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Capitalism and Technology: An Integrated Interpretation

Theodore John Rivers

Independent, Forest Hills, USA
Email: trivers13@verizon.net

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Abstract

There are several factors that relate to the development of capitalism when aligned with technology which include the technical expertise of labor, the essence of innovation, the mechanization of time, the idea of process when distinguished from progress, and the pursuit of utility as a motivating mechanism. These factors present an integrated approach to capitalism not only as an economic system now evident globally but also as a societal force that may be equated morally, socially, and even metaphysically with the appearance of modernity that may be perceived in part as an extension and modification of its medieval background. It is not any technology, but Western technology that was required for the appearance of capitalism as an economic system. The historical factors discussed in this essay are unrelated to the theory that the European causes of capitalism were derived from the disappearance of feudalism that occurred in the late Middle Ages.

Keywords

Capitalism, Technology, Labor, Innovation, Mechanization of Time, Process, Utility

1. Introduction

Capitalism is usually defined as an economic system that presupposes the existence of a market that generates a demand for goods and services, while it also attempts by various means to satisfy this demand, known as supply. Therefore, it is different from many other economic systems, but there are also different types of capitalism such as mercantilism or a so-called mixed economy. Although the market sets the price of goods and services, not all phases of capitalism are tied to a free market, since goods may be withheld from the market for a time so that demand increases. Because capitalists invest their capital in many diverse ways,

capitalism is also called the free enterprise system, but this idea ignores the possibility that a capitalistic market can be manipulated. Capitalism presupposes that the owners of capital are private individuals (hence, privately owned) or private partnerships (corporately owned). It also presupposes that economic growth occurs because of the development of the right to own private property, but there are exceptions to this development as economic growth in China attests.

It is well-known that capitalism is an ambiguous word and perhaps more so than feudalism, socialism, or communism, and in the absence of a more precise word, its use should be limited to its context. Nevertheless, a definition of capitalism may be acceptable when it is utilized for a particular time and place that must be distinguished from many others that could also fall victim to the same ambiguity, for even the use of the expression "market economy" for capitalism may be inaccurate. Perhaps no economic system can be accurately described, and yet for capitalism it might be acceptable to refer to it as the name of a free-market system whose primary pursuit is the attainment of profit that would relate to the description of an enormous range of possibilities from agricultural production with a vast variety of products to manufacturing with a nearly endless list of goods to a service industry that is facilitated by computer technology. If capitalism signifies a social system that is derived from its economics, then capitalism did not exist before 1500. And when it does appear for the first time, it is European. Although it may be said that the growth of agricultural production helped the economy in late medieval England to excel when compared with economies on the Continent, this pre-industrial development supplemented the pre-existing technological development that evolved from the Middle Ages but had little relevance to the population/production controversy known as the Brenner Debate (Ashton & Philpin, 1985). Any social consequences that it may generate, which some critics may perceive to be fundamentally important, whether beneficial or harmful, may be minor when compared with its economics.

Traditionally, capitalism is usually conceived as an economic system associated with Western civilization, but such an inference does not agree with the pre-modern or non-Western occurrences that are associated with it, and therefore, capitalism acquires additional ambiguities that make its clarification even more difficult. Inferring that Western Europe was a latecomer to capitalism is highly suspect because so-called non-Western merchant capitalism was profitable merely from an individual merchant's point of view that had little to do with capitalism as an economic system. Peddling and selling commodities on the Silk Road does not make a seller a capitalist any more than operating a business makes one an entrepreneur. The latecomer interpretation has been put forth by Jürgen Kocka (Kocka, 2016). Such an interpretation is further challenged by other historians (Bruland & Mowery, 2014). Regardless of how capitalism evolved, its evolution in the West is noteworthy because of many factors that originated there.

It is the purpose of this essay to demonstrate that certain manifestations of technology were essential for capitalism's evolution (Arthur, 2009). Nevertheless,

some popular literature such as J. Bradford DeLong's *Slouching Towards Utopia* (2022) or John Cassidy's *Capitalism and Its Critics* (2025) do not discuss the historical factors that affected the development of capitalism. When combined, these historical factors were essential in creating, promoting, and perfecting capitalism as modernity's formative economic system, factors that characterized capitalism as a specialized economic manifestation of medieval Europe.

As already noted, there are different types of capitalism, the most expansive type is globally based and the least expansive type is locally based, and the two do not need to merge. Depending on the historical setting and its economic conditions, capitalism has changed as the historical past has changed. Although capitalism entered a new phase during the Industrial Revolution, there was a pre-historical type of so-called merchant capitalism that began in the late Middle Ages and concerned profits from the cloth trade, mining, and overseas exploration, but only on an individual level. The idea of merchant capitalism that generated wealth through trade must be differentiated from industrial capitalism that generated wealth through industrialization which became the stimulus for mass production. The combination of industrial, technological, and historical factors defined capitalism as an economic system.

It should also be noted that monasticism held importance because it achieved societal and political prominence as it also acquired wealth. Additionally, the Renaissance with its emphasis on the individual was an essential motivation for the rise of capitalism, along with the rise of the nation-state that included the idea of a strong monarchy, the expansion of credit, the advancement of science, and the appearance of individuals who were willing to take risks in order to acquire wealth. The origin of capitalism is often attributed to the decline of serfdom in the late fourteenth century and to the rise of a wealthy peasanty class (Dimmock, 2014), but both conditions were supplemental to the more fundamental technological factors that prepared European economy for capitalism. These earlier types of capitalism, whether industrial or pre-industrial, are different from the types of capitalism evident today.

