

History

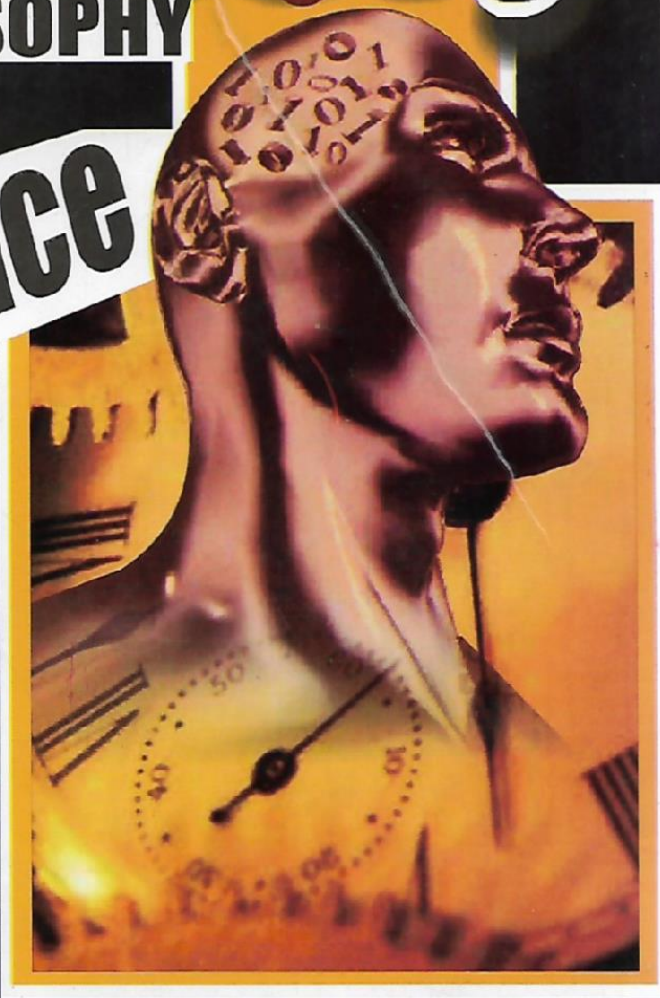
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PHILOSOPHY

of

Science

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Chapter Four

HISTORICAL CONDITIONS FOR DEVELOPMENT OF SCIENCE AND TECHNOLOGY

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"There is no error.....which has not had its professors" - John Locke .

Science and History attract expert attention everyday. This age, known for over-science in the wider world is for Nigerians one of under-use. And the neglect of history has become near – traditional. The recent over emphasis on Science and Technology de-classes History², the *nne oha* or all-mother subject among academic disciplines.

Scholars studied science's history³ its outlook,⁴ its culture⁵ its intellectual tradition⁶, the African angle to the scientific⁷, and the link between science, the arts, and technology. Science, however, looks very mad. Shows knowledge explosion⁸; teaches inventions; creates labour attrition⁹, and promotes adhocracy on sudden death for social values as Toffler, the American futurologist, has correctly observed.¹⁰ undergraduates, indeed, have to double – barrel their education in order to scientize their humanities as well as humanize their sciences. Otherwise, such learning would produce a

brakeless culture. Since survival remains human history's goal, it is urgent to upgrade understanding here and expand national power in a competitive universe, through teaching, mastering, adopting, and protecting the scientific heritage.

This paper notes the historical conditions that favour the rise and progress of sci-technology. A working thesis argues that conditions promote scientific growth whether governments are attentive or not.

So, this inquiry stands justified in ten ways. For one thing, it is timely in this century of science in which laggards can no longer compete with advantage. For another, social needs, to wit, food, water, security, knowledge and development – cannot be postponed. They demand solutions that require continual inventions. Any inventor begins with knowing his or her times¹¹, meaning doing so through their hard needs. Problems not tackled by thinkers get mouldy and remain unsolved. The inventor, a new creature in society, can never be communised. Such a one reasons differently enough to be odd in his generation. Societies that improve their citizens lives connect needs to practical solutions. Besides, holdovers¹² tend to choke the inventive mind. These have been organized religion, rigid tradition, idle affluence, closed government and false democracy. For everywhere new knowledge attracts opposition. Women, often unhonoured, added much to civilization in the onward march of science and

technology. Historylessness, whether by neglect or politicians, the past upholds became, and interprets the present. Being slow to exploit the ripe situation for sci-tech development inflicts losses upon late-comers since victory, like success, gives to able men and women – not to the tireless watchers, the absent-minded consumers and the satisfied do-nothings.

