Dismantling Lock-ins and Tragedies of the Commons

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3 DISMANTLING LOCK-INS AND TRAGEDIES OF THE COMMONS

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Most of us are affected by "thought models" that lock us into mindsets and behaviors that create inertia for change. We may remain for long periods of time in this state without any need for significant changes. But the lock-in can become a threat to the individual, the organization or the society that is locked-in when the context in which one "operates" changes faster than one can unlock. The inertia to change inhibits sufficiently rapid adaptation. From an evolutionary perspective, such inhibitions can be life-threatening. Many examples can be given where individuals, companies and societies die off because of inabilities to adapt caused by lock-ins in mental models unsuitable for the contextual changes they experience (cf. Diamond, 2006).

This lock-in effect may be one important explanation for why society, despite our knowledge regarding human-caused environmental degradation, climate change and the extinction rate of other life forms, seems so reluctant to do something about it.

It may also be one important explanation for why companies seem reluctant to change their product offerings despite the insight that those who do – in directions that solve the environmental challenges in ways appreciated and valued by their customers – will experience "one of the biggest business opportunities in the history of commerce" (Hart and Milstein, 1999:25).

Lock-in can appear at all three system levels of society: the individual level, the organizational level and the societal level. Each of these three levels' lock-ins pose threats and opportunities for the entrepreneur.

This article tries to dismantle these lock-ins and the tragedies of the commons that seem to be consequences of these lock-ins. The focus is the entrepreneur and it is discussed how the threats can be addressed and opportunities exploited in ways that will benefit the entrepreneur's business.

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LOCK-INS

What is a lock-in? In short, one can say that it is "an act or instance of becoming unalterable, unmovable or rigid" or a "commitment, binding or restriction"[1]. The use of the QWERTY keyboard is an almost global illustration of a lock-in. The QWERTY keyboard layout was originally designed to slow down the writing speed of users, so as to prevent the mechanical parts in the first typewriters from jamming with each other. The widespread production, habitual use and expectation of this keyboard layout makes it almost impossible to change despite what, these days, is its obviously inferior layout. The lock-in develops inertia for change.

Mostly, we are affected by contemporary "thought models" that lock us in – fashions, standards, social status attributes, perceptions of society, contemporary things worth striving for and so forth. Lock-ins are not new. Mankind has believed that the Earth is flat, that the Earth is in the centre of the universe, and that the sun orbits around the Earth. It has not been trivial to change these beliefs and thought models. Some, like Galileo Galilei, even got arrested when claiming that these thought models were wrong[2]. Lock-ins may occur on the individual, the organizational, and the societal level in any age.

DEFINITIONS AND DELIMITATIONS

The following text in this chapter will elaborate on lock-ins and inertia to change, from an eco-environmental perspective and with the aim to build insights on how entrepreneurs can build eco-environmentally sustainable businesses and capitalize on eco-environmentally sustainable offerings. In order to pursue this aim, we need to understand some basic notions like *tragedy of the commons,* the notion of *good* and two dimensions of good, namely *private good* and *common good*. In addition, the notions of *externalization* and *internalization*, including their effects, must be explained.

[1] www.dictionary.com 2009-12-19 entering "lock-in"

[2] From http://en.wikipedia.org/wiki/Galileo_Galilei: Galileo's championing of Copernicanism was controversial within his lifetime, when a large majority of philosophers and astronomers still subscribed (at least outwardly) to the geocentric view that the Earth is at the centre of the universe. After 1610, when he began publicly supporting the heliocentric view, which placed the Sun at the center of the universe, he met with bitter opposition from some philosophers and clerics, and two of the latter eventually denounced him to the Roman Inquisition early in 1615. Although he was cleared of any offense at that time, the Catholic Church nevertheless condemned heliocentrism as "false and contrary to Scripture" in February 1616,[10] and Galileo was warned to abandon his support for it – which he promised to do. When he later defended his views in his most famous work, *Dialogue Concerning the Two Chief World Systems*, published in 1632, he was tried by the Inquisition, found "vehemently suspect of heresy," forced to recant, and spent the rest of his life under house arrest.