Regardless of the form it takes, capitalism has an influence on many aspects of society, which include not only goods and services and their underlying technology, but also the political and economic situations in which they appear. Capitalism introduces changes into the nature of business as well as the social consequences that follow from them, but in the present age capitalism has gone beyond the expectations of the past. Although it is presumed to be free from government involvement in theory, capitalism presupposes some type of government control in fact or government participation in the development of a specific policy, such as public safety or social welfare, it is encouraged by a state-led developmental model. And yet the economic policies of globalization tend to weaken the role of government in wealthy nations if there is no systematic and persistent opposition while it also leads to poverty in poor nations unless they are tied to the process of industrialization, which seems to be aggravated by impractical and politically ex-

treme decisions. Originally applicable to economics, the events of the last two centuries indicate that capitalism is also a political concept (Habermas, 1975). But then again, religions and religious movements seem to be similarly motivated.

Issues that concern the modern world, globalization, democracy, socialism, automation, or Asian economics are related to the ideas expressed in this essay because they relate directly or indirectly to the West. In reference to capitalism, there is ample evidence that it originated in the West, not only because of its medieval origins but also because of its Judaic, Hellenic, and Christian foundations (Latouche, 1996).

A basic understanding of capitalism concerns both industry and economics. Originating as essential components of capitalism, both industry and economics are appended to another component which is technology. Because capitalism is aligned with technology, we should inquire about their relationship. Although technology can be understood in the absence of capitalism, especially when economics is not considered, capitalism cannot be understood in the absence of technology, an interpretation that is still fundamentally denied (Lee, 2009). Given the importance of both, capitalism has a greater tendency to be influenced by technology than the reverse (Mumford, 1934), at least through the economic impact of innovations and their applications, and this relationship should be apparent because although capitalism is influenced by technology, it is not dominated by it. Because the modern history of capitalism in large part coincides with the modern history of technology, their contemporaneity cannot be assumed as proof of reciprocity. Without historical evidence of this presumed relationship, we cannot confirm if it is true (Braudel, 1981, 1982, 1984). In addition to the arguments given above and the evidence given below, it should be apparent that the history of medieval Europe was imperative for the appearance and evolution of capitalism. Although it is possible that capitalism might have developed outside of Europe, this possibility is unlikely unless historical conditions were nearly identical.

Capitalism as an economic system came into full flowering during the Industrial Revolution which in the seventeenth century began in agriculture, became industrialized in the eighteenth, and continued with further mechanization throughout the nineteenth and twentieth centuries. Despite the emphasis that is usually placed upon the Industrial Revolution and its relationship with technology as key factors upon capitalism, there were also medieval merchants who formed profitable relationships with banking houses and business centers located in towns, with government financiers and local manufacturers, and with trade and craft guilds. Influential families became powerful enterprises that through marriage and negotiations, such as the House of Rothschild, were able to influence papal policy and the politics of nation-states (Reynolds, 1961). Because the Industrial Revolution modified the application of capital from agriculture to industry and from simple to more elaborate applications, this modification had a positive influence on the type of capitalism we utilize today.

The five factors discussed in this essay were important interactively since no

one factor was influential by itself. Labor was unimportant unless connected with utility. Utility was impractical unless joined with a process that fortified its meaning. The process was unproductive unless connected by innovations. Innovations were meaningful only within a timely context. And it was essential for these four factors to be joined with the fifth which gave a forwardly directed linear conception of time which differentiated antiquity from the Middle Ages. The interconnectedness of these five factors gave all of them a unified purpose that rendered them more productive than any institutional, proprietary, financial, or political application.

2. Labor

Capitalism cannot function without the use of labor since labor is how profits are made. If labor is the means to making a profit, then the value that labor confers is proportionate to the investment the capitalist makes. If for the sake of argument, an investment remains constant, then the more a capitalist pays for labor, the less profit he makes, and the reverse is also true. Whatever means are applied to reduce the cost of labor (and expenses affiliated with it, such as health care or pensions) should increase profits. The spread of labor that is dependent on wages (wage labor) has now become a global phenomenon and has led to the weakening of labor in general. Although we should be careful not to demonize capitalism, nevertheless, labor has been debased in many nations so that we can still speak, even if only as an abstraction, of a world proletariat (Botwinick, 1993; Coates, 2000; Piketty, 2014).

This debasement also indicates how labor is tied to technology. During the early phase of the Industrial Revolution, the use of technology was limited at best, and in fact underutilized. Today, the opposite is the case because the use of labor in relation to technology has changed considerably. Is it possible through technology to reduce labor to such an extent as to eliminate it almost completely in some cases and replace it with automation? Does automation signify that many skills have been diminished? If these questions can be answered affirmatively, then some critics have perceived capitalism to be the means of exploitation.

Because capitalism is sometimes subject to forces beyond its control, it is vulnerable to economic crises such as the depression of the 1930s or the threat of global terrorism today, but it is also capable of exerting considerable pressure on the teeming masses who have no other means of making a living other than as wage laborers, even when they sit in an office using a computer. The days of everyone being a simple farmer or artisan from the ancient and medieval past to the early twentieth century are no longer tenable. As we will discuss below, technology does more than increase labor's productivity because it also intensifies labor's dependency. How well a nation develops technologically indicates that technology is a form of wealth (Kozmetsky et al., 2004). For even outsourcing that spreads technology elsewhere enriches the economies of other nations, but it presupposes that these nations have initiated industrialization or mechanization first before

they can participate in any global demand (Baldwin, 2016). Globalization promotes the continuation of capitalism by determining the rate of economic growth among nations while promoting competition among them. Capitalism is technology's preeminent economic system, and by so being, it is expressive of this relationship because the spread of knowledge, even technical knowledge that relates to industry, finance, and logistics, promotes a method which itself is a technology.

