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### THE CORPORATION: NATURE'S BLACK BOX

*Setting the Scene.* The central message of *Values, Nature, and Culture in the American Corporation*, published in 1995, is that business values, the corporation's moral standing, and its moral dilemmas are the outcome of natural evolutionary forces interacting with corporate culture. The present chapter extends that picture by focusing on the actual functions performed by the modern corporation, arguing once again that they, like the values they express, are another manifestation of nature at work.

Nature plays an enormously important role in business life. Hurricanes, floods, tornadoes, snow storms, and other natural disasters cause immense property damage, disrupt vital services, reduce business profits, and sometimes bankrupt insurance companies. Drouths and unseasonable weather cycles bring financial ruin to farmers, lower the demand for seasonal farm workers, and drastically raise supermarket prices of consumables. Attempts to reduce environmental pollution and global warming, whether through government regulation or industry initiatives, impose costs, delay the adoption of new technologies, and ban useful products from markets. Pharmaceutical and health care companies are required by law to test drugs and medical devices for efficacy and safety, while many food products require quality checks and nutritional labeling to encourage optimum diets. Personal computers come with instructions and warnings about proper posture and periodic rest breaks so as "to reduce the risk of nerve, tendon, or muscle injury." Sick-building syndrome has felled countless office workers and required large remodeling investments by firms.

Health care costs alone, borne directly or indirectly by corporate benefit programs, are a dramatic marker of how biology and business interact, not to speak of the growing number of health maintenance organizations whose task is to find an acceptable balance between economic return and the health needs of their subscribers. Then there is the rush of firms eager

to cash in on the growing number of patentable gene therapies and other genetic miracles that offer the lure of better health, or improved farm crops, along with enviable financial returns to the patent holders.

These intersections of nature and business—where biology impinges upon finance, weather cycles make or break agribusiness, health needs challenge for-profit HMOs, and atmospheric chemistry constrains car makers and their designers—are only the most obvious signs that nature has a direct impact on the bottom line. In a more subtle yet comprehensive sense, nature also operates within almost every nook and cranny of the business firm. The profits, the losses, the competitive drive, the high levels of economic productivity, the explosive global diffusion of business culture, the mergers and acquisitions that continue to build corporate behemoths, the onrush of technology—all of these and much more are the end result of natural forces at play in human affairs.

In what follows, the arguments for nature's activist role are vigorously pursued. Business motives are linked to the physics of cosmic evolution—a bold thrust but believable in the end. The yardsticks that measure business success, such as market domination, return on capital, exorbitantly lavish executive salaries, bonuses, and stock options, are attributed to innate biological urges. The socially disruptive swirls of new technology, along with the innovative miracles of productivity they inject into the business system, are traced to synaptic connections and neuronal firings lying deep with the human brain. The way business employees and managers are organized into levels of command and control, into complex hierarchies of technical sophistication, into teams, task forces, coalitions, alliances, assembly lines, cubicled ranks—these too are shown to owe their traits and patterns to expressive cerebral codes long ago implanted in the brains of our Stone Age ancestors. And the business practitioner's urge to control what happens, to direct the firm into chosen channels, to measure outcomes with precision, and to assure a long life for the enterprise will be shown to stand on shaky ground, undercut by nonlinear ecological forces that defy the practitioner's rationalistic urges and linear mindset.

Using nature to interpret business behavior is unusual and potentially off-putting because we are accustomed to believe that a combination of economics, psychology, and politics can tell most of the story. Self-interested pursuit of profits, modulated by a political system supportive of private property, has long constituted the ideological infrastructure and the central plot of Western market economies. For many of Adam Smith's current followers, it seems to explain enough without resort to natural causes, although Smith himself argued that supply and demand are natural laws expressive of natural sentiments. Nor have the many and diverse social cri-

tiques of market economic theory—Marxist, socialist, institutionalist, socioeconomic, feminist—ventured into the naturalist realm to any significant degree. Nature has been left to one side.

