is not only vital for developing an ethical framework for the assessment of emerging technologies such as genetic engineering, but also for the ethical issues related to creative and innovative technologies. For technological determinists, technology not only drives, but also defines social change. Social determinists argue against this idea. For them, social and cultural practices shape technological development. When will the debate between the two camps end?

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