Given that profit is the underlying motivation for capitalism, we may assume that it is an integral part of any interpretation even when it is not formally considered, but the use of labor is not the only source of profit. Since technology has a direct bearing on the historical role of labor, it is by means of technology that labor produces profits. It is also by means of technology that capital is invested. Because technology and labor are concomitant aspects of capitalism, they have a more intimate and reciprocal relationship with it than with other economic systems (Adas, 1989). This conclusion does not imply that non-capitalistic systems do not utilize technology, but that the relationship between labor and technology is less developed or less integrated in non-capitalistic systems as it also manifests a reduced effect in an environment with reduced technology. Capitalism has become technology's preeminent economic system. Wherever modern technology is actively pursued throughout the world, some type of capitalism (unless it is deliberately suppressed) will follow in its wake as manifested historically from the Industrial Revolution to today.

We should be mindful that using very simple tools in a primitive setting, such as in ancient Mesopotamia, Egypt, or China millennia before the beginning of modern technology still concerns the use of technology, although it predated capitalism. We should also be mindful that capitalism might not be an advancement over its economic predecessor—feudalism—but that it is simply a different economic system.

This technological interpretation also concerns the practical effects of capitalism which are aided by technology's exploitation of labor. This idea brings us directly to Marx's understanding of capitalism. Although some critics may assume that invoking the name of Marx implies a socialist interpretation, it is important to consider his view because Marx had a profound understanding of labor in relationship to technology when referring to manufacturing in the nineteenth century. Marx concluded that the use of technology reduces the value of labor, a conclusion we should accept if we are willing to live in a technological age, but then again, every age is a technological age, some with primitive technology such as three-wheeled plows, and some with advanced technology such as tractors. Because technology has become such an integral part of labor, it is difficult to separate them. It is used to increase labor's productivity as it decreases labor's value in which the worker uses a tool or machine to do or to make something, but technology also dominates the worker so that the value of the worker is reduced in proportion to the use of technology. As technology decreases labor's value, it also increases its dependency. Even working in an office is unimaginable without the

use of mechanical or electrical devices, or at least the rudimentary technology of paper and pen. For example, under modern industrial production models, workers manufacturing products with tools or machines inevitably develop a dependency on technology and management systems. This is because modern industry has developed numerous methods to tightly bind labor to complex production networks—regardless of whether washing machines are made in China, shirts in India, or jet engines in Massachusetts. It is dependent upon broad-based logistics that are tied to the idea of process. Any increase in technology leads to greater dependency not only because technology in general makes everyone dependent upon it, but also because capitalism is strongly influenced by technology's means of application (its methods) and its principles that determine how they are applied (its methodologies) (Buchler, 1961).

If capitalism is influenced by technology, any aspect of the latter should influence it, and these aspects are numerous. To exclude some aspect of technology while including only a generalized presence of its being may lead to ambiguity. The history of the modern market economy reveals the influence of many technological aspects that, when combined, strengthen the presence of a new economic system, which must be built upon a modern industrial foundation. Even China, in order to participate in the global economy, must actively pursue technological innovation. Once this process begins, any reduction in industrialization or mechanization threatens the economy that produced it.

We said above that technology does more than increase labor's productivity because it also intensifies its dependency, but that productivity is contradictory, especially regarding artificial intelligence (AI). When machines are used in place of humans that need no rest, no food, no light, no hesitation, then the economic well-being of human beings has changed. The sense of meaningful employment has been modified in our time by means of technological development, although the latter may even outpace moral improvement. Artificial intelligence is more than a tool to be mastered because it also signifies a shift to a different type of efficiency that has been revealed most notably in the twenty-first century.

In reference to labor, new norms that concerned the division of labor or the hours allocated for work were themselves new technologies that were historically derived from industrialization. Because the meaning of technology is applicable to all its aspects, this meaning was greatly enhanced by the Industrial Revolution through the increased use of machinery when contrasted with the previous cottage industry, and through widespread changes. that became "revolutionary".

3. Innovation

Initially, technology was dependent upon innovation, upon the utilization of devices and ideas many of which were newly conceived and have practical applications, even if they were accidentally discovered as the microwave oven (an innovation) was developed from electromagnetic radiation (an invention). Because innovation is dependent upon invention, there is a relationship between them as

there is also a relationship between invention and technology. From a technological point of view, invention means the creation of anything such as tools, machinery, ideas, or procedures that did not exist before. As the means to have a practical effect, an invention must be innovative. Because invention is simply a newly devised means to an end, the end is simply the practical application of the means, and that is what is meant by innovation. The difference between invention and innovation is not a minor comparison, but a major distinction that subordinates and replaces the inventive nature of technology with its repository nature which is particularly notable for capitalism. When emphasizing these views more emphatically, we can say that invention is a fundamental requirement for the creation and perpetuation of technology, and yet innovation is emphasized more than invention because technology when revealing the source of its creative energy must indicate how it relates to praxis, a praxis that is noted by adaptability, from automobiles to personal computers, from pizzerias to Mexican restaurants, from flavored water to craft beer. Since innovation as the practical effect of the means of technology is not to be confused with invention as the original cause for anything that might follow, it is important that the idea of inventive originality be understood supplementally. It is important to note that innovations are often changed or modified to fit changing situations (Rogers, 2003).

Although it is easy to confuse invention and innovation, this confusion goes a long way to obscuring the relationship between capitalism and technology. Simply put, invention is not a type of innovation (Usher, 1954), but the introduction of something new that may or may not be innovative. Technology is the effect of inventiveness, but invention without praxis has a most limited effect because technology is the result of an innovative spirit. It is not enough to say that humans invent or create technology. We must also say that technology has meaning not only because we use it to bring new things into the world that may be marketable, but also because these things are useful. Therefore, an innovation is a description of an action, procedure, method, or device that has attained practical application because many factors to which it relates converge to produce an effect. If we were to cite examples, we could say that technology and its innovative ingenuity have led, among other things, to the invention of tools and machines, the practical effects of mathematical reasoning, the invention of writing, the specialization of labor, the development of cultures and civilizations, and the perpetuation of a technological presence that is associated with human and humanoid species from stone tools to robotics.