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TRAGEDY OF THE COMMONS

The tragedy of the commons (Hardin, 1968) is one element that contributes to understanding why consumers and industry, despite becoming aware that the current economic growth paradigm follows an unsustainable path, and despite having at least knowledge about mitigating technologies, seem reluctant to act and use it. Commons are shared "things" such as the seas, the air we breathe and initially also land. The simple logic behind the tragedy of the commons is that the whole benefit of using a common is personal while the consequence of overuse is shared among all users of that common. Hardin describes the result in his example of the herdsmen having private animals on a common pasture (Hardin, 1968:1244):

> Each man is locked into a system that compels him to increase his herd without limit—in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.

The tragedy thus is that in a collective, each individual tends to pursue his or her immediate best interest. When everyone does this, using a common, the consequence is ruin, which is not in everyone's best interest. The same principle is valid when using commons for disposal (Hardin 1968:1245):

> Here it is not a question of taking something out of the commons, but of putting something in—sewage, or chemical, radioactive, and heat wastes into water, noxious and dangerous fumes into the air, and distracting and unpleasant advertising signs into the line of sight. The calculations of utility are much the same as before. The rational man finds that his share of the cost of the wastes he discharges into the commons is less than the cost of purifying his wastes before releasing them. Since this is true for everyone, we are locked into a system of "fouling our own nest," so long as we behave only as independent, rational, free-enterprisers.

Hence, while the world we live in has commons and there are difficulties in legislating temperance, the tragedy of the commons plays an important role in explaining why awareness of a problem may be high without translating into behavioral changes. It is worth noting that the tragedy of the commons is applicable not only to individuals, but also to companies and countries. No single entity in these three categories can be expected to show sacrificing temperance in the use of a free global common as long as the consequences are shared.

Hardin's generalization has been challenged. One hypothesis about environmental impact from growing affluence is that in the initial phase of the development of an economy, economic growth is preferred over environmental improvements – while in later phases, as citizens become more affluent, they change preferences towards environmental improvements. Such simultaneity of technology progress and change of preferences is argued to reduce the environmental impact. This is referred to as the Environmental Kuznets Curve hypothesis. The hypothesis is based on the relative measure of pollution per capita income. Several types of pollution seem to follow this hypothesis, but it has not proved applicable to all, for instance to municipal waste and carbon dioxide emissions, either in absolute measures or on a per capita level (Azar et al., 2002). Although many countries show improvements in relative reductions of CO_2 from GDP, absolute reductions have been much more difficult to obtain. The hypothesis is thus not very useful in regard to the impact of CO_2 and other greenhouse gases on climate.

Jared Diamond (2006) has described isolated societies that collapsed due to overuse, but also some local societies with self-organized Social-Ecological Systems[3] (SES) which worked for centuries. One of the two 2009 Nobel Prize laureates in economics, Elinor Ostrom, has for decades researched under what conditions the users of certain resource systems may self-organize in order to sustain them over time. Here are some claims regarding Social-Ecological Systems:

- All humanly used resources are embedded in complex social-ecological systems (SES)
- SES are composed of multiple subsystems and internal variables within these systems at multiple levels analogous to organisms composed of organs, organs of tissues, tissues of cells, cells of proteins etc.
- SESs are therefore complex systems
- Thus, we must learn how to dissect and harness complexity

A FRAMEWORK FOR AVOIDING THE TRAGEDY

Ostrom uses Easter Island as an example of the importance of understanding the SES and its system dynamics. The resource system regenerated slowly on Easter Island while the population grew rapidly. Lack of understanding of the SES led to destruction of the resources (Ostrom, 2009). The Easter Island case is independently described also in *Collapse* (Diamond, 2006), and is a good illustration of how lock-ins actually may become life-threatening to the people locked in.

Ostrom suggests a general framework for analyzing sustainability of SES. She introduces a core subsystem, shown in Fig. 1 below (Ostrom 2009:420), from which she goes through a list of second-level variables that matter greatly as to whether a sustained SES may develop or not, such as (not the complete list):

- Size of the resource system
- Predictability of system dynamics
- Resource mobility (fish and water movements, possibly outside the resource system)
- Number of users
- Knowledge of the SES among users

[3] This is the notion used by Ostrom (2009) in Science, Vol. 325, 414-422.

