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The green invisible hand

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Abstract *The idea behind the invisible hand is that when market participants pursue their own self-interest constrained by sympathy for man and economic rivalry they satisfy the needs of others more effectually than if they intentionally tried to satisfy those needs. This pursuit of self-interest drives the marketplace towards generation of wealth, and it has undoubtedly led to many technical and societal marvels, but limitations are evident because the material wealth has partly been developed at the expense of the natural and social wealth. To improve this unfortunate situation we need to fundamentally reengineer commerce. Some ideas are discussed here – an important one is the concept of money because an environmental equivalent of money is needed to make the invisible hand “green”.*

Frame of reference

As shown in Emblemsvåg and Bras (1999), current environmental management and policy efforts concerning large-scale problems are not working properly because they do not provide comparable results and consistent decision support. This is a major problem several industry representatives have pointed out (see Jensen et al., 1997). Also, these approaches are politically driven and not by a market mechanism. Over time this may lead to environmental management becoming left-hand work because lacking comparability and consistency makes it impossible to manage environmental issues effectively[1]. Furthermore, lacking market-drive makes environmental management efforts inefficient[2]. We should not continue like this.

The approach advocated here is that we should learn from economics and cost management and rather reengineer some economic concepts instead of coming up with entirely new “environmental” concepts. Basically, environmental management should work according to Adam Smith’s invisible hand because that is the most effective and efficient approach, and to do that we need an environmental

The views presented in this paper are those of the author and do not necessarily represent Det Norske Veritas (DNV) Consulting in any fashion.

measure with the same properties as money – comparability, uniformity, generality, abstractness and consistency.

The discussion of these topics is organized as follows: in the following section the economic problem is discussed because that is the starting point for the entire economy. Then, in the third section the environmental problem is identified and discussed. In the fourth section, the monetary system is discussed because the concept behind money is crucial to understand to establish a sound environmental impact measure in my opinion. From the discussion so far it will be evident how important the lessons from economics are with respect to environmental management. This is discussed in the fifth section. Then, it is possible to discuss the invisible hand and how it can become “green”, which is done in the sixth section. Finally, in the road ahead section a possible first step on the road towards sustainability is discussed.

The economic problem

Economics can be defined as “the study of how scarce resources are allocated to satisfy alternative, competing human wants” (Wonnacott and Wonnacott, 1990). The purpose of economics is to solve the economic problem, which concerns how to allocate resources – to choose. It arises from the fact that:

- Our material wants are virtually unlimited.
- Economic resources are scarce.

The degree of choice in the market will greatly influence the allocation, and there are three economic doctrines that must be discussed for three distinct reasons concerning this paper:

- (1) The Classical doctrine – the role of the free market.
- (2) The Keynesian doctrine – the role of the government.
- (3) The Marxist doctrine – the effect of suspending the free market.

In the next three sections these doctrines are discussed.



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The classical doctrine

In 1776 Adam Smith published his classic book *An Inquiry into the Nature and Causes of the Wealth of Nations*, commonly referred to as *The Wealth of Nations*. He argued that; “It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest”. Furthermore, “by pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it”. This mechanism he termed the “invisible hand”. In fact, any order which arises spontaneously without intention or design can be regarded an instance of the invisible hand (Honderich, 1995). Consequently, Adam Smith generally argues against government interference in the operations of the private market and thereby promoted *laissez faire* – French for “leave it alone” – policy. Smith’s work has stood the test of time (Wonnacott and Wonnacott, 1990) although it has been modified.

It is important to recall that Adam Smith was very concerned about the moral issues relating to commerce – his contemporaries mostly saw him as a moral philosopher, and not as an economist. In *The Theory of Moral Sentiments* from 1759 he argues that self-love and sympathy, mediated by customs and institutions of civilized society, guide man to behave virtuously towards man (The Economist, 1999a). Therefore, Adam Smith is very considerate about commoners and he favors probably the marketplace mainly because the curbs it places on the mighty. The economic system is an institution of civilized society, and the quintessence of *The Wealth of Nations* is that self-interest and sympathy for man constrained by economic rivalry will lead to widespread prosperity.

Where the classical doctrine is prevalent the market can operate freely (within constraints) using capital resources. This is commonly referred to as capitalism. However, two important aspects of the invisible hand are dysfunctional today; economic rivalry, and sympathy for man. These aspects are discussed next.