We already mentioned that the confusion between invention and innovation obscures the relationship between capitalism and technology. Because of the Industrial Revolution, capitalism has increasingly borne the effect of inventions and the inventive spirit, but only when inventions have been practically applied. An invention without practical application may be innovated many years later, or not at all (Mensch, 1979; Jewkes et al., 1969). Unless a device, tool, or procedure is profitable, it is often removed from the market, since the lack of profits may indi-

cate either poor marketability or the introduction of a more competitive item. Non-profitable endeavors are often self-destructive; otherwise, some capitalistic endeavors may be risky, if not foolhardy. Similarly, an invention that has lost its competitive edge or has been superseded would probably become obsolete or may perform a minor role in capitalism. A case in point is the gas light, which was invented in the late eighteenth century and developed many applications both for internal and external use by the early nineteenth century, but eventually was superseded by the more practical electric light in the late nineteenth century. It is apparent that economies which have already benefited from many inventions and innovations will render additional inventions and innovations more likely. Less advanced economies can always mimic more advanced economies and can take advantage within a relatively short period of time of the greater length of time that advanced economies required.

4. The Mechanization of Time

Another factor that is fundamental in the development of capitalism is the mechanization of time. Of course, time's mechanization that originated in the late Middle Ages is based on its own historical conditions. It is dependent upon the concept of linearity that was introduced into the West by Christianity, a conception of time that gave birth in a progressive dimension that led to an optimism by which humanity could be improved. Linear time replaced the cyclical conception of time typical of Greco-Roman civilization in which events were presumed to occur and reoccur in an endless cycle. By comparison. linearity signified that time had a beginning and ultimately an end. Because the idea of linear time lies at the core of Western civilization, it has influenced all subsequent institutions from religion to science to economics.

The mechanization of time is a result of the invention of the mechanical clock which originated in Western monasteries in the late thirteenth or early fourteenth century (Simpson, 1995; Dohrn-van Rossum, 1996). Before the invention of the mechanical clock, time was inaccurately measured by sundials and water clocks. The purpose of the mechanical clock was to devise a reckoning of time by which monks could more accurately attend to their working and praying duties, a reckoning that was known as "church time". Subsequently, time became measurable and divisible. Because the mechanical clock allowed time to be measured precisely, it acquired a district practicality that over time was described as "merchant time", since one result was its use in the making of money.

The description of "church time" (temps de l'église) and "merchant time" (temps du marchand) are derived from Jacques LeGoff (LeGoff, 1980). Because "merchant time" was slow to be accepted, it took more than a few centuries before it was apparent that "merchant time" was a rival to "church time". Nevertheless, the description of "church time" and "merchant time" should not ignore cultural or political factors that may alter what LeGoff assumed were uniform distinctions of time because even the conception of "merchant time" varied from place to

place, a uniformity that is subject to criticism (Humphrey, 2001).

More importantly, mechanized time began to acquire a worldly or universal meaning from the religious meaning pre-mechanized time had before. The earlier meaning of pre-mechanized time in the early and high Middle Ages represented a sacred idea of duration, but mechanized time in the late Middle Ages represented a self-awareness that offered the possibility of doing something practical such as making money. The mechanization of time led eventually to the secularization of sacred time with the result that time became profane. Mechanized time intensified the importance of a temporal world and gradually influenced the secularization of European society, and ultimately the world at large. Although the standardization of timekeeping developed gradually, it made the mechanization of time predictable, if not inevitable. Eventually, the mechanization of time enabled technological development to increase the need to find and pursue an efficient reckoning of time because the latter maintained its own practicality that enforced and reinforced technology that made its use, regardless of how important it may become, subordinate to its purpose.

The technological use of time and time's alignment with technology strengthen both. Although the relationship between time and technology is more historical or cultural than metaphysical, the latter cannot be ignored when emphasis is placed upon the former. Notably, technology enables the development of knowledge which when applied promotes the practical pursuit by acquiring control over what it strives to achieve, that is, what its benefactors, supporters, and marketers strive to achieve. Technology's artifice promotes the methods that are devised for maximum performance. More than any other economic system, capitalism is promoted by its technological underpinning, in its artifice, methods, and purpose (Rivers, 2000).

Because capitalism is a practical system in which needs and wants are satisfied in economically lucrative ways, it utilizes time pragmatically. This means that time should not be wasted. This practicality started when some Renaissance humanists questioned the use to which time was put. In 1434, the humanist Leon Battista Alberti desired time to be utilized for personal improvement that conflicted with the medieval view that the ideal was the maintenance of the status quo (Grayson, 1960; Guarino, 1971). Just as one did not have to own a clock or a watch to benefit from the mechanization of time, yet the fact that there were clocks and watches here and there implies their impact. Nevertheless, the importance of time that was influenced by the mechanical clock took a long time to become efficient due to its slow evolution and because it was not universally recognized (Glennie & Thrift, 2009). Eventually, merchants, traders, and capitalists associated this conception of time with the pursuit of money. One description of this idea led to the expression by Benjamin Franklin in 1748 (and now popularized) that "time is money" (Labaree et al., 1961).

5. Process

Mechanized time confers a practical measurement of time. It also gives encour-

agement to the idea of process. Apart from the aid of mechanization, process is an essential characteristic of technology. It is an indispensable factor of technology in general and capitalism in particular. Initially, we can say that although process should be distinguished from progress, process is an indication that technology is based on the accumulation of its results. And this accumulation may involve tools or machines, ideas or procedures, or any type of device or application. A process is an engagement, that is, a manner of doing something, and therefore, technological process is the engagement of the activities that go to make it up. Because a process may lead to improvements, it is at this point that process is related to progress.