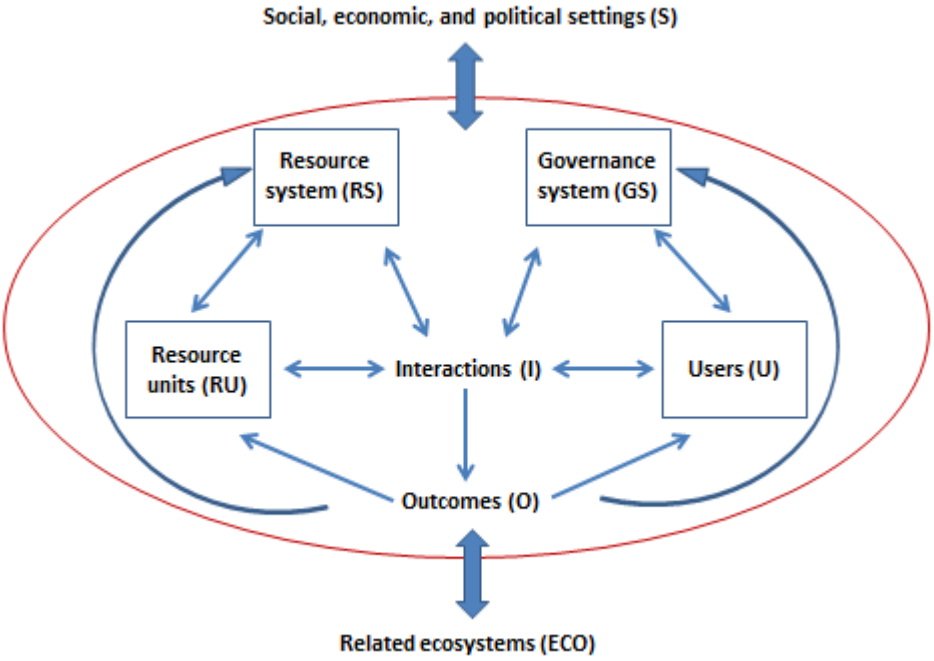

Figure 1. The core subsystems in a framework for analyzing social-ecological systems. Source: Ostrom (2009)

Creating a sustainable SES is not about not taking space in the ecosystem, which is inevitable. It is about not taking harmfully large amounts of space. The linear thinking and the notion of "efficiency" that come with our current paradigm do not seem to fit into a sustained ecosystem. Normally, we want to maximize the yield of something we want to "produce". To achieve that, we:

- remove everything else than what we want to grow = introducing a monoculture on that level
- kill everything that feeds on what we want to grow = introducing a monoculture on that higher level as well
- boost "productivity" with artificial fertilizer and irrigation, often an unsustainable way to produce
- expand geographically to meet "demand" = expanding the monoculture

Some effects:

- The extinction rate of species is about 100 times higher than pre-industrial level
- At the current rate, all rainforest will be gone before 2030
- A prediction is that it will take at least ten million years to restore – not meaning that extinct species will return, but that the diversity of species will be restored.

Conceptual thinking to avoid unsustainable business models was introduced with "The Natural Step" in the late 1980s, further refined by Holmberg et al. (cf. Holmberg, 1998). Three of the four principles relate to ecosustainability. Holmberg states (1998:33-34):

In order for a society to be sustainable, nature's functions and diversity must not be systematically:

1. *Subject to increasing concentrations of substances extracted from the earth's crust*
2. *Subject to increasing concentrations of substances produced by society*
3. *Impoverished by over-harvesting or other forms of ecosystem manipulation*

As seen, the linear thought model we currently use frequently clashes with these principles. The question is how to design a business model in line with the sustainability requirements yet producing "good" value as economically viable as an unsustainable business model.

THE NOTION "GOOD" AND PRODUCTS' "PRIVATE GOOD"

The notion of "good" or value is far from a pure and objective utility maximization. One aspect is a product's perceived value for the paying customer – its perceived "private good". An illustrative and not so distant example of what is meant comes from the energy and petrochemical conglomerate Shell[4]. In the year 2000, Shell launched low-sulfur petrol under the name Pura, for a price premium of € 0.45 per liter. The marketing message was that it was a more eco-benign fuel. Pura came to account for only a few percent of Shell's petrol sales. Despite the disappointing market results, Shell continued, now together with Ferrari, and managed to further reduce the sulfur content. It was then re-launched under the name V-Power, with the message that the fuel was good for the engine and actively cleaned the intake valves. V-Power rapidly reached over 20% share of the sales. Both messages were equally true, but one focused on the common good and the other on the private good of the product delivery, resulting in a substantial difference in customer appreciation and market share.

