

# Chapter 17

## 'Arte' An Economic Perspective

### The Role of 'Arte' in the Production of Social Wealth

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"In communications, computing makes it possible to switch and route over 100 million long distance telephone calls per day."

National Research Council, "Computing the Future"

"Can we expect, that a government will be well modeled by a people, who know not how to make a spinning-wheel, or to employ a loom to advantage?"

David Hume, "Of Refinements in the Arts"

"If computer-aided communication doubled the effectiveness of a man paid \$16 per hour then, according to our estimate, it could be worth what it cost if it could be bought right now. Thus we have some basis for arguing that computer-aided communication is economically feasible."

J. C. R. Lickliger and Robert Taylor,  
"The Computer As Communicator"

Writing in the Great French Encyclopedia, Denis Diderot (1713-1784) pointed out the striking contradiction of modern society. Even though the wealth of society is produced by those who do the work of that society, they are the least respected and the study of the mechanical arts, which is necessary to make work most productive, is treated with disdain and disrespect. Diderot describes this dilemma: "Place on one side of the balance the real benefits of the most exalted sciences and the most honored 'arts' and on the other side those of the 'mechanical arts', and you will find that the esteem granted to both has not been distributed in the correct proportion of these benefits; and that people praised much more highly those men who were engaged in making us believe that we were happy, than those men actually engaged in doing so. What odd judgments we make! We demand that people be usefully employed and we scorn useful men."<sup>1</sup>

There is a similar tendency in our times, 250 years after Diderot wrote, to dismiss the study of the mechanical arts rather than encourage it. For example, in a study produced in 1992 by the National Research Council the increasing importance of computers and computing in the daily life of our society was documented.<sup>2</sup> Yet the study notes how the ratio of funding for computer science and engineering research has dropped by more than 20% since 1985.<sup>3</sup> Voices defending the social benefits from technological developments like the computer and the global computer network it makes possible need to be part of the public debate. Instead, there are numerous articles, books, journals, etc. that claim such developments are only harmful to society.<sup>4</sup> The social implications of new technological developments like the computer and the telecommunications networks are important and should not be dismissed as harmful as this literature implies. To gain some perspective on the principles at stake in this controversy, it is helpful to look back to early economic writers and

their studies about the value to a society of 'arte'.

The 17<sup>th</sup> and 18<sup>th</sup> centuries were a period of profound social and economic change in Europe. This period was one of great transformation in the ability to produce the necessities and conveniences of life for a growing population. Accompanying this social transformation was a growing attention to the role that the mechanical arts, often referred to as 'arte', play in production.

Concern with the question of 'arte' was not new. Philosophers like Plato and Aristotle had identified this concept, considering it something important to be studied. For Plato, as he explains in his dialogue "Protagoras," the mechanical arts were akin to a gift from the gods, the sole advantage that humans had in their struggle for survival with the rest of the animal kingdom. They were the essential element which gave people the ability to survive in a hostile world.

Plato tells the story of how the gods Prometheus and Epimetheus were charged with populating the world with living creatures. They created a variety of life, giving to each species an advantage to help it to survive. By the time they came to create humans, they had exhausted the traits they could provide, "Man alone was naked and shoeless, and had neither bed nor arms of defense."<sup>5</sup> Prometheus, Plato explains, not knowing how else to be helpful to humans, "stole the mechanical arts from Hephaestus and Athene, and fire with them (they could neither have been acquired nor used without fire), and gave them to man."<sup>6</sup> Using this parable, Plato shows how only the mechanical arts, which differentiated humans from the rest of the animal kingdom, have made human life sustainable.

Aristotle demonstrates a similar high regard for 'arte' which is defined as "scientific knowledge and the corresponding skill of how to produce something in accordance with that knowledge."<sup>7</sup> In the "Nicomachean Ethics", Aristotle distinguishes art from nature and explains that "Every art is concerned with bringing something into existence and to think by art is to investigate how to generate something...of which the [moving] principle is in the producer and not in the thing produced."<sup>8</sup> He goes on to explain that 'arte' is concerned with things which do not have this [moving] or regenerating principle in themselves. 'Arte' describes the production of things that nature does not create on her own. Hence 'arte' requires the human creator and makes possible the manifold inventions not provided by nature.