When considered by itself, a process is usually accompanied by some type of organization which increases its efficiency, although any organization in general is a process consisting of actions that are intended to achieve a result. The efficiency of a process concerns the means, not the end, of whatever the engagement concerns. Although the means is how something achieves its result, the acceptance of an end does not imply acceptance of its means. We should question the Machiavellian expression that the end justifies the means, which might be true in some cases, but not in all. The acceptance of the means in a non-Machiavellian sense implies acceptance of its end which is a predominant characteristic of technology. It is a means-based enforcer.

How much does the means-end relationship relate to causality in which a cause that is equated with the means is joined with an effect that is equated with an end? If a cause has a relationship with its effect or end, then that relationship is presupposed regardless of how different it may be to be verified. But how do these ideas relate to capitalism? Since capitalism is a progressive economic system, the idea of process has given it an efficiency that is used to posit ideas and create procedures in which capital may be used to make a profit in any number of ways. This process, which is technologically based concerns broad based logistics, including quality control, accounting, forecasting, marketing (including advertising), product design, financial planning, technology management (including research and development), outsourcing, tax analysis, information technology, and other business-related strategies. All these strategies are based on knowledge, and all are derived from informed rationality. Capitalism is based on technology (its means) that encourages individuals and corporations to pursue economic policies whose primary goal is to generate profits and economic well-being (its end). Since a process is an engagement, the process of capitalism is forwardly projected—to innovate more, to produce more, to sell more, even apart from the threats of entropy. It is connected to consumerism and to the latter's characteristic of filling up the world with things, although excessive consumerism may be perceived negatively. Any increase in population potentially intensifies its ability to do so because an increase reinforces the need for production.

Directly related to Western medieval culture in the late Middle Ages was scholasticism that defined not only a philosophical movement but a cultural one as

well. Influenced by many important individuals over several centuries, scholasticism's primary directive was to introduce a method that was intended to resolve disputes rationally by explaining difficulties that were caused by contradictions and inconsistencies. Its purpose was to harmonize Christian doctrine with classical learning, and because it was broadly based, scholasticism acquired a profound and universal influence beyond its original purpose. Eventually, it was utiized as an encouragement for society, medieval or modern, to develop favorable policies for one's own benefit if they were useful and practical. Although such a conception may have come into conflict with the teachings of Christian society, the latter took a subordinate role when individuals sought to benefit themselves at the expense of everyone else (Colish, 1997).

6. Utility

If capitalism is a practical economic system and useful for the well-being of humanity, it should last indefinitely, but thoughts of its demise have been promoted by concepts or ideologies that are antagonistic, antithetical, idealistic, or impractical. Like any economic system, capitalism is subject to change as well as chance, subject to change because permanence is unlikely in a world that is liable to conflicting forces as it is also subject to chance because unplanned and coincidental happenings do occur. As an economic system, even when it is applied collectively, capitalism is individualistic, a characteristic that helps to explain Adam Smith's "invisible hand". But not so with socialism which theoretically is collectively pursued, although individualistic in practice, even when applicable to the institutions of an economy. Socialism emphasizes its pursuit of aiding the many by taxing and redistributing the wealth of the few, but in fact aims to do the reverse for its own benefit. There is little difference between both systems when some individuals benefit regardless of the wishes of the many.

Capitalism emphasizes economics over politics even when politics is pulled into the fray, and socialism emphasizes politics over economics even when economics is used to assert it. Individuals who want to make money become capitalists (or move to capitalistic nations), and individuals who want political power become socialists (or promote socialism within capitalistic nations). Wealth and the influence of economics are the motivations for both, but capitalism reveals its objectives openly whereas socialism is less revealing. The greatest challenge to capitalism and to capitalistic economics is socialism which evolved as a benevolent movement but later became radicalized into an anti-capitalistic ideology. Socialism is strongly aligned with its political party, but capitalism is aligned with industry, banks, and investors. Both systems are creations, inventions if you will, with different objectives that seem to be similar in theory but dissimilar in practice. It is within this description where utility is pivoting because neither system can function without individuals who promote its ideas (or ideals) even if not consciously known. All systems, including capitalism, must be supported by trust, and if undermined, so is the system. When conferring approval or compliance,

any system is guaranteed, and therein its methodology. Utility is a technique of capitalism's technology. Just as methodology is an aspect of method, technique is an aspect of technology, that is, the technology of capitalism as an economic system gives itself over to the procedures, processes, and policies of the profit motive.

Socialism advocates more than the redistribution of wealth because it also suppresses, but does not eliminate, the development of technology at the expense of its own "improvements". When technology falters, economic systems that are promoted by it will falter as well. Therefore, the projected end of capitalism will not favor socialism which also is technologically motivated for two reasons: 1) because it has no other choice; 2) because it cannot promote itself unless it is financed by governments that receive financial support by taxation. Socialism appears to be a type of capitalism, and is made possible because of it.

It should be apparent that any economic system must have supporters who promote its policies. The description of utility when used with capitalism may be a description of the obvious. Since utility means usefulness and this word is also applicable to public service companies, such as Con Edison or Consolidated Edison of New York, its meaning takes on additional significance because practicality is its goal. And practicality overlaps with capitalism as it reinforces the technological meaning of both. No economic system, socialism included, can function without supporters of usefulness. And therefore, the greatest threat to the survival of capitalism is the denial or refutation of its utility. When it is no longer supported as beneficial for economic well-being, it will be replaced by something else which may be no better.