Capitalism and economic rivalry

Many think of capitalism as the epiphany of economic rivalry, however, the fact is that the current capitalism is lacking significant economic rivalry. Examples include:

- *Protectionism reduces/prevents market access by, for example, imposing tariffs on trade. Thus, goods and services are not produced as effectively as possibly, yielding higher environmental impact and costs.*
- *Subsidies of raw materials, goods and services cause perverted usage of resources and often prevent poor countries from benefiting from their cost advantage. For example, the US government spends more on building logging roads than the US logging industry earns from timber sales (Roodman, 1994). Thus, not only does the US government lose money, but lower timber prices are also an indirect subsidy which in turn give higher*

consumption of timber. Similar situations are found all around the world concerning a huge variety of natural resources; annually the world spends at least \$650 billion – equivalent to 9 percent of all government revenues (Brown et al., 1999). In fact *The Economist* (2001) concludes after discussing US energy subsidies and taxes that “The extraordinary complexity of the various ‘taxes’ and ‘subsidies’ affecting the oil industry is revealing in itself – eloquent testimony to politicians’ desire to meddle, and to obscure the true cost of their meddling”.

- *Dumping is an attempt at gaining/protecting market shares and/or getting rid of overproduction, by selling goods and services with loss. Dumping is essentially a subsidy of the consumer, which also increases resource consumption.*

That economic rivalry is missing to some extent is a problem by itself; but the aforementioned practices also lead to major misallocation of resources that in turn yields unnecessary and possibly high impact on the environment and costs. Another problem is that lacking economic rivalry often protects the wealthy against the poor due to the mechanisms behind political and legislative processes (see Bradbrook, 1994). Thus, lack of economic rivalry is ultimately lack of sympathy for man.

Capitalism and the sympathy for man

The current capitalistic system has several unwanted aspects. I believe this waning sympathy for man is systemic and not intentional by design and that it is largely related to the most important invention (after money and central banking) to capitalism – “limited liability”. In fact *The Economist, 1999b* claims that *limited liability is a key to industrial capitalism as important for the Industrial Revolution as the contributions of Watt, Stephenson and other pioneers. The first law of limited liability was passed in the State of New York in 1811, and in 1854 Britain followed suit. This meant that shareholders were no longer personally responsible for what the company did; they only risked losing their capital and not being imprisoned and losing everything they owned, as before. This unlocked vast sums of money that was needed to finance the Industrial Revolution. A side effect was that the importance of knowing those who ran the company disappeared. Hence, shareholders could be passive and closeness to the other stakeholders was no longer needed. This distance is likely to increase due to globalization, and the negative effect of this distance is documented see (e.g. Gates, 1998).*

To counter this development, it is important for organizations to think in terms of stakeholders. A stakeholder is “any group or individual who can affect or is affected by the achievement of the organization’s objectives” (Freeman, 1984). This is a shift away from “economic man” whose goal is to maximize the wealth of the firm based on contractual

and financial duties to shareholders (Brenner and Cochran, 1991) to “socially responsible man” whose goal is to ethically maximize the wealth of the firm based on a variety of duties to stakeholders.

Social responsibility is not only the “right thing” to do, but also the most profitable in the long run. In fact Kotter and Heskett (1992) found that “firms with cultures that emphasized key managerial constituencies (customers, stockholders, and employees) and leadership from managers at all levels outperformed firms that did not have those cultural traits by a huge margin. Over an 11-year period, the former increased revenues by an average of 682 percent versus 116 percent, expanded workforce by 282 percent versus 36 percent, saw stock prices increase 901 percent versus 74 percent, and improved their net incomes by 756 percent versus 1 percent”. Thus, short-term financial considerations should become the exception – not the rule.

Nevertheless, despite the shortcomings of capitalism, capitalism seems to be the system in which resources are utilized most effectively and has therefore the best inherent remedies for the environmental problems.

The Keynesian doctrine

The Great Depression indicated major flaws of the *laissez faire* policy. *The General Theory of Employment, Interest and Money* or simply *General Theory* therefore came timely in 1936 where John Maynard Keynes argued that the government has the duty to intervene and put the unemployed back to work. Keynes’ main objective was to modify and improve the economic system (Wonnacott and Wonnacott, 1990).