Several British writers of the 17<sup>th</sup> and 18<sup>th</sup> centuries examined the role that 'arte' or the mechanical arts play in production. The mechanical arts were necessary for the production of the food, clothing and shelter needed to provide for a population that was moving from the land under feudalism into the towns and cities that would characterize the industrial revolution. The annual production of such food, clothing, shelter and other necessities and conveniences of life was seen as one of the pressing concerns in this time of change.

Sir William Petty (1623-1687) who has been called "The Father of Political Economy" isolated four economic categories as being crucial for the production of social wealth. They were labor, land (i.e. nature), arte and stock. Petty maintained that the two essential categories were labor and land, and that labor was the active element and nature the passive element. He wrote "Labor is

the Father and active principle of wealth as Lands are the Mother.”<sup>9</sup> Though human beings could survive without ‘arte’, Petty believed that ‘arte’ was an important component of life, making it possible to produce more with less labor. “Art,” he explains is “equal to the labor and skill of many in producing commodities.”<sup>10</sup>

In order to increase the production available, Petty saw only two alternatives. “People must either work harder or introduce labor saving processes.” These labor saving processes, according to Petty, save the labor of many hands and provide more riches for society. “One man by art may do as much work as many without it.”<sup>11</sup> He gives several examples: “viz one Man with a Mill can grind as much Corn as twenty can pound in a Mortar; one Printer can make as many Copies, as a Hundred Men can write by hands; one Horse can carry upon Wheels, as much as Five upon their Backs; and, in a Boat, or upon ice, as Twenty...”<sup>12</sup> For Petty, the choice facing society was to have “hands...laboring harder, or by introducing the Compendium and Facilitations of Art,” to have a few workers doing the work of many.<sup>13</sup>

Petty refers to the example of Holland which had the advantage of being able to use windmills instead of hand labor and thereby the “advantage of the labor of many thousand Hands is saved, for as much as a Mill made by one Man in half a year, will do as much Labor as four Men for five years together.”<sup>14</sup> Petty reasoned that the use of ‘arte’ to save human labor was a continuing benefit to society. He demonstrated the long term social advantage gained from ‘arte’ over simple labor by an illustration comparing the production by ‘arte’ with that of simple labor. “For if by such Simple Labor, I could dig and prepare for Seed a hundred acres in a thousand days; suppose then, I spend a hundred days in studying a more compendious way, and in contriving Tools for the same purpose; but in all the hundred days dig nothing.” If he now needs only the remaining nine hundred days to dig two hundred acres of ground, “then,” Petty concludes, “I say, that the Art which cost but one hundred days Invention is worth one Man’s labor forever; because the new Art, and one Man, performed as much as two Men could have done without it.”<sup>15</sup>

The social advantage of ‘arte’, according to Petty, is that a large portion of the population is freed from having to produce the goods needed by society and thus available for other important work, especially for scientific pursuits. The remaining people, Petty writes “may safely and without possible prejudice to the Commonwealth, be employed in Arts and Exercises of pleasure and ornament; the greatest whereof is the Improvement of natural knowledge.”<sup>16</sup>

Petty’s work is part of a body of economic literature written during the 17<sup>th</sup> and 18<sup>th</sup> centuries which set out to scientifically define ‘arte’. In “‘Art’ and ‘Ingenious Society’”, E. A. J. Johnson gathers several descriptions of ‘arte’ and looks at what Petty and other 17<sup>th</sup> and 18<sup>th</sup> century economic commentators considered as the role of ‘arte’ and the effect it has had on the development of society.<sup>17</sup>

David Hume (1711-1776), one of the economists Johnson discusses, echoes Plato’s emphasis on the importance of ‘arte’ in distinguishing human beings from other animals. “There is one fundamental difference between man and other animals,” Hume wrote, “...Nature has ‘endowed the

former with a sublime celestial spirit, and having given him an affinity with superior beings, she allows not such noble faculties to lie lethargic or idle, but urges him by necessity to employ, on every emergence, his utmost art and industry’.”<sup>18</sup>

In this sense “Art” is, according to Johnson, “an ennobling faculty, implanted by Nature, which separates man from the rest of the zoological world by making greater production possible.”<sup>19</sup> Writers like Petty and Hume saw ‘arte’ as the ability to utilize science and technology to abridge labor, and thus as a wondrous faculty peculiar to humans as part of the animal kingdom.