A product may have more social meaning than its pure utility function. A car is a means to getting transported from A to B, but is also associated today with status, lifestyle, comfort, and other additional meanings beyond its pure utility function (e.g. Ahuvia, 2005; Belk, 1988; Dobers and Strannegård, 2005; Wattanasuwan, 2005). The status part is, among other things, reflected in engine power and torque, which affects the car's energy use and efficiency. From a CO_2 emission perspective, the status dimension of the car is in conflict with its eco-environmental performance. In comparison, a higher energy consumption of a refrigerator is not necessarily associated with more status, but can rather be seen as evidence of inferior technology and hence as carrying a lower status value. Different types of products thus carry different environmental challenges from a market perspective.

Another aspect of products in society is their dependence on other products and services. The usefulness of a car is highly dependent on an infrastructure of fueling stations that can provide the fuel the car runs on. Similarly, a refrigerator is expected to fit the voltage of the wall socket. Over time, a substantial inertia to change may develop in these networks of interdependent

[4] http://www.duurzaam-ondernemen.nl/index.html?http://www.duurzaam-ondernemen.nl/detail_press.phtml?act_id=5743&username=gast@duurzaam-ondernemen.nl&password=9999&publish=Y&username=gast@duurzaam-ondernemen.nl&password=9999&groups=DUO (accessed 2006-03-08) based on an article in The Netherlands Het Financieele Dagblad 2004-12-01.

products and services. Using the car as an example, changing fuel from fossil petrol or diesel to a renewable fuel may be easy for the car manufacturer, inconvenient for the consumer and very costly for the fuel provider. In comparison, more stand-alone products, like clothes, may be easier to change because of their higher relative independence.

The magnitude of required eco-environmental improvements will inevitably affect the current consumer meaning of products. An important competence among companies that intend to choose the sustainable route will thus be to redefine the consumers' meaning of products in directions that allow significant eco-environmental improvements in ways consumers will appreciate and interpret as being superior to the "old" alternatives. Currently there are not many eco-environmental illustrations to provide, while the more general theory on radical innovations in product meaning is developing rapidly (c.f. Dell'Era et al., 2010; Verganti, 2008). Companies like Kartell, Luceplan, Alessi and Apple seem to have developed a competence to redefine the meaning of products in ways that help them create new markets or uncontested market segments.

Thus, consumers' willingness to pay for eco-environmental improvements depends on factors that change *and can be changed*, such as the product's role and meaning, the infrastructure it is part of, and the perceived delivered value. Some changes can be made and appreciated more easily than others. Consumers' willingness to pay for eco-environmental improvements is affected by the products' social meaning, by the products' fit to the broader infrastructure of products and services, and by the products' perceived value. These factors are not static but may change over time. Companies, NGOs, media and governments may affect them, both consciously and unconsciously. This means that various product typologies carry different "greening" challenges and that these challenges may be consciously changed.

"COMMON GOOD" AND ECO-ENVIRONMENTAL IMPROVEMENT

A reduced misuse, or reduced overuse of a common, can be expressed as either a greater common good or a lesser common bad. Eco-environmental issues are often about such misuse or overuse of various commons. CO_2 emission from combustion of fossil fuels is seen today as a common bad since it is an anthropogenic addition of CO_2 to the atmosphere that seems to cause unnatural and unwanted climate changes. Greening efforts that reduce the use of fossil fuels are seen as improving the common good or at least reducing the common bad. The notion of common good or common bad incorporates more than just eco-environmental issues, for instance traffic accidents and noise. Greening of industry is thus a subset of "common good".