A well known example of employing the ideas of Keynes is Roosevelt’s The National Industrial Recovery Act (New Deal) in 1933, but the intended effect was at best limited (see *The Economist*, 1999c). In fact, the US Supreme Court overturned the whole law in 1935 for being “unconstitutional”. In Scandinavia, Keynes’ ideas formed the basis for the policies of countering business cycles. However, it is clear that such practices have eroded competitiveness. It therefore appears that to politically and legislatively control and regulate the economy beyond a certain point is futile in the long run.

Another example is global warming where small countries such as Norway that ratified the Kyoto treaty are, despite ratification, incapable of meeting their commitments. In fact, Harbo (2000) reports that from 1990 to 1998 the Norwegian CO₂ emissions have increased by 19 percent while the Kyoto protocol only allows a 1 percent increase from 1990 to 2008-2012.

Clearly, it is crucial for our future that the invisible hand becomes green because only the self-interest of the market works effectively and efficiently enough. The role of government will be to implement legislation that constrains economic rivalry without directly interfering, such as the successful ban of CFC gasses.

The Marxist doctrine

Karl Heinrich Marx is probably the single most influential economist of all time. He devised a theory, presented in *Das Kapital (The Capital)* that became a cornerstone of both the former Soviet Union and China. Marxism derives from a thorough historic analysis that (correctly) showed that workers always were exploited. This exploitation was unjust because “labor is the sole source of value”, and only workers labored. Thus, the workers were the only ones entitled to the fruits of production. Since the capitalists did not accept this conclusion, the workers were to take their rightful place by revolution.

As time passes by, however, Marxist economies turn capitalistic. The reasons are virtually littered over rundown Russia – in a system where the individual is deprived of its chances to excel, nobody will eventually care and take responsibility. Marxism is therefore a socially irresponsible system, in my opinion. Ironically, Marx believed that Hegel’s process[3] of thesis- antithesis-synthesis would end with the Marxist system, but no economic system has probably undermined itself as swiftly as the Marxist system.

In terms of environmental issues, it is important to identify the lessons from the results of the Marxist doctrine. First, a command style approach towards sustainability is unwise. This does not mean that promoting legislation is unwise because even a free market needs constraints. What it does mean is that we must avoid rules and regulations that prohibit the ingenuity of the marketplace. For similar reasons, Scarlett (1998) warns that the way environmentalists and others eagerly tell people what is green and what is not, stalls innovation of new and better products because companies become more aware of what is “green” than what is “better”. The fact is that nobody knows what is green, i.e. has low environmental impact, because we have not agreed upon a generic, reliable and comparable framework for assessing environmental impact (see Emblemsvåg (1999) for a thorough discussion).

Second, central decision making brings aloofness, which erodes commitment and action. In the former Soviet Union, the workers were supposedly in power, but the truth was quite different. The central committee, the Polit Bureau, determined everything. In such systems nobody eventually cares because they cannot influence their own situation to any significant degree; they take orders and comply. Most organizations act almost like this when it comes to environmental issues: environmental management is reduced to complying to rules, regulations and standards to avoid bad publicity and possible sanctions.

Essentially, the two aforementioned points can be summarized into a single statement; we must aim for a market-driven approach towards sustainability. This is discussed further in section 6, but first we look at “the environmental problem” to understand what the objective of environmental management should be.

The environmental problem

The world trade is capitalistic. Hence, when reengineering commerce we must implicitly assume free markets with some governmental interventions. Hence, both the environmental problem and the economic problem is rooted in decision making – choosing. The choices derive from the fact that:

- Our material wants are virtually unlimited.
- Real resources are scarce.
- Waste is generated.

By comparing the three points above with the economic problem, we see that there are only two differences. First, while the economic problem is related to economic resources, the environmental problem is related to real resources. Hence, the difference is how resources are measured:

- In the economy, resources are measured as costs, which are represented by money. The economic problem is therefore closely linked to the monetary system, which is discussed later.
- In Nature, resources have no common measure, and as long as no agreed-upon, generic, comparable and reliable environmental impact measure exists (Emblemsvåg, 1999), environmental management will be ineffective and inefficient. Furthermore, because “what you measure is what you get” and performance measurement systems drive behavior (Brown, 1995), environmental issues are only attended sporadically.