Why, what, which – explain several facts to background this theme. Other paragraphs define science with technology; identify proscience and scientists; before preventing an open – ended conclusion.

Upon the scholars to understand his day rests many definitions about science and technology¹³, “Science” has various meanings. It is a body of gathered knowledge, that is, any kind; a tested truth; an unproved or unverifiable opinion; an act of faith; a subject-bound history; the enabling laws and usages for operating scientists; the scientific workforce; and a wayward, bohemian culture lived out by the scientific tribe. Whether unpunished or not, thinkers in this sphere and their books qualify for science as do their politics which unite or divide scientists, their governments together with their ways.¹⁴

Similarly, technology has several senses. As knowledge, it's involves building or making things in nature. It denotes a corpus to be learned, using science; scientific their ways through life; the institution linked to

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Similarly, technology has several senses. As knowledge, it's involves building or making things in nature. It denotes a corpus to be learned, using science; scientific their ways through life; the institution linked to

them; the cultural societies that champion their interests. It pressure politics, lobbying, and subsidized educational; or mass movements. The last include antinuclear rallies¹⁵ in the seventies amidst the nuclear non-proliferation treaties¹⁶ between African states and the world power.

To round out such interpretation, there follows the concept, historical.¹⁷ Which suggests change and importance in time. Changeful, therefore, historical conditions mean social forces. They represent institutions, attitudes, successes, failures, hopes and fears as well as economics and politics that support the scientist as nature's analyst. Time and event never stand still even in the nineteenth century marked by European vain imperialism, and aggressive capitalism.¹⁸

Several elements, certainly, developed science and technology. These range wide, beginning with necessity, the first teacher of the human mind.

For an example, during the Nigerian – Biafran hot¹⁹ war 1967 – 1970, often misnamed the Nigerian civil war, the Biafara, embittered justice – minded nationalists, faced genocide, lived its fears, and resisted death. The Research and production (RAP) Directorate of engineers or so, in (mimicked) their competitions, invented, perfected, and mimicked weapons such as the “shore – battery”, “Ogbunigwe”²⁰ bombs and the pro-napalm grenades. Such military wonders bought living time;

attracted foreign observers; ignited confidence, advertised Biafara sci-tech,²¹ and uprooted the white man's scientific arrogance. Soon nationals realised the scholarly fact that science aids war and war backs science. In the European world wars 1914 – 1918 and 1939 – 1945, new weapons, born in adversity to inventive minds, formed harvests. They meant the radar, the armoured car, the vengeance, (v) weapon, and the mustard gas.²² By their newness, surprise and destructiveness these removed glory from warfare, but planted disaster and folly.²³

War or no war, a doubting habit always increased scientific knowledge, usually against the states quo. To the true scientist, seeing, first of all, disbelieves – not believing on trust. For past popular wisdoms like a flat earth, a geocentric universe, a mechanistic God, or the elixir of life had, early on attracted and engaged doubters, first in private and, later on, in public. These were men and women who questioned the givens meaning, the so-called self-evident thoughts. They aimed to base their opinions, knowledges, facts, or conclusions on reason. Rightly, therefore, did Professors J. Bronwsi and B.Mazlish, topflight American scholars, title their epochal study. **The Western Intellectual Tradition** based on reasoned doubt.²⁴ Not one, however, but many traditions existed. The historical pioneers include Aristotle, Archimedes among the Greeks, Galileo of Italy, Copenicus of Poland Farady and Boyle of the United Kingdom, Pasteur in

France Morse America, Professors B. Nnaji, C. Ejike and Animalu of Nigeria²⁵. Unsatisfied thinkers, they challenged what was but saw a better future on the horizon. Whether the doubter died martyred lived imprisoned, stayed discredited like Galileo or vegetated, as an outcast does not matter²⁶. For each step forward in science upset conservatives; stirred progressives; cheered warriors; and enlivened secret admirers.