Now, however, it is possible to think in naturalistic terms because of the great upwelling of information and new insights being generated by natural scientists in many fields. One observer labels this gush of scientific discovery and interpretation as a “third culture,” the work of a loose collection of scientific theorists who are exploring everything from cosmic origins to language origins, primate behavior and its possible relation to human behavior, evolutionary biology, the meaning of consciousness, gene-directed human traits, computer-simulated neural networks, genetic algorithms of emergence and self-organizing systems, ecological diversity and species extinctions, and the neurobiology of both normal and abnormal behavior.

Why not make use of these scientific riches, if any of them can help clarify or improve business performance? Doing so is the central thrust and inspiration of this chapter. It will carry the reader along new pathways, broader and more inviting than the usual dry economic explanations, and less ideologically argumentative than those offered by business’s many critics.

If business is surrounded and shaped by nature, what are the practical effects? Wouldn’t one have to show that nature has the power to make the bottom line either a plus or a minus? Or that nature is able to control the direction and pace of a company’s strategic planning? Can nature actually override a manager’s decisions? Where free markets rest on initiative, personal autonomy, consumer choice, and decentralized decision making, any claim that an impersonal, unfeeling nature is in charge of economic and business affairs will meet great resistance. Free enterprisers work to free themselves and their companies from all fetters imposed by government regulators, employee unions, or social protestors. They won’t like to be told that natural causes are a newly discovered constraint. Some entrepreneurs, however, have an easier time seeing nature as a co-investor and working partner when new business opportunities, such as recycling industrial wastes to produce useful products, create both jobs and profits. It seems possible, then, that the practical effects of the nature-business bonding may run in two directions, one possibly channeling or constraining the range of business decisions, the other opening the way for business to collaborate with nature and therefore to dampen some of nature’s negative impacts on human affairs—and of equal importance, lessening the damage done to our natural earthly home by some kinds of business operations.

The main message is that nature matters. It matters in the way busi-

ness is done and how well it achieves its purposes. Nature also makes a difference to the people who work in business, what they give to it and what they take away from it. Perhaps more important than any other aspect of the nature-business bond, nature matters regarding the larger purposes and ultimate meaning sought by human communities around the globe. That ancient unending personal search is now subject to the burgeoning power and influence of a business order that reaches into the remotest, innermost recesses of human existence—once by transistor radio, now by the Internet. Business has indeed thrust itself, without full knowledge, into that poignant human space that tradition has reserved for the contemplative search for life's meaning. It is there, in stark and simple ways, that one comes to terms with life, death, and nature. Nature does matter. And business matters because it has been drawn into a deep, lasting, and profoundly close relationship with nature and natural forces.

To explore these business-and-nature ties, both practical and philosophical, four major, overarching questions are posed. Each question raises an issue vital to the successful operation of any business firm, whether large or small, international or local, for-profit or not-for-profit. In each case, nature plays an indispensable part in shaping the firm's bottom line. The four questions are:

- What motivates or drives the business firm?
- What generates business productivity and innovation?
- What shapes business organization?
- What enables the achievement of business goals?

The four key concepts here are *motivation*, *productivity/innovation*, *organization*, and *goal achievement*, and the plan is to demonstrate how nature affects and shapes each of these central processes of the typical business firm.

### Nature's Black Box

The metaphor Nature's Black Box suggests that much of what goes on inside the business firm is of naturalistic origin and is either unknown or appears to be mysterious and remote to observers who are on the outside looking in. The "black box" image has frequently been used to describe any reasonably complex, specialized process or activity that may be admired for what it does but whose internal functioning is not fully understood. Could there be a better example than today's personal computer, especially

laptops whose main processor is literally a black box and whose miraculous inner workings are out of reach of most users? The same image can be applied to an organization or institution, such as a hospital, a university, a religious organization, or a legislative body, where internal expert knowledge and skills are required but run well beyond the average person's grasp. To the outsider or neophyte, the hospital may do a marvelous job of caring for patients, or the university may graduate a stream of well educated students, or a church may reach many communicants with its message, or a legislature may govern a society in compelling ways—but just what happens and how these feats are accomplished may be a mystery. For all practical purposes, the organization is an opaque-sided black box, not unlike one's personal computer.