Second, waste has a different role. Economically, waste is only interesting to the extent it costs, whereas in the environment waste is regarded as one of the main causes of environmental impact. Thus, to reengineer commerce towards sustainability, we need a generic resource measure that captures the state of the environment significantly better than money can. But as shown in the subsequent sections, this is not a sufficient condition for reengineering commerce.

Nonetheless, the economic and the environmental problem are quite similar. The economic problem is in principle handled by an economic and a monetary system. The former is discussed in section 2, while the latter is discussed next.

The monetary system

The main purpose of the monetary system is to ease transactions, as David Hume said: “Money . . . is not of the wheels of trade; it is the oil which renders the motion of the wheels smooth and easy”. In fact, this property of money is so advantageous that in lieu of official money, local “money” tends to emerge. We can find many examples of this throughout history, such as:

- In the early colony of Quebec playing cards were used as “money” (Wonnacott and Wonnacott, 1990).

- In the World War II Prisoner-Of-War (POW) camps cigarettes were used as “money” (Radford, 1945).

The POWs, however, faced two problems associated with their crude monetary system. First, the POWs realized that they could remove strands of tobacco before “spending it”. Over time this led to a distinction between “good” cigarettes, which were smoked, and “bad” cigarettes, which were used as “money”. This undermined the system as it opened up for debasing the cigarettes in various ways. Sir Tomas Gresham described such processes in Gresham’s Law, which popularly can be stated as “bad money drives out good”. One possible way of preventing this is that a piece of money has the same value no matter what – old or new, clean or dirty and so on. Second, the supply of money varied greatly, which caused price fluctuations and the like. Price stability was therefore not obtained, which violates an important economic goal.

In modern monetary systems such problems are overcome by using uniform money (a one dollar bill is worth one dollar regardless of appearance, smell, feel and so forth) and by controlling the supply of money, which is done by a central bank. This is possible because the society (the general public, commercial banks and the central bank) has agreed upon a certain monetary base.

Clearly, anything can be used as money provided it makes transactions easier than without the money. Thus, the measurement system we use is an important premise behind our economic system, because the monetary system rewards economically oriented behavior, and it is needed for economic transactions in the unforeseeable future.

Hence, the economic and monetary system has flaws that cannot be ignored, but there are valuable lessons.

Lessons from the monetary system and the economic system

The author believes that the lessons from the economic and the monetary system are indispensable for developing environmental management systems. The need for comparability and consistency is obvious:

- Without comparability managers cannot choose between various alternatives.
- Without consistency managers cannot trust the analyses.

These views are largely shared by industry representatives, e.g. Rolf Bretz of Ciba said; “comparability is indispensable; if we fail to achieve comparability and benchmarkability in the LCA field, we cannot expect LCA to survive for long in commercial world” (Jensen et al., 1997). Hence, consistency and comparability are crucial for industry and for environmental management. Here, the lessons from money are indispensable.

The lessons from money

“Money is what renders trade smooth and easy” we just learned, and what we seek is something that would render trade green as well. This “something” is called “Nature’s currency” in this paper. As shown, the economic and the environmental problems are similar – the main difference lies in resource measurement. Consequently, money has several indispensable characteristics that Nature’s currency needs, see Table I.

Abstractness is apparently difficult to comprehend or simply ignored in environmental management literature because it is fixed on actual environmental problems, see e.g. the discussion on impact categorization in ISO (1997). The problem with actual environmental problems – and impact categories – is that they are per definition incomparable. This is one of the reasons why ISO 14000 LCA cannot produce comparable results (see Emblemståg and Bras, 1999).

There is also a second dimension to consistency not mentioned in Table I concerning how economic and environmental dimensions can be treated consistently together. Such consistency is by itself a major reason for making Nature’s currency similar to money because it ensures trade-off/win-win opportunities between economic and environmental issues. Also, this similarity eases adaptation and usage of Nature’s currency and today’s cost management practices can be utilized directly. This is illustrated well by Emblemståg and Bras (2000) in which a comprehensive method for performing integrated activity-based cost- and environmental management is presented.

Standards like ISO 14000 would simply be obsolete. Standardization will then only concern a few parameters that determine Nature’s currency, however, this determination will not occur on practitioner level. It will take place on a similar role as a central bank; but instead of issuing money this “environmental central bank” will issue the numerical values

of the parameters that determine Nature’s currency. This, of course, is something ISO could and should work on.