Notably modern scientific development owes much to successful, failed and indifferent doubters. Indeed, much active dissent yields much unexpected result, challenge; and progress – despite the known quick – death in scientific theorizing or experiment.²⁷

Whenever, historians ponder this development, they stress the political climate. Politicians by governing privately to benefit few supporters create troubled environments for change, doubt, innovation, or obstruction. Agreeably, advancement in American science, for an instance, had to do with encouraging citizens to be the best possible for their abilities.²⁸ The Great Napoleon Bonaparte (1769 –1821), the effective French Emperor mobilized his subjects through a policy of “careers open to talent”²⁹. Not hidebound, not radical though revolutionary, but open to new ideas, re-ignited the latent powers in the nation. So, knowledge flourished as France, in fact, led European culture. Her universities began to think again while the fatherland inspired unbelievable change in the known world. Dr.

the Hon. Nnamdi Azikiwe³¹, highly educated in the United States, pan-Africanist and inspiringly adventuresome, created the university of Nigeria whose motto is "To Restore the Dignity of Man". Doing that includes providing balanced nationalist and democratic education. In contrast, the anti-Biafra quixotic plunder of this institution by learned federalists in 1970 was tragic. It pinpoints an anti-science that has failed to dim the scientific breakthrough of a convinced, gallant, rebel soldiery or else Dr. M. Okpara's pro-science policy in the Eastern Region during his primership.³² Today, the universities keep this impact at a sixty-forty ratio with the arts.³³

Though governments invent wars or enhance science thereby, other sponsors urge progress. Art, so history teaches attentive citizens, needs patronage. Scientists sometimes, depend on good givers. In the sixteenth century, royals promoted science as seen in the founding of the British Royal society³⁴ or the German **Kolonialverein**³⁵ centuries afterwards. These set up expeditions that charted the seas; mapped the mountains; reported the so-called "primitive" peoples territories that were weaker in technology, hence their later colonization. Where would the world be today without the Mungo Parks. The Landers, the Raleigh's and many more. They were famous explorers on ⁶⁵ adventurers; indeed, a mix of bandits, privateers, agents and glory seekers.³⁶ pro-science support at all events remained uneven, for few reasons. Gold-hunting

enabled monarchs in Spain, such as Queen Isabella, Henry The Navigator in Portugal and Queen Elizabeth I in England to dispatch explorers officially – unofficially, that is, for themselves when things went wrong and otherwise for their nation³⁷. Many explorers still butchered the indigenes enroute and felt that those had no rights to own their territories or to be left alone. Often the adventurers factored religion into their exploits for “God, Gold and Glory”³⁸ hence the concept of a **requerimiento**, which to the foreigners justified the conquerors in forcing the American Indians to accept baptism or else get killed. Islamic warriors felt the same urge to expand scientific knowledge. Evidently, Islam in India preserved the classical scientific theories in the European middle ages known for their blind faith³⁹. Ibn Khaldun Tunis (d.1406) stands out as a great mirror. Yet patronage, violence and greed accompanied most advances.

Milieu, patronage and war - these elements ensured development according to time, circumstance, place, action and actor.

Other conditions, however, demand notice. Nationalism that hard wine in human bottles kicked science up and up during the nineteenth century as nation states struggled for wealth and power with their armed forces. Modern Japan's motto was “a rich nation, a strong army.”⁴⁰ Technologies, the newer the better, tended to breed and shift warfare from land to sea to air, a radical

change. All the nations that led "world" history from the sixteenth century, monopolized effective science – based instruments of national power: Spain and Portugal men-of-war and gold (16c); Holland-seamanship (17c), France, land armies (18c); Britain, a strong navy (18-19c), Italy and Germany, diplomacy backed with armed force (19c late), the United States, affluence coupled with a mass ideology-democracy-and nuclear teeth (20c early) and Soviet Russia, far-out atheistic technology and nuclear power (late 20c). In Nigeria, the Niger Delta city-states had war canoes⁴¹ while the Aro people had contract warriors (mercenaries) backed by fine-tuned intelligence-gathering (20c)⁴².

A little emphasis appears necessary now. For in all these foreign states leaders developed higher education and specially cultivated SciTech. Like the German monarchs in pre-1870 times. The German tradition spread beyond Europe. The focus on university education was knowledge production for leadership. That in effect, influenced administration, economic advance, and power politics. Such a knowledge culture created an epistemic society, which flowered best in the Industrial Revolution⁴³. Something new happened too: the soldier, in general, had to be educated, not alone the officer corps. The army, well organized and sometimes, nationalistic, vanguarded change, say in the new nations (1948-80) in Latin America, Asia and Africa⁴⁴. There militipolitics aborted democracies which

were attempting to use science to secure glory and prosperity, mostly against the masses once "crony capitalism" began.