In the same way, today's businesses employ a daunting array of specialized technology, complex financial analysis, advanced marketing research, accounting and cost controls, computerized production and inventory systems, human resource and benefit plans, competitive intelligence systems, and (for the largest companies) the managerial equivalent of satellite-based global positioning systems to calculate the rate and timing of their capital investments, new market ventures, and alliances with other firms and governments around the globe. Most corporate insiders themselves seldom see or understand more than a fraction of the company's overall operations, while outsiders can only guess what goes on behind the corporate walls. For this reason, the idea of a "corporate black box" that does something but whose inner workings are invisible and not readily accessible seems to fit today's business firm.

Now go one step further and imagine that the forces driving and influencing business activity have a natural origin. In other words, put nature inside the black box and let it represent the source of the box's output. Getting inside to see how nature works, that is, explaining how nature causes business to be what it is and to do what it does, is the goal. The guiding vision of Nature's Black Box is that the business firm itself is little more than a feature of the natural landscape.

Some may object on theoretical and aesthetic grounds to the mechanical image invoked by probing the innards of a square, opaque, six-sided box. Putting a spontaneous, unpredictable, evolving nature inside such a mechanical contraption will strike some as wrong-headed and contradictory of nature's dynamic, flowing character. More imaginatively, one might take a page from current cosmological theory where constantly evolving "bubble" universes are said to be created in an endless procession, with passageways called worm holes theoretically allowing travel from one bubble to another. As a metaphor, "bubble" might work as well as "black box" and

would certainly convey more vividly the evolutionary, untamed character of business and business change. However, setting aside the speculative, unobserved (and probably unobservable), untested tenets of cosmology's bubbles, there is a certain comfort and well understood stability in the notion of a "black box" with inner workings that need clarification, so that is the vision to be used here.

So, shall we gingerly lift the lid of Nature's Black Box?

### Looking Inside the Black Box

Inside Nature's Black Box natural forces of great complexity and stunning power generate all the behavior we recognize as business practice. The Black Box's output *is* business. The power generated deep within that Box takes on phenomenal, even cosmic dimensions, whether the box is large, as in today's global corporate behemoths, or small sleek-lean-and-agile entrepreneurial firms. All of them do business suspended in a force-field that oscillates and pulses to rhythms set deep within cosmic time and space.

One of the first things you notice when peeking under the lid of the Black Box is the clustering of components. Although complex, the contents are not a total mess. Maybe they resemble your own desk—it may look like total chaos but you know where everything is among heaps of stuff stacked everywhere. A little bit of poking and tinkering reveals these component-clusters are linked together. That tells us that what one cluster does must affect the others. When it beeps or hums, it can make others do the same. If these interconnecting pathways were to be lighted up the way those computerized brain scans are, we would be able to see the signals each gadget-cluster sends out and where they go. Fortunately, each cluster-component bears a label, which gives a broad hint about what it does.

Keep in mind that we're talking about business here—plain old commerce, making money, trying to earn a profit, finding ways to get enough people, money, and materials together to turn out products or services that other people might want to buy. It's not very romantic but can be exciting, not the stuff of Nobel prizes but not entirely ignoble either. In one way or another, it keeps all of us going by creating and generating what is needed to get through the days and years.

When we first pried the lid off, you might have noticed how old-looking, how very ancient the entire thing seemed to be. Still strong, it reeked of old age. Something about it hinted at times long past and worlds no longer seen. It was as if those component-clusters had been humming and clicking, sending out those impulses to one another for untold centuries,

long before the centuries themselves were known—out to the edge of time itself. That's because everything inside the Box—*everything!*—is a little fragment of space-time, primordial, molar, basal, as original as the initial elements of the Big Bang. We're talking fundamentals here in a big way, the biggest that can be fitted into the human imagination, and that's saying a lot. But it's not saying that Adam Smith's capitalism or Karl Marx's communism were "present at the Creation." One now extinct, the other globally regnant, they have been only small wrinkles on the face of galactic evolution. The Black Box as we know it today cannot be invented anew because it was never invented in the first place. As we shall see, it houses natural rhythms that owe everything to forces that long antedated the conscious shaping of anything. The Box and its contents are nature emergent, a "becoming" process, one still evolving, as full of surprises as ever, which is why it is so incomparably valuable. What we call business is nothing less than a natural substrate of cosmic forces.