The lessons from economics

The root of the economic system is what Adam Smith referred to as “the division of labor” or specialization, which arises from two key assumptions;

- (1) The division of labor is the key to producing more.
- (2) People desire to produce more in order to consume more.

These assumptions are undoubtedly valid both by argumentation and empirical evidence. Given these assumptions, the economic system with the invisible hand can be illustrated as in Figure 1. The degree and type of specialization depends on the comparative advantage of each individual; people roughly specialize according to what they

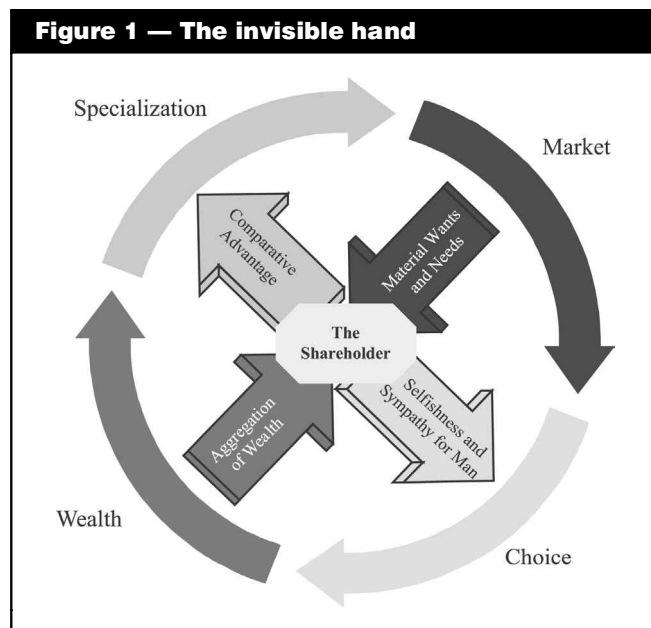


Table I — Characteristics of money versus Nature’s currency		
Characteristic	Money	Nature’s currency
Comparability	Money makes it possible to assess and compare any product, service and process with each other. This enables economically motivated decision making, e.g. choose the product with lowest cost	Industry demands comparability (Jensen et al., 1994) see to be able to assess and compare any product, service and process with each other and decide accordingly
Uniformity	Money is worth the same regardless of appearance, usage, for what purpose it was used and so forth	A unit of Nature’s currency must have the same interpretation and “value” regardless of what context it is used in, for what purpose it is used and so on
Generality	Money can be used to measure the economic value of any economic resource	Nature’s currency must measure the environmental impact of any product, service and process
Abstractness	Money is a measure of wealth but is not wealth in itself. This is important to ensure both supply and uniformity	Nature’s currency must measure environmental impact in relation to the environment without measuring the actual environmental problems
Consistency	The central bank issues money, which is worth the same regardless of what practitioners do	Nature’s currency must be logical and indisputable without allowing manipulations by practitioners

are best at. To satisfy our material wants and needs (a core aspect of the economic problem) we perform our specialized skills in a market. The skills may result in material or immaterial “products” that allow each individual to choose (the economic problem) according to their own liking and sympathy for man. Finally, we aggregate wealth according to our choices, the value of our skills in the market and our specialization. Our wealth can then be deployed in further specialization. Please note that the order of events (specialization – market – etc.) in Figure 1 is not fixed and depends on the individual, the marketplace, type of specialization and minor choices that are made continuously and so forth.

We see from Figure 1 that the individual is a “shareholder” to signify that the invisible hand works the best in capitalism as argued earlier. This is evident since capitalism gives the freest trade environment. It also provides the most economic resource-effective solutions, despite the aforementioned shortcomings. This occurs because we cannot satisfy ourselves without satisfying others. In other words, those that satisfy others with the most resources effectively will on average satisfy themselves the best. As mentioned earlier, the invisible hand is a very effective resource allocation mechanism, but it produces unwanted side-effects to both humans and Nature because many important factors are external to the economic system. The question is then; how can we internalize these externalities? That is discussed next.