7. Synthesis

Other thinkers have offered different interpretations of capitalism. One of these thinkers was Max Weber who concluded that Protestantism was instrumental for the formation of capitalism because it promoted the idea of religious duty that may be equated with a calling. When secularized, this calling transformed into the behavior that promoted a work ethic that emphasized self-discipline and diligence in which immediate gratification was delayed for long-term goals. Both self-discipline and diligence could lead to capitalism, that is, to the accumulation of wealth (Weber, 1930).

Although Weber associated a work ethic with Protestantism, this interpretation is unfounded because the Middle Ages already developed a work ethic that was accompanied by its own techniques. This medieval work ethic helped to influence the development of modern technological society (White Jr., 1978). Historically, there was little difference between Protestants and non-Protestants regarding usury or the desire to make a profit, as there was little economic difference between the activities of capitalists and non-capitalists at that time.

A different interpretation was proposed in 1911 by Werner Sombart, a contemporary of Weber, who attributed capitalism to European Jewry because the latter had developed an economic outlook when supported by accompanying tech-

niques in which profit was the goal. Sombart based his interpretation on the ethnicity, not the religion of the Jews. He believed that the pivotal causes of capitalism were founded in Jewish alienation from European society, which was often intolerant of Jews, as well as the basic beliefs of Judaism (Sombart, 1982). The contemporary techniques of shop keeping, usury, double entry bookkeeping, and the idea of credit helped to perfect the skills of the first capitalists (Sombart, 1924), but these characteristics would be applicable whether one was or was not Jewish. As a criticism of Sombart, we should note that not only Jews, but also Catholics and non-fanatical Protestants were expelled from Protestant countries in the sixteenth and seventeenth centuries because of religious intolerance (Lecler, 1960). And they migrated to countries where they might have engaged in capitalism, that is, where social and economic conditions were favorable for it. One would assume that anti-Semitism is unrelated to capitalism and has deeper roots. We should also keep in mind that there were capitalists before there was capitalism.

For Karl Marx, the essence of capitalism as promoted by capitalists was based upon the exploitation of the surplus value of workers, that is, capitalists sought above all to accumulate wealth from the labor that produced it (Marx, 1907-1909). This interpretation associates the means of production with the technology that produced it, and it is dependent upon labor as the means by which wealth is made. This type of wealth is made primarily in factories through manufacturing technology. According to Marx, technology is effective only if it increases production, and production is effective only if it leads to consumption. Production not followed by consumption would be detrimental to capitalism. If labor is the source of all value, then there must be some other explanation why many laborers live in poverty, which implies that they have lost value. But this lost value was exploited by workers who formed unions that first appeared in the late nineteenth century.

Although labor is essential economically, its importance has changed because, as Marx perceived, the use of technology has increased. We need to ask if the use of technology reduces the value of labor. Despite the conclusions of Marx and the importance of technology, labor is still exploited today, which is relevant to the controversy concerning increases of the minimum wage, the development of the middle class, and the place of women in the work force.

Since the Industrial Revolution, capitalism has acquired additional meanings because Marxism has redefined the social importance of capitalism and its economic impact. Although Marx had his own theory of history, he did not render an objective or unbiased interpretation of economics and certainly not of capitalism because he put the burden of any reform that might benefit laborers upon the owners (capitalists). Additional terminology associated with Marx, especially surplus value, reinforced his interpretation because it merely describes the difference in value between what a worker receives for producing a product by his labor and the wages he receives from it. The difference between these two amounts refers to the profit that was generated by labor and was given to the capitalist. Although the productivity of labor concerns the amount of goods or services that are gen-

erated by the resources utilized including the capital, time, and labor needed to produce a product or render a service, it does not displace or disqualify the importance of technology with the means of production, even if skilled labor is replaced by deskilled workers or even by robots. This labor theory of value relates to the time associated to produce any good or service as it also relates to any society, even if it is not industrial.

The idea that capitalism cannot always be economically successful is associated with the thought of Joseph Schumpeter. Because capitalism concerns economic changes that lead to instability, Schumpeter predicted (beginning in 1942) that capitalism would not survive because it would undergo a process of stagnation (Schumpeter, 1987). The lack of success and the stagnation that follows, he said, will destroy the entrepreneurial spirit that is essential to capitalism. If capitalism contains the seeds of its own destruction, this idea parallels Marx's interpretation that capitalism must always expand to survive. Schumpeter's interpretation does not explain why capitalism is potentially self-destructive, particularly when we consider that the survival of capitalism and its evolution into different forms seem to contradict this view, although the notion that capitalism will turn against itself seems to parallel the idea that it is vulnerable to economic crises, an idea that may be extended to politics as well.

A notable critic of capitalism was James Burnham who conceived of the development of a managerial class that would be composed essentially of technically trained individuals capable of replacing the capitalist class. As a revelation of the complexity of modern economics when coupled with the transformation of industry and agriculture, these managers would be successful in managing, organizing, and manipulating the means of production. Regardless of the techniques employed, the influence of technology remains predominant, if not foreseeable. Burnham predicted that the capitalist class would become obsolete, giving an opportunity to another class (Burnham, 1941), but how will this change occur without changing capitalism's entire structure? The substitution of the name or designation for the means of production without making substantive changes hardly qualifies as a change at all. Despite this proposal, technology will continue.

Indeed, the idea of labor's exploitation has been continued by Harry Braverman who in 1974 emphasized labor's estrangement from capitalism, that is, labor becomes detached from the work it performs (Braverman, 1974). Braverman concluded that modern industrial production does not need a highly skilled work force, since individual workers are employed for only a small part of the total production process. And retraining is unnecessary unless a worker changes jobs. Therefore, the role of technology degrades labor to such an extent as to make the latter miniscule to capital, except on a most rudimentary level. Braverman concluded that in a technological age skilled labor will be rendered superfluous, an idea like Frederick Taylor's "scientific management" (also known as Taylorism) in which labor is weakened because it can be easily replaced by equally deskilled laborers. Although not a radical interpretation of capitalism, Braverman offered a

major criticism of the role of technology in an age that has become highly capitalistic. And these arguments are pertinent even to the loss of skill in an age that is dependent on artificial intelligence when aligned with automation.