### The Nature of Business

Now to the clusters. What are they? What do they do? Four in number, they are labeled **Motivator, Creator, Organizer, Enabler**.

*What motivates or drives the business firm?* The natural **Motivator** of all business and economic activity is thermodynamic entropy, which is one of the most pervasive physical processes in the entire cosmos and is probably *the* most basic life-generating force in all of organic nature. Entropy—the relentless tendency of all energy to disperse toward an equilibrium that renders the energy unavailable or useless for work—drives organic life's economizing activities that attempt to stem or delay the arrival of thermodynamic equilibrium conditions where all life would cease. The first appearance of life was necessarily an economizing act, for it meant that organisms, however simple and rudimentary they may have been, had begun to capture and preserve, however temporarily, enough energy to offset its entropic flow toward thermodynamic equilibrium. Economizing organisms are catch basins of life-sustaining energy. The initial acts of economizing laid the basis for the evolution of all subsequent organic life. In today's highly elaborated and extended evolutionary world, this core economizing function is performed by business and economic institutions, as well as by myriad forms of organic life. Hence, modern business rests on, and finds its societal rationale in, an ability to forestall the entropic rush of energy toward a condition of lifeless and formless equilibrium. Business practitioners of whatever stripe share a common motivation—to economize, to capture energy, to channel it in self-protective and

self-promoting ways so that they and their firms may survive, grow, and develop within the potentials offered by their own personal DNA and within the constraints set by the societies where they do business. Their motives are forged in one of nature's most fundamental furnaces, where entropy and economizing are fused to drive the business system and human society away from thermodynamic equilibrium. In this sense, economizing is the supreme motivator of all business activity.

*What generates business productivity and innovation?* The natural source of business knowing, creativity, and innovation—the **Creator** component of Nature's Black Box—is the human brain as it interacts with its environment. Composed of several billion neurons (nerve cells) interconnected so that they form an astonishingly complex network, the brain generates symbols or images or representations of what it senses. It might aptly be called the restless brain for it is in constant motion as the axons and dendrites of each nerve cell both send and receive electrochemical impulses or "firings" to and from other neurons. The human brain never sleeps, as everyone knows by the nighttime dreams it manufactures as if an endless video tape depicting strange, wonderful, and weird events and stories. When fully awake and when its circuits are plugged into the circuits of other people, as in a business firm, even more wonderful things can and do regularly happen. The cerebral codes flow together, mix and mingle, creating new and unforeseen blends and patterns. There one finds the fount of creativity and innovation, the source of unique combinations, new inventions, startling insights never glimpsed before, vistas of an emerging future, new markets, novel products, emergent technologies. Recognizing creativity's source in the human brain is equivalent to acknowledging that business innovation is the product of a biological process, a brain-and-environment interaction. Cognition and creativity are not the full story of either business innovation or of the human brain, for environment plays a role though a curious one that is difficult to disentangle from the brain itself.

Adding fascinating detail—and perhaps innovative energy—to the whole neurobiological process is the presence of what some have called the emotional brain, paired with the cognitive, calculative brain, both of them active agents in business strategy, structure, and goal seeking. The **Creator** component undergirds and makes possible all business activity, for if escape from entropy's grasp drives business to economize, knowing how to do it depends on the creativity and innovativeness that spew out of the human brain's neurological circuits.

*What shapes business organization?* Organization in business is the agency of biological process. That means that the **Organizer** component of



Nature's Black Box is an extrusion of the natural forces that undergird and give life to the business firm. Business organization is built upon three biological bases. One is neural networks mediated by symbolic language. Another is the power-and-dominance hierarchy so common to business firms. A third is systems of social exchange moderated by reciprocal altruism. Each of these organizational patterns is grounded firmly in one type or another of biological process that has proven to have selective advantage through evolutionary time; hence, they are the most substantial, basal, molar organizational elements upon which business firms can be built.