How the invisible hand can become green

Evidently, the invisible hand must promote sustainable growth, but sustainable growth comes neither by itself nor from good intentions. Sustainable growth will only come if organizations and humans alike gain from it. There seems to be two options:

- (1) Economic incentives, laws and regulations and so forth can be introduced, but the overall framework remains the same. This is the current approach and is referred to as “business as usual”.
- (2) The overall framework can be changed by introducing new measurement systems and the associated legislation to establish Nature’s currency. For simplicity, this option, which is rarely discussed, is referred to as “reengineering business”.

In reality, both ways must be followed to become sustainable, but the point is, which is discussed next, that the current efforts are not sufficient. They will probably never lead to sustainability.

Business as usual

Most agree that the current state of affairs is unsustainable and that new ways of conducting business must be found. So far it seems that this means nothing but the same old command-style approaches, such as environmental taxes (e.g. the CO₂ tax on fuel in Norway), establishment of environmental agencies (e.g. the US Environmental

Protection Agency in 1972), international treaties on climate gases and so on. The objective of all these approaches is compliance. Luckily, there are initiatives that aim for more than compliance; as ABB’s Percy Barnevik says: “In spite of all the criticism industry receives, it is the strongest force these days in improving the environment” (Gupte, 1998). Hence, much of industry see the economic potential in leading the way towards sustainability, at least in the long run. In fact Brown et al. (1999) call the quest towards sustainability “the biggest investment opportunity in history”, but environmental management is at best left-hand work in most organizations. The reasons are many, such as:

- (1) Management is unaware of the great savings environmental management can yield. The Rocky Mountain Institute estimates that in the USA alone the annual potential savings from improved energy management are roughly \$300 billion (Lovins and Lovins, 1997).
- (2) Industry is becoming increasingly focused on short-term financial gains, often with damaging consequences for both the environment and the long-term economic performance of businesses. This problem is complex (see Gates, 1998), but one reason is that financial markets constantly push towards higher and higher gains. This is partly due to the increasing distance between stakeholders and decision makers, as discussed earlier.
- (3) Environmental management approaches are still in their infancy, impractical and “indecipherable to the non-expert” (Vigon, 1997).
- (4) There is no common baseline for benchmarking due to lacking comparability, which unfortunately means that we do not know what is better than the other and how we should prioritize. Ultimately, this will prevent us from making any real progress towards sustainability, and it will be the demise of environmental management if it continues.
- (5) There is no market thrust towards sustainability, i.e. there is no green invisible hand. There are several reasons for this, as discussed earlier in this paper, but in addition:
 - The political and legislative processes are subject to vested interests that can block any meaningful change (Bradbrook, 1994).
 - The policy and legislative processes prevent the introduction of new improved technologies. In the USA, for example Heaton Jr and Banks (1997) estimate that:
 - The legislative structure is at best unconcerned with, or at worst inimical to, technological innovation.
 - Various environmental problems have different legal and administrative regimes while companies often perceive environmental

problems as much more integrative than the law effectively allows.

- There is an implicit bias against new technology, e.g. in pollution control where there are stricter regulations for new pollution sources than for old.
- The regulatory decision process is slow and discontinuous so that standards quickly become obsolete in the face of continuing technical advance.

Of the five aforementioned points we see that the first is concerning general ignorance, which is the easiest to overcome because it is a matter of education. Also, as some companies start to generate savings and/or better customer relations, others will eventually follow suit.

Point 2 is purely financial. This poses a very serious challenge because shortsightedness is incompatible with environmental issues that have long time horizons. The answers are not easy to find, but in Gates (1998) there are some good ideas to start with.

The three last points are concerning performance measurement systems which are crucial because such systems determine behavior, and behavior determines what we do, which ultimately determines our future.

The Organization for Economic Cooperation and Development (OECD) (1998a) in fact endorses drastic cuts in material consumption to become sustainable – some as much as 90 percent compared to today. Thus, the goals are ambitious and taken seriously but the means are highly limited. In fact, OECD estimates that “under current market conditions and environmental policies, firms in industrial nations can make profitable reductions in materials (and energy) use of 10 percent – 40 percent” (OECD 1998b). When we take into account that energy demand, which is a good socio-economic indicator (Olsson, 1994), may double by 2020 (Holberton, 1997), we realize that we will most likely never become sustainable. Thus, it is time to find a comprehensive and systematic approach, or else we may face the truth of an old Chinese saying:

If we do not change our direction, we are likely to end up where we are going.