The relationship between capitalism and technology is commonly known, but a new interpretation has come to light by Luis Suarez-Villa (Suarez-Villa, 2000). Although he uses the expression "technocapitalism", this expression is redundant because all forms of capitalism are influenced by technology, as are all economic systems. Of greater concern is the misunderstanding of the relationship between invention and capitalism. It assumes that because invention appeared before capitalism, and supposedly there may be a relationship between them, then invention must be the cause of capitalism. If this conclusion is correct, then it is an example of the philosophical fallacy post hoc ergo propter hoc. Although it is true that invention has an influence upon capitalism and may even be an inspiration for it, invention and capitalism are not causally related. An inspiration is not a cause because it is only one way into a pending reality.

The factors presented in this essay indicate that capitalism is a practical economic system. It is based upon the pragmatic application of technology that either supplements labor, or in the case of artificial intelligence replaces it. Like technology, capitalism emphasizes praxis over theory. Therefore, the replacement of labor by technology is one approach to capitalism, but the use of labor in conjunction with technology is another. When the two are combined, technology assumes dominance over labor. The replacement of labor by technology may be self-defeating, but the use of labor in conjunction with technology concerns a different idea altogether because when technology commands, that is, when we use technology through our efforts, labor obeys. How often have we heard that "capital sets the laborer to work", and yet we ignore this fact when we consider the use of technology. When technology is present, labor submits to a force greater than itself. Technology is useful and capitalism is profitable because both allow for the economizing of labor at the lowest possible cost.

Nevertheless, capitalism is not immune to economic difficulties, particularly to those effects that relate to inflation which are described as a contradictory characteristic of capitalism in general (Bell, 1996). Nor is it immune to difficulties that are based upon the innate inequalities of society, upon opportunities that are advantageous for some but not for all, upon conditions that favor luck over ability, upon unknown preferences that become available when better choices have not been considered, and so on in a nearly endless flow of uncertainties.

Issues that relate to mass migration, the development of trade, the integration of international capital markets, or the post-World War I and World War II recovery must be considered when dealing with capitalism, to which must be added anti-immigration movements and a backlash to globalization in general (O'Rourke & Williamson, 2014).

If capitalism is the pragmatic effect of change in an economic worldview, does it reflect a metaphysical change in late medieval or early modern times? Is it

caused by the weakening of Christianity in the West, which itself has many roots, and its replacement by a concern that puts more emphasis on this world (the sensory world of the here and now) rather than the world to come (the presumed supersensory world, or the world beyond this one)? These questions lead us to the more important question that concerns whether capitalism is an economic effect of a metaphysical cause. If it is, then capitalism seems to be an example of the historical transformation of Western civilization. Therefore, there is a much larger significance to capitalism. It seems to be the result of the changes brought to bear at the end of the medieval world, changes that had important effects on Europe, the New World, and the world at large. Although historical conditions preceded the development of capitalism, they also predicted it.

The relationship between capitalism and technology is intricate. Of the many causes of capitalism, technology has a multifaceted influence, although it is unwarranted to say that technology influences capitalism without describing what this means. Likewise, it is false to say that invention is the cause. Although capitalism began in medieval Europe, it became technologically self-perpetuating during the Industrial Revolution. Despite technology's influence, capitalism is not a technological phenomenon. And yet without technology, which includes its features and techniques, capitalism would not exist. In addition to labor, the innovations of inventions, the mechanization of time (accompanied by an inherent practicality), the concept of process (accompanied by organization and efficiency), and utility have made capitalism a dynamic and technologically driven force in the world. But the influence of these causes does not mean that they all have an identical impact simultaneously at every time and every place. They may have wavered, being weaker at one time and stronger at another. Their real influence concerns the fact that they coexisted within various degrees to have a lasting effect.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

Adas, M. (1989). *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance* (p. 251). Cornell University Press.

Arthur, W. B. (2009). *The Nature of Technology: What It Is and How It Evolves* (pp. 93-96). Free Press.

Ashton, T. H., & Philpin, C. H. E. (1985). The Brenner Debate: Agrarian Class Structure and Economic Development in Pre-Industrial Europe (pp. 10-63). Cambridge University Press.

Baldwin, R. (2016). The Great Convergence: Information Technology and the New Globalization (pp. 186-191). Belknap Press. https://doi.org/10.2307/j.ctv24w655w

Bell, D. (1996). *The Cultural Contradictions of Capitalism* (pp. 237-243). Basic Books.

Botwinick, H. (1993). *Persistent Inequalities: Wage Disparity under Capitalist Competition* (p. 72). Princeton University Press.

Braudel, F. (1981). *Civilization and Capitalism, 15th-18th Centuries* (Vol. I, pp. 334-435, S. Reynolds Trans.). Harper & Row.

Braudel, F. (1982). *Civilization and Capitalism, 15th-18th Centuries* (Vol. II, pp. 297-373, S. Reynolds Trans.). Harper & Row.

Braudel, F. (1984). *Civilization and Capitalism, 15th-18th Centuries* (Vol. III, pp. 536-618, S. Reynolds Trans.). Harper & Row.

Braverman, H. (1974). *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century* (pp. 56-58, 377-378). Monthly Review Press.

Bruland, K., & Mowery, D. C. (2014). Technology and the Spread of Capitalism. In L. Neal, & J. G. Williamson (Eds.), *The Cambridge History of Capitalism* (pp. 82-126). Cambridge University Press. https://doi.org/10.1017/CHO9781139095105.004

Buchler, J. (1961). *The Concept of Method* (pp. 124-128). Columbia University Press. https://doi.org/10.7312/buch93240

Burnham, J. (1941). *The Managerial Revolution: What Is Happening in the World* (pp. 30-31, 71-95). John Day Co.