Being organized means being linked to others. In business, those linkages induce cooperation among specialized professional practitioners to achieve the firm's purposes. Person-to-person and group-to-group networks exist, and these networks *are* the firm's organization. At a biological level, they consist of neuron-to-neuron, brain-to-brain, synapse-to-synapse, electrochemical-firing-pattern to electrochemical-firing-pattern linkages and the resulting flow of cerebral codes back and forth between members of the firm and between the company and its stakeholders. In the most basic sense, the substance of business organization is an interconnected flow of symbolic quanta, or packets of meaning, activated as multiple human brains interact with each other. Organization exists only when neurons are interlinked in purposive exchange patterns.

From ethology and primate studies, we learn that organizational form among those creatures most closely related to humans has evolved mainly as a power-and-dominance pattern where alpha males dominate other males and have the widest access to food and females. Of unquestionable genetic origins, this organizational pattern is imprinted widely through other evolutionary lines, including the human species where it prevails across a broad spectrum of human endeavor. The business firm is one of those behavioral realms where the linkages between employees, managers, and owners are mediated by and through a power-and-dominance model. Its biological-genetic-evolutionary base is obvious and irrefutable.

From evolution, the **Organizer** component embraces yet another natural trait. Social exchange, upon which market exchange is based, is an ancient human practice etched deeply into the neural circuitry of Ice Age Pleistocene people and probably owing no little to their even more ancient proto-human ancestors. Accompanying that impulse to exchange was a guardedness to insure if possible that the exchange was perceived as appropriate for the parties to the transaction. Modern game theory offers explanations of the tit-for-tat exchange strategies intended to achieve social reciprocity, thereby avoiding the potential social instability that can arise from unequal or unfair exchanges. A second biologically embedded group

practice is found in reciprocal altruism, which ensures genetic continuity through self-sacrificial acts of individuals in behalf of close kin. By extending reciprocal altruistic acts beyond immediate kin to non-kin individuals and groups, a basis is laid for the emergence of a rudimentary moral system. The combination of these two biologically derived behavioral systems—social exchange modulated by game theory strategies, and reciprocal altruism that supports generational continuity by self-sacrificial acts—creates a naturalistic organizational infrastructure contributory to market exchanges and to strategies for resolving moral issues arising from this kind of social exchange among humans.

Thus, the organizational sinews of modern business firms owe much to nature: the neural networks literally join business practitioners together within their firms and into bonding relationships with their stakeholders; the power-and-dominance impulses structure the principal hierarchical organizational systems of the typical business firm; and the linked systems of social exchange and reciprocal altruism govern the organizational dynamics found within today's business corporations. At all points, nature is the foundational element, revealed by the sciences of neurology, ethology, and evolutionary psychology.

*What enables the achievement of business goals?* To understand the **Enabler** component of Nature's Black Box requires a brief journey into ecosystems and the ways they operate. All organisms live within ecosystems that are composed of sets of interrelated plants and animals and their physical surroundings. Their lives are affected by the niche they acquire and can hold. Their niche is their life base while the niches of all others in the ecosystem comprise their environment. Within that niche base, the organism economizes and in doing so comes in contact with other organisms also economizing in *their* respective niches. In this way, an ecosystem consists of a vast network of interlinked life forms, where each affects all the others and the totality affects the smallest unit. Mutual benefits abound, along with dire threats from competitive or predatory agents. Throughout the ecosystem, internal change is constant as life ebbs and flows among the niches, although the ecosystem itself tends to remain stable over long periods of time.

It is within such ecosystems that business is conducted. The business firm itself is an integral part of the ecosystem. It is composed largely of individual organisms (its employees, managers, and owners), each one an economizing life form seeking and attempting to hold onto a supportive niche. So too is the firm itself a larger life unit—a complex adaptive system charged to economize in economically productive ways. It too seeks a niche within markets and as part of an economy where others do the same.