Nonetheless, a command-style approach with taxes, laws and regulations will still be important in becoming sustainable to “constrain economic rivalry”. But it is not enough; the green invisible hand must promote sustainable behavior the same way economic behavior is promoted by the invisible hand: We must reengineer business, which is discussed next.

Reengineering business

Since the policy and legislative processes are incapable of keeping up with technological changes (see Heaton Jr and Banks, 1997), governments should implement a market-oriented framework to ensure a market drive towards sustainability. A market is the aggregate effect of all the

individuals that freely interact according to the invisible hand, which can be referred to as “the power of one” (see section “The power of one”). An effective drive towards sustainability occurs if industry can do economically well by doing environmentally good, as discussed next.

Doing well by doing good

Behind “doing well by doing good” lies the urgent need for being economically viable while at the same time being sustainable, see e.g. the story of Interface, Inc. that aims towards becoming the first truly sustainable enterprise (Anderson, 1998). This is, however, just an instance of the invisible hand, but the significance is that it comes from industry (e.g. Interface, Inc.) and that it is a green invisible hand. The question is, of course, how can we accommodate industry so that selfishness and concern for our environment can complement each other effectively and efficiently?

“Doing well” is the ruling paradigm of measuring economic success and will remain so for the unforeseeable future. “Doing good”, however, is a new paradigm in measuring business success. Unfortunately, as argued earlier, no measures are available. Thus, not only do we need environmental impact measurement systems for the sake of environmental management per se, see section “Business as usual”, but also for measuring business success. In other words, to make the invisible hand green we must design a reliable, comparable and generic environmental impact measure with similar characteristics as money, see Table I.

The power of one

Deming once said that:

As we shall see, apparent differences between people arise almost entirely from the action of the system they work in, not from people themselves.

Translated freely to our topic; “apparent differences between systems arise almost entirely from the effect of the performance measurements system, not from the systems themselves”. Or; “capitalism produces potentially ugly long-term side-effects – which are non-economic at least in the short term – because the measurements systems are not designed to measure non-economic and non-monetary effects; not because capitalism is a bad concept in itself”. In fact, I believe capitalism is a prerequisite to sustainability:

- Capitalism yields probably the most resource effective market situation, as argued earlier. The most resource effective “market” on the planet, however, is Nature, where nothing is wasted. This should be our goal; zero waste in a wide sense. This is the ultimate goal of “socially responsible man”, and capitalism constrained by economic rivalry and sympathy for man is the only effective and efficient vehicle of delivery history has shown us.
- Capitalism is the most effective and efficient deployment of “the power of one”. “The power of one” is a simple notion regarding the fact that if we all do a little bit, the

aggregated effect is very substantial. This can be empirically indicated by the fact that capitalist economies are much larger than other economies.

Thus, capitalism is arguably the “best” economic system, but some changes must be made, as discussed next.

Practical implications – the three changes

The current capitalism is disconnected to Nature for reasons explained earlier. The environmental problem, however, takes the generation of waste into account and the resource definition is wider. Regarding earlier discussions, the invisible hand can become green if we manage to reengineer business according to Figure 2. Compared to Figure 1, we identify three changes in Figure 2 that are discussed in the subsequent sections.

■ *The first change – perspective. We see that specialization and making choices remain the same, in principle. Note, however, that because of the lacking sympathy for man in today’s capitalism the importance of true sympathy for man must be stressed, which ultimately supports economic rivalry and vice versa, see section “Capitalism and economic rivalry”. Furthermore, sympathy for man is ultimately sympathy for oneself. As Marcus Aurelius said (Meditations 6.54);*

What brings no benefit to the hive brings none to the bee.

Thus, the first change is a change of perspective, and it is a profound change to make that will only manifest itself when a sufficient number of us realize our interconnectedness, and that will most likely take some time.

■ *The second change – scope. Regarding the market, we see that the environment is included. This is a logical consequence of expanding the individual*

from being a shareholder to a stakeholder, see section “Capitalism and sympathy for man”, and from selfishness to selfishness constrained by true sympathy for man. Hence, whenever we try to satisfy our material wants and needs we should consider the stakeholders, and expand our horizon from short-term financial gains to long-term stakeholder considerations. The second change is consequently a change of scope.