Other literary figures, like Daniel Defoe (1660-1731) in *Plan of the English Commerce* and writers of economic tracts like *The Advantages of the East India Trade to England Consider’d* (1707), provide examples of the environmental and economic benefits which accompany the increased use of tools and machines to abridge the labor necessary for production. In Russia, Defoe explains, where “Labor was not assisted by Art” there was “no other Way to cut out a large Plank, but by felling a great Tree and then with a multitude of Hands and Axes hew away all the Sides of the Timber, till they reduced the middle to one large Plank.” The Swedes or Prussians, on the other hand, Defoe observes, “could cut three or four, or more Planks of the like Size from one Tree by the Help of Saws and Saw Mills.” The Consequence is “that the miserable Russian labored ten times as much as the other [the Swedes and the Prussians] for the Same Money.”<sup>20</sup> Not only does ‘arte’ make it possible for more goods to be produced by less labor, but ‘arte’ also makes it possible to produce more planks of lumber from each tree. When ‘arte’ is used, fewer trees need to be cut down. And higher wages can be paid to those using the most modern technology as they produce more goods with less labor than those who use backward production techniques.

John Cary, in *An Essay on the State of England in Relation to its Trade* (1695) observes that because of ‘arte’ the price of many manufactures like glass bottles, silk stockings, sugar, etc. went down even though the wages of the workers were not cut. “But then the question will be, how this is done?” he asks, and he answers “It proceeds from the Ingenuity of the Manufacturer, and the Improvements he makes in his ways of working, thus the Refiner of Sugars goes thro’ that operation in a Month, which our Forefathers required four Months to effect.” And “the Distillers draw more Spirits, and in less time...than those formerly did who taught them the Art.”<sup>21</sup>

Cary lists other examples of how improvements in ‘arte’ have led to changes in production that have increased the goods available to the population, though they cost less labor and so are cheaper. He writes: “The Glassmaker hath found a quicker way of making it out of things which cost him little or nothing; Silk Stockings are wove instead of knit; Tobacco is cut by Engines instead of Knives; Books are printed instead of written;...Lead is smelted by Wind-Furnaces, instead of blowing with Bellows; all which save the labor of many Hands, so the Wages of those employed need not be lessened.”<sup>22</sup> Cary also observes that the price of goods has come down, even though their desirability has improved.<sup>23</sup> After showing how a similar trend has occurred in the Navigation trades, Cary concludes, “New Projections are every day set on foot to render making our Manufactures easy, which are made cheap...not by falling the Price of poor People’s Labor.” He shows how these advances lead to a general environment of improved methods of production.<sup>24</sup> And, he notes, these

improvements not only lessen the number of laborers needed to do the work, but also make possible the payment of higher wages. According to these early British economists, government has a role to play to support the development of technology. “It should therefore,” writes Johnson, “be the duty of the state to increase ‘art’.”<sup>25</sup>

Understanding ‘arte’ as the means of mechanical or scientific abridgement of labor, it is useful to look at the effect ‘arte’ has had on the life and health of society. Several essays written by David Hume consider the role ‘arte’ plays in determining whether a society flourishes or decays, and thus whether the society can produce the wealth needed to support its people. Hume observes the correlation between a society’s support for the mechanical arts and its political and intellectual achievements.<sup>26</sup> “The same age,” writes Hume, “which produces great philosophers and politicians, renowned generals and poets, usually abounds with skillful weavers and ship-carpenters.”

Hume maintains that a vibrant intellectual environment is the product, not the cause of social support for mechanical invention and the mastery of mechanical techniques. “Another advantage of industry and of refinements in the mechanical arts, is that...Minds...being once aroused from their lethargy, are put into fermentation, turn themselves on all sides and carry improvements into every art and science.”<sup>27</sup> Thus attention to the mechanical arts stimulates ferment in all other intellectual areas.