Like all organisms, business enjoys and seeks to promote mutual benefits with others, while suffering the slings and arrows of vigorous competition from others who covet its niche. As all now realize, change is constant within business ecosystems, as firms jockey for position and advantage. The landscape on which these struggles occur is a test of survival fitness and can be the scene of exultant triumph or disastrous failure. The alert companies search ceaselessly for the keys to competitive success, spurring a drive for economizing efficiency and technological innovations.

Business is enabled to economize, to be creative and productive, and to organize people and resources by the naturalistic traits of the ecosystems in which the firm operates. From the self-seeking behaviors of many firms there emerge strong supportive mutual advantages for all participants. That may sound like Adam Smith speaking but it isn't. It's the voice of nature. Mutualistic economizing occurs all the time: competitive alliances, coalitions, mergers, regional compacts to regulate trade, and international agreements to control transnational pollutants. These arrangements allow business to go forward by finding ways that are beneficial to many parties, and in that way they reveal their kinship with all kinds of biologically based mutualisms found widely throughout the organic world.

It is in such a nonlinear world of ecosystem dynamics that business is conducted, a realm where the shortest distance is frequently not the best route, clear goals blur as they are approached, carefully crafted strategies miss maddeningly elusive targets, yardsticks and benchmarks swell and shrink, and the future is but a phantom shadow of present experience. Faced with such nonlinearity, it is understandable why modern business minds have found so alluring the seeming stability of the precision, measurement, and predictability offered up by accountants, financial experts, economists, and computer analysts. But it will not be until they grasp that their businesses are irretrievably subsumed within unpredictable, unmeasurable, imprecise nonlinear ecosystem dynamics that they will be fully enabled to practice the business they seek and to promote the kind of business the world needs.

Many questions remain. Business practitioners will want to know what practical difference it makes to know that they are beholden to and perhaps even driven by natural forces. Are they thereby ensnared within a natural cage that provides no outlet for individual judgment, making them mere captive automatons responding passively and obediently to nature's demands and whims? Do business plans, strategies, initiatives undertaken, carefully crafted analyses, innovative organizational systems, clever marketing programs count for nothing? Has an indifferent nature programmed each firm's actions, set each manager and employee on a predetermined

course, and left the outcome to be decided by nature's own fickle, fluctuating, and sometimes ominous powers? More fundamentally, does nature rule the bottom line?

And what of human culture? Does it have a role? Is nature all, or is it only part of the story? Have we not learned that a corporation's culture is key to its success or failure? Have not many corporate mergers foundered on the shoals of incompatible cultures? Does culture regulate, moderate, and redirect nature's powers toward humanly sought ends?

Then there is the question of moral governance. Can nature's own governors—the moral safeguards offered by social exchange and reciprocal altruism—be trusted to do the job? Are the natural forces that drive business conduct powerful enough to overwhelm the moral, aesthetic, humanitarian dimensions favored by societies everywhere? More intriguingly and optimistically, can a governing and humane morality perhaps be found within nature itself?

These are the questions. Some of the answers are found in the next chapters of Part III, but let me say this now to business practitioners: Nature can be your powerful ally if you get to know its ways. Its grip on you and your firm is not unyielding or inescapable. Nature's realm is infinitely variable. It provides opportunities galore for those who value freedom of enterprise and individual initiative. Nature is the fount of productivity and innovation sought by every business firm. Tapping and releasing the vast store of organizational energy found within a company's employees, managers, and supportive stakeholders can be achieved only when mindful of people's natural proclivities to self-organize and self-direct. Business itself is one of nature's creations. If it is to find its way toward the goals of its directors and managers, if it is to fit successfully and effectively within its natural surroundings, and if it is to be both admired and sought as a valuable, indispensable feature of society, then practitioners must become as familiar with the natural forces that shape the firm as with the shape and form they seek to impart to it by their goal-seeking decisions.

And I add this note to business scholars, teachers, and researchers: You teach, study, and write of nature whether you know it or not. The behavior, the motives, the organizational systems, the strategies, the goals, the outcomes—all bear the mark of nature's processes, are indeed themselves nothing but nature speaking the language of business while insinuating its subtle influence deep within the business mind. Business is not merely *like* nature. Business *is* nature.