This change is not as profound as the former. In fact, businesses can lead the way if they realize the great economic potential, see section “Capitalism and sympathy for man”.

■ *The third change – measures. Finally, we note that wealth is supplemented by waste in a wide sense (the negation). Basically, waste is anything that does not contribute towards satisfying our material wants and needs. This includes “trash”, emissions and so on. Here, we need to measure the environmental impact of waste just as money measures wealth. The reasons are many, as discussed earlier, but the most important is that without a reliable measure we cannot compare, without the ability to compare we cannot choose and without being able to choose we cannot solve the environmental problem. The third change is, in other words, a change of measures.*

How to accomplish this change is discussed thoroughly in Emblemsvåg and Bras (2000), but the quintessence of that discussion is that environmental management must relate to performance measures that can stand the test of time. That can probably only be achieved if the measures are simple, indisputable and relate to some very basic scientific concepts (see Emblemsvåg and Bras, 1999).

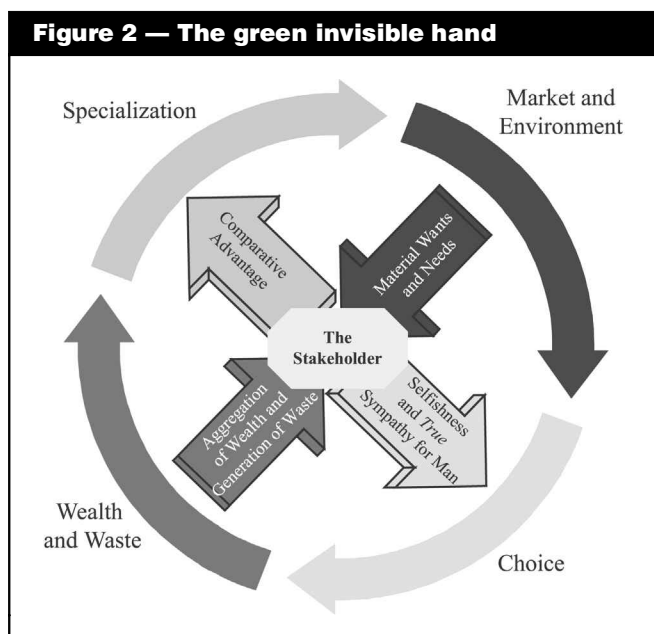
With the three aforementioned changes the invisible hand can truly become green. Maybe we in fact can become sustainable in the true meaning of the word, but it requires new ideas and revision of old ones. How to proceed is discussed next.

The road ahead

In the years to come, agreement upon the basics of environmental management must be reached. The author believes it is best to start with the third change because it is the easiest and because “measures drive performance”. That is, we must answer two simple questions[4]:

- (1) What are we to measure?
- (2) How are we to measure?

The answers to these questions should enable us to conduct environmental management along the lines of cost management using a consistent accounting system at the



bottom to ensure information flow of comparable numbers. Then, taxation systems could be shifted away from tax on labor to tax on waste and consumption. Thus, the whole economy could drive towards sustainability.

For this to occur, we need to start with the basics of the invisible hand and avoid the meddling and the political agendas around the world. The invisible hand is after all a powerful concept that Adam Smith gave us in the age of the Industrial Revolution. We now need a green invisible hand to fuel the next industrial revolution to save us from the undesirable results of the first industrial revolution. Then, the synthesis of a society where nothing is wasted can emerge.

Notes

- 1 Effectiveness is a measure of quality of a decision (correctness, completeness and comprehensiveness) (Mistree et al., 1990).
- 2 Efficiency is here understood as a measure of the swiftness with which information, that can be used to make decisions, is generated (Mistree et al., 1990).
- 3 Any system (thesis) will eventually undermine itself, cause its own destruction and thereby give place for an opposite system (antithesis). The antithesis will undergo a similar process and the new system will be the synthesis of the two preceding systems. Hegel believed that this is how history progresses. Marx was a firm believer in this process too, which is called Hegelian dialectic, see Honderich (1995) for more information.
- 4 Some may argue that this is what the Kyoto protocol is about, but it covers only CO₂ – I am talking about a generic measure, which is lacking today, that handles all emissions like the metric proposed in Emblemsvåg (1999) and Emblemsvåg and Bras (1999).

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