Not only does the ferment stimulated by mechanical activity and invention lead to a renaissance in intellectual development, but it also affects sociability. Hume writes: “The more these refined arts advance, the more sociable men become: nor is it possible that, when enriched with science, and possessed of a fund of conversation, they should be contented to remain in solitude, or live with their fellow citizens in that distant manner, which is peculiar to ignorant and barbarous nations. They flock into cities; love to receive and communicate knowledge; to show their wit or their breeding; their taste in conversation or living, in clothes or furniture....”<sup>28</sup>

This ferment leads to the development of social organizations, Hume explains: “Particular clubs and societies are everywhere formed: Both sexes meet in an easy and sociable manner: and the tempers of men, as well as their behavior, refine apace. So that, beside the improvements which they receive from knowledge and the liberal arts, it is impossible but they must feel an increase of humanity, from the very habit of conversing together and contribute to each other’s pleasure and entertainment.”<sup>29</sup>

He summarizes, “Thus industry, knowledge, and humanity, are linked together by an indissoluble chain....”<sup>30</sup>

People personally benefit from the development of technology and industry; more importantly, however a public benefit is achieved. Hume writes: “Laws, order, police, discipline; these can never be carried to any degree of perfection, before human reason has refined itself by exercise, and by an application to the more vulgar arts, at least of commerce and manufacture. Can we expect, that a government will be well modeled by a people, who know not how to make a

spinning-wheel, or to employ a loom to advantage?”<sup>31</sup>

Similarly, Hume connects bad government with ignorance in the mechanical arts, “Not to mention that all ignorant ages are infested with superstition, which throws the government off its bias, and disturbs men in the pursuit of their interest and happiness.”<sup>32</sup> Furthermore, he relates the development of political liberty to the development of technology. “The liberties of England,” Hume writes, “so far from decaying since the improvements in the arts, have never flourished so much as during that period.”<sup>33</sup>

He finds a symbiotic relationship between the progress of the mechanical arts in a society and the possibility of good government. In societies which encourage the mechanical arts to develop, larger sections of the population have the time and know how to fashion a more democratic and responsive government. Where technological development is discouraged, a greater part of the population has to spend all of its time producing for subsistence and has no time to devote to the oversight of the government.

Hume traces the development of government in England, attributing changes to the level of technological development of the nation’s industry. He describes how the House of Commons in England evolved from the growth and expansion of industry: “The lower house is the support of our popular government; and all the world acknowledges, that it owed its chief influence and consideration to the increase of commerce, which threw such a balance of property into the hands of the commons. How inconsistent then is it to blame so violently a refinement in the arts, [mechanical arts] and to represent it as the bane of liberty and public spirit!”<sup>34</sup>

Hume’s defense of technology against its detractors has a familiar ring. His writings provide a foundation for a critique of those who dismiss the benefits of the computer because of a supposed loss of privacy or supposed increase in the potential for government control over the lives of its citizens. Hume’s writings provide a theoretical basis to challenge any efforts to blame the computer for such problems and instead point an arrow to the democratic achievements of the last part of the 20<sup>th</sup> century that are the result of computer technology.

One of the most exciting of these achievements is the development of Usenet, the worldwide computer conferencing news network that makes possible democratic and uncensored debate and communication on thousands of subjects for computer users around the world. Hume’s observation that ‘arte’ leads to intellectual ferment and the possibility of a more democratic set of institutions is being demonstrated by the dramatic applications that have developed as a result of the widespread use of computer technology.

Writing in the 18<sup>th</sup> Century, Hume described the intellectual ferment that accompanied the development of technology. Hume’s observations provide a helpful perspective to use to view the phenomenal growth of technological achievements like Usenet. This intellectual ferment is the needed support for the development of technology and the development of technology make possible the needed political and social changes that are required to have the technology function. The study

of economic writers of the 17<sup>th</sup> and 18<sup>th</sup> centuries who discuss the importance of ‘arte’ provides a helpful theoretical foundation for assessing the significance of such practical developments for our times.