Without competition without problem, so it seems life becomes dull. That is why success, here or there, attracts imitators as well as rivals. For a wonder, the Russians launched the **Sputnik** (a satellite) on 4th October 1960. Their warm-heart beatings at home sparked off panic, unease, and self-doubt in the non-communist societies. Especially was this so in the United States, then the pioneer nuclear super-power since Hiroshima and Nagasaki in 1945⁴⁵. Fears compelled other nations to rush funds into the hard sciences, namely, Physics, Mathematics, Chemistry and so forth just to catch up with the "Reds" before overtaking them. Democracy, affluence, anticommunist propaganda, expert-seduction – all these forces generated a national movement for widening practical education in America's national interest. As academic roads began to lead to the west, free world universities, now shamed awake or so, sweated back into public excellence through sponsored university-based researches. For new ideas meant fresh weapons. Every state entered the struggle, a complete new race for science and Technology. For a surprise, this feverish game opened the age of nuclear suicide. Over this, experts and humanists are echoing Professor Bertrand Russell's anxiety in his book "**Has Mankind a future?**"⁴⁶. Or it can be philosophised that success in

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science exposes humankind to a bad risk. But when the scientific onward march outruns human wisdom, knowledge, security, and caution the end stands near. The result is point-no-point, unless historical awareness prevails under a clear-headed and bold government that respects its own ignorance; its own citizen. ✓✓

These facts can now explain the open national hurry to acquire and expand modern science⁴⁷. Institutions for higher education such as this Enugu State University of Science and Technology (ESUT) compete with those for further education like Nekede, Ibadan and Kaduna Polytechnics to modernize and industrialize Nigeria. They can do so by schooling citizens; producing scientists; introducing copy engineering; planning academic exchange programmes; and Japanizing education through borrowing in order to add something else. What the British colonizers-competent patriots-achieved was to extend their basic scientific tradition through de-industrialization⁴⁸. They did not introduce iron technology, astronomy, astrology, engineering, chemistry and so on. Rather they impressed theirs on an occupied culture as a colonial necessity through streaming the education system to get a narrow elite and aristocracy. Truly, Nigerians cannot get far without advancing in science and technology. For, in life as in science, to stand still is to decay. Decay spells weakness, invites decline, and brings misfortune. |||

For a conclusion, science, as already defined, is still science all over and everywhere. The conditions favouring its development with technology have been examined after some definition beginning with necessity. Today, science and technology have changed the world; imprisoned humankind in a cage of fear and anxiety; modernized terrorism; and created a fragile urban civilization. To stand still is to decay. Where lies the future in a nuclear age? Science impacts society heavily, indeed as philosopher Evaristus Ezeogwu has interestingly noted⁴⁹. Yet the new nations grab around and within for scientific development. By learning from History, they can achieve greatness. That necessity exists but do they have the inventors that think in their own heads? For in the wise words of Charles E. Merriam, a social philosopher, at Columbia University: "Nonconformity may be one of the qualities tending to insure survival, even in war."⁵⁰ Very true. Necessity is the mother of invention only if there are inventors in a needy society.

• **Endnotes**

1. John Locke. Quoted in C. I. Barnhart & R.K. Barnhart, The World Desk Book Dictionary, Vol. II (1977), p.1662.
2. R.C. Okafor, L. Emeka & G. Enebe, Eds. Man At Center Stage (Social Science For Higher Education), (Enugu: Hugotez, 1999), Pp. 1-10.
3. Thomas S. Kuhn, "The History of Science" International Encyclopedia of the Social Sciences Vol. 14 (1968), pp. 74-81. Edited by D.L. Sills (N.Y: Macmillan Free Press, 1968).
4. Thomas, Kuhn, The Structure of Scientific Revolutions (Chicago: University of Chicago Press, 1962).
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8. Voice of America, Washington, D.C. "Science in the News Program" (Daily).
9. G. M. Trevelyan, A Shortened History of England (Harmondsworth: Penguin Books, 1976), pp. 429 & 553. The Machine-Breakers Came to be Called "Luddites".
10. Alvin Toffler, Future Shock (London: Pan Books, 1974), pp. 129-30.
11. Kuhn in Sills, 78-79 on the "External History" Concept of Science.
12. William H. Macneill, The Ecumene: Story of Mankind (N.Y: Harper & Row, 1973), 429 ff.
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14. Trade Unionism ⁱⁿ is the Scientific Communities Require Special Studies. For an Example, The Science Teachers Association of Nigeria (Stan) can be investigated.
15. Campaigns for Nuclear Disarmament Featured in the Sixties and Seventies. Professor Bertrand Russell, a famous British Philosopher, was an active member and

inspirer of the CNDs. See Solly Zuckerman, Nuclear Illusion and Reality (N.Y: The Viking Press, 1982), 109-113.