Coates, D. (2000). *Model of Capitalism: Growth and Stagnation in the Modern Era* (pp. 103, 255-256). Polity Press.

Colish, M. L. (1997). *Medieval Foundations of the Western Tradition 400-1400* (p. 334). Yale University Press.

Dimmock, S. (2014). *The Origin of Capitalism in England, 1400-1600* (p. 364). Brill. https://doi.org/10.1163/9789004271104

Dohrn-van Rossum, G. (1996). *History of the Hour: Clocks and Modern Temporal Orders* (T. Dunlop Trans., pp. 46, 89-96). University of Chicago Press.

Glennie, P., & Thrift, N. (2009). *Shaping the Day: A History of Timekeeping in England and Wales 1300-1800* (pp. 8-14, 47). Oxford University Press.

Grayson, C. (1960). *Leon Battista Alberti, Il Libri Della Famiglia in Opere Volgari, 3 Vols* (Vol. 1, pp. 176-178). Laterza.

Guarino, G. A. (1971). *The Alberti's of Florence: Leon Battista Alberti's 'Della Famiglia'* (pp. 179-180). Bucknell University Press.

Habermas, J. (1975). *Legitimation Crisis* (T. McCarthy Trans., pp. 48-50). Beacon Press.

Humphrey, C. (2001). Time and Urban Culture in Late Medieval England. In C. Humphrey, & W.H. Ormrod (Eds.), *Time in the Medieval World* (pp. 105-117). York Medieval Press.

Jewkes, J., Sawers, D., & Stillerman, R. (1969). *The Sources of Invention* (2nd ed., pp. 171-173). W. W. Norton & Co. https://doi.org/10.1007/978-1-349-00015-9

Kocka, J. (2016). *Capitalism: A Short History* (J. Riemer Trans., pp. 35-49). Princeton University Press.

Kozmetsky, G., Williams, F., & Williams, V. (2004). *New Wealth: Commercialization of Science and Technology for Business and Economic Development* (p. 14). Praeger. https://doi.org/10.5040/9798400691331

Labaree, L. W. et al. (1961). *The Papers of Benjamin Franklin, 37 Vols.* (Vol. III, p. 306). Yale University Press.

Latouche, S. (1996). *The Westernization of the World: The Significance, Scope and Limits of the Drive towards Global Uniformity* (R. Morris Trans., pp. 29-38). Polity Press.

Lecler, J. (1960). *Toleration and the Reformation, 2 Vols.* (Voil. II, T. L. Westow Trans., pp. 271-272, 498). Association Press.

Lee, K. (2009). Asian Politics, Economy and Technology. In J. K. B. Olsen Friis, S. A. Peder-

sen, & V. F. Hendricks (Eds.), *A Companion to the Philosophy of Technology* (p. 348). Wiley-Blackwell.

LeGoff, J. (1980). *Time, Work and Culture in the Middle Ages* (A. Goldhammer Trans., pp. 30, 35-36). University of Chicago Press.

Marx, K. (1907-1909). *Capital: A Critique of Political Economy, 3 Vols.* (S. Moore et al., Trans., Voil. III, pp. 197, 243). Charles H. Kerr & Co.

Mensch, G. (1979). *Stalemate in Technology: Innovations Overcome the Depression* (C. Reade, & C. Franco Trans., p. 119). Ballinger Publishing Co.

Mumford, L. (1934). *Technics and Civilization* (pp. 26-27). Harcourt, Brace & World.

O'Rourke, K. H., & Williamson, J. G. (2014). Introduction: The Spread of and Resistance to Global Capitalism. In L. Neal & J. G. Williamson (Eds.), *The Cambridge History of Capitalism, 2 Vols.* (Vol. II, pp. 1-21). Cambridge University Press.

Piketty, T. (2014). *Capital in the Twenty-First Century* (A. Goldhammer Trans., pp. 7-9). Belknap Press.

Reynolds, R. L. (1961). *Europe Emerges: Transition toward an Industrial Worldwide Society 600-1750* (pp. 230-245). University of Wisconsin Press.

Rivers, T. J. (2000). The Conception of Time and Its Relationship to Technology. In C. Mitcham (Ed.), *Research in Philosophy and Technology* (pp. 215-217). Elsevier Science Inc.

Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed., p. 181). Free Press.

Schumpeter, J. A. (1987). *Capitalism, Socialism, and Democracy* (6th ed., pp. 82-83). Unwin Paperbacks.

Simpson, L. C. (1995). *Technology, Time, and the Conversations of Modernity* (p. 23). Routledge.

Sombart, W. (1924). *Der modern Kapitalismus: Historisch-systematische Darstellung des Gesamteuropäischen Wirtschaftslebens von seinen Anfängen bis zur Gegenwart* (6th ed., Vol. I, pp. 302-306, Vol. II, pp. 38, 110-136, 513-532). Duncker & Humbolt.

Sombart, W. (1982). *The Jews and Modern Capitalism* (pp. 175-177, 205). Transaction Books.

Suarez-Villa, L. (2000). *Invention and the Rise of Technocapitalism* (pp. 119-129). Rowman & Littlefield.

Usher, A. P. (1954). *A History of Mechanical Inventions* (p. 56). Harvard University Press.

Weber, M. (1930). *The Protestant Ethic and the Spirit of Capitalism* (T. Parsons Trans., pp. 108-112, 119, 157-159). Charles Scribner's Sons.

White Jr., L. (1978). *Medieval Religion and Technology: Collected Essays* (pp. 182-185, 236-238, 319-321). University of California Press.