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#### Notes for Chapter 17

1. “Art”, in *The Encyclopedia: Selections*, edited and translated by Stephen J. Gendzier, New York, 1967, p. 60. A modern example of such ‘arte’ is provided by Carl Malamud in *Exploring the Internet* (New Jersey, 1992), p. 100. He writes: “The system takes raw timber and figures out the most efficient way to saw up the log to produce the most lumber. In an economy where 30 to 40 percent of GNP is based on forestry, this system proved quite popular.” The French title of *The Encyclopedia* is *Encyclopedie ou Dictionnaire raisonne des sciences, des arts, et des metiers*. It first appeared in France between 1751 and 1772.
2. *Computing the Future*, edited by Juris Hartmanis and Herbert Lin, Washington, DC, 1992, pp. 13-16.
3. *Ibid.*, p. 3.
4. See for example, Bob Ickes, “Die, Computer, Die,” *New York Magazine*, Vol. 28 no. 29, July 24, 1995, pp. 22-26. For references to some of this literature see “Questioning Technology,” *The Whole Earth Review*, No 73, Winter, 1991.
5. From “Protagoras”, in *the Works of Plato, Vol I, The Franklin Library, Philadelphia, 1979, p. 81.*
6. *Ibid.*
7. *Aristotle’s Selected Works*, translated by Hippocrates G. Apostle and Lloyd P. Gerson, 1986, p. 676.
8. *Ibid.*, “Nicomachean Ethics”, 1140a lines 6-23.
9. “A Treatise of Taxes and Contributions”, in *The Economic Writings of Sir William Petty*, ed. Charles Hull, 1899, Reprinted, Augustus Kelley, Fairfield, New Jersey, 1986, Vol. I, p. 68.
10. “History of Trade”, *Petty Papers, Vol I, London, 1927, p. 211.*
11. “Political Arithmetick”, *The Economic Writings, Vol I, p. 249.*
12. *Ibid.*, pp. 249-250.
13. “Verbum Sapienti,” *The Economic Writings, Vol I, p. 118.*
14. “Political Arithmethic,” *The Economic Writings, Vol I, p. 256.*
15. “The Political Anatomy of Ireland,” *The Economic Writings, Vol I, p. 182.*
16. “Political Arithmetick,” *The Economic Writings, pp. 270-271.*
17. “‘Arte’ and ‘Ingenious Society’” is a chapter in *Predecessors of Adam Smith* by E. A. G. Johnson, 1937, reprint, Augustus Kelley, New York, 1960.
18. *Predecessors of Adam Smith, p. 264.*

19. Ibid.

20. A Plan of English Commerce, 1730, Reprint, Augustus Kelley, New York, p. 36.

21. Predecessors of Adam Smith, pp. 145-6.

22. Ibid., p. 146.

23. Ibid. Cary writes, "The variety of our Woollen Manufactures is so pretty, that Fashion makes a thing worth both at Home and Abroad twice the Price it is sold for.... Artificers by Tools and Laves fitted for different Uses make such things as would puzzle a Stander by to set a price on according to the worth of Men's Labor; the Plummer by new Inventions casts a Tun of Shott for Ten Shillings, which an indifferent Person could not guess worth less than Fifty."

24. Ibid., pp. 147-148. Cary writes, "Pits are drained and Land made Healthy by Engines and Aquaeducts instead of Hands; the Husbandman turns up his Soil with the Sallow, not digs it with his Spade; Soves his Grain, not plants it; covers it with the Harrow, not with the Rake; brings home his Harvest with Carts, not on Horseback; and many other easy Methods are used both for improving of Land and raising its Product, which are obvious to the Eyes of Men versed therein, though do not come within the Compass of my present Thoughts."

25. Ibid., p. 266.

26. These essays are from Political Discourses, Edinburgh, 1752. Several of the essays have been reprinted in D. Hume, Writings on Economics, E. Rotwein ed., Madison, 1955 , reprinted 1970.

27. "Of Refinement in the Arts," Writings on Economics, p. 22.

28. Writings on Economics, p. 22.

29. Ibid., pp.22-23.

30. Ibid., p. 23.

31. Ibid., p. 24.

32. Ibid.

33. Ibid., p. 27. Hume explains, "If we consider the matter in a proper light, we shall find, that a progress in the arts is rather favorable to liberty, and has a natural tendency to preserve, if not produce a free government. In rude unpolished nations, where the arts are neglected, all labor is bestowed on the cultivation of the ground; and the whole society is divided into two classes, proprietors of land, and their vassals or tenants. The latter are necessarily dependent and fitted for slavery and subjection; especially where they possess no riches, and are not valued for their knowledge in agriculture; as must always be the case where the arts [mechanical arts] are neglected."(p. 28)

He also observes that in a land based society, tyranny is the norm, writing, "The former naturally erect themselves into petty tyrants; and must either submit to an absolute master, for the sake of peace and order; or if they will preserve their independence, like the ancient barons, they must fall into feuds and contests among themselves, and throw the whole society into such confusion, as is perhaps worse than the most despotic government."

34. Ibid., p. 29.

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