16. G. Aforaka Nweke, African Security in the Nuclear Age (Enugu: Fourth Dimension Publishers, 1985), 139-144.
17. See A. L. Rowse, The Use of History (London: EUP, 1948), chapter 4.
18. John Bowle, Politics and Opinion in the Nineteenth Century (A History Introduction) (London: Jonathan Cape, 1963), 18-19.
19. "Hot" Wars Grow out of Cold Wars, cf. The Nigerian Crises of 1960 -1967 Before the Civil War Years, 1967-1970.
20. The Spanish Influenza of 1918 Hit the World Hard. It killed the Igbo ethnics, like other Nigerians hence the local names "Ogbunigwe" (killer in large numbers) and "Ogbukpelekepele" (Wide-Spreading Killer).
21. The Soviet Voice of Moscow Broadcast of May 1968 vs. Radio Voice of the Gospel, Addis Ababa, Ethiopia. The second laughed at the new Biafran missiles, which the Moxovites praised, adding that through

Moxovites

them, the Biafrans would guinea pig the federalists.

22. Cyril Falls, A Hundred Years of War 1850-1950 (N.Y: Collier Books, 1967), Passim. Also R.P. Sellman. The First World War (London: Methuen, 1973), 22 & 38.
23. Erich Marie Remarque, All Quiet on the Western Front (N.Y: Fawcett Crest, 1975), 167 & 228.
24. Bronowski & Mazlish, 557-559.
25. Prof. Barth Nnaji is an international scholar in Computer Science Engineering. Prof. C. Ejike, A former Vice-Chancellor of The Anambra State University of Science and Technology (ASUTECH), stands eminent in Zoology while Prof. Alex O. Animalu excels in Physics. They are Igbo in Nigeria.
26. Macneil, 429. Also James K. Feibleman, Understanding Philosophy (A Popular History of Ideas). (N.Y: Horizon Press, 1973), 96 & 124ff).
27. Awake! September 22, 2001, "Watching The World", 28-29. This is a Jehovah's Witness

Publication, always written in lucid language.

28. Alexander Hamilton, Hamilton's Blueprint for Economic Development, presented to (The United States) Congress, December, 1791.
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30. Ibid, 917 Ff.
31. Alex O. Animalu, Zik Of Africa An Epitaph (Nsukka: Ucheakonam Foundation, 1996), 17-19, Passim.
32. Professor Pius Okigbo, Entitled His Approach To Socio Economic Development Okparanomics – In A Solid Pamphlet Circulating In The 1960. Also Chris Offordile, Dr. M.I. Okpara: A Biography (Enugu: Fourth Dimension Publishers, 1980).
33. University Law incorporates this policy thrust. See The National Policy on Education, 1981.
34. Bronowski & Mazlish, 213-226.

35. Gordon A. Craig, Germany 1866-1945 (N.Y: OUP, 1980), 119.
36. J.A. Williamson, The British Empire and Commonwealth (A History for Senior Forms) (London: Macmillan, 1956), 3-42.
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✓
38. Robin Winks, Ed. The Age of Imperialism (Englewood Cliffs, N.J: Prentice Hall, 1969). Also Byron Farwell, Eminent Victorian Soldiers (Seekers of Glory) (N.Y.: W.W. Norton, 1985).
39. See Martin Plessner, "The National Sciences and Medicine" and Juan Veriret, "Mathematics, Astronomy, Optics" in Joseph Schacht & C.E. Bosworth, eds. The Legacy of Islam Oxford: Clarendon Press 1974), 425-460, and 461-489. Also (Lt. Gen.) E.A. Vas, Terrorism and Insurgency (The Challenge of Modernization) (Dehra Dun, India: Natraj Publishers, 1986), 128-131.
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40. Eugen Weber, Modern History of Europe (Men, Cultures and Societies from the Renaissance to the Present) (N.Y: W.W. Norton, 1971), 747.

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47. The National Policy on Education (Yaba: NERC, 1981).
48. J. Forbes Munro, British in Tropical Africa 1880-1960: Economic Relationships And Impact (London: Macmillan, 1984), 62-3.
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50. C.E. Merriam, The Making of Citizens (Introduction and Notes by George Z.F. Beready) N.Y: Teachers College Press, Columbia University, 1931 & 1966), 348-349 paraphrasing Meyer.