Another reason for using the notion of common good instead of eco-environmental improvements is the established notion of "private good". The need for industry to focus on and improve the private good of its offerings in order to survive is more or less generally assimilated in the part of the world that runs market economies. When society's awareness about the negative consequences of consumption grows, this may affect the market rules for firms. A complementary "common good" dimension to the current market focus on private good may help organizations change their view of the market and find ways to innovate differently. In order for an organization to improve the common good of its product offerings, it must have

knowledge about the issue of common good, just as knowledge about the perceived good of private consumers is required to stay competitive in the marketplace of private goods.

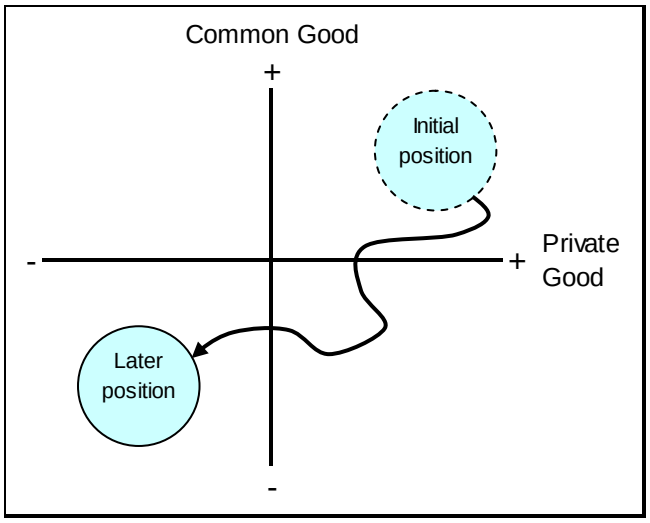

Figure 2. Illustration of competitiveness for a non-changing firm. Source: Author

The general competitive arena for product offerings is the right side of the vertical axis in the illustration above. Green innovations in general belong to the upper half of the above-depicted alternative market view. Successful green innovations belong to the upper right quadrant in that view. "Successful green innovations" are thus a subset of the more general "successful innovations" (the right half), while green innovations in general can also be uncompetitive (the upper left quadrant). The reason why a company's market proposition may move as in the illustration is that its competitive playground is not fixed and hence consumer preferences are not either. Henry Ford could not continue to sell "any color as long as it is black", and the industry producing CRT tubes for "fat TV" sets has seen their competitiveness vanish.

Since greening of industry is about improving commons while the tragedy of the commons is applicable, it seems appropriate to expect that more eco-benign product offerings also must provide personal value to the individual who pays, in order to become accepted, attractive and used. As has been described, this personal value can be added either within the current interpretation of product meaning or by innovating its meaning to something new.

EXTERNALIZING AND INTERNALIZING COSTS

In the second quote from Hardin (1968) he stated: "The rational man finds that his share of the cost of the wastes he discharges into the commons is less than the cost of purifying his wastes before releasing them." What is described here is a situation where one (the rational man) has something he no longer wants to have (waste). When the rational man chooses to discard his waste into the common, it means he is *externalizing* the cost. If (or when) society's concern over the waste results in legislation that forces the rational man to take care of his waste and purify it at his own expense, it means the cost is *internalized*. Externalize/internalize is thus to be seen as moving the responsibility and associated cost of something (in this case waste) outside/inside the entity (individual, organization, country) that produced the waste.

Examples of internalizations of waste from road vehicles are NOx, VOC, HC and CO released from the vehicles' engines during combustion[5,6]. These are now regulated by governments which from time to time revise the maximum allowed levels. The internalization has carried several cost types and required legislation in order to happen.

HOW LOCK-INS DEVELOP (THE KNOWLEDGE PERSPECTIVE)

One way to understand how lock-ins develop is by using a knowledge perspective. Knowledge can primarily be gained in two ways: through observations or through experiments. Entrepreneurs typically experiment with new market offers (private good) in the marketplace, while we mostly gain knowledge about eco-environmental issues (common bad) through observations. About 100 years ago an entrepreneur, Henry Ford, had a market success with a new technology – cars propelled by an internal combustion engine that runs on petrol.

When the market for automobiles started to grow, transport was an enabler of increased wealth through the expansion of markets for suppliers, products for consumers and the labor market for employers and employees. Personal mobility with the use of cars let people work and live at different locations. Leisure time became enriched. Relatives could easily meet. Since then, the average growth of the world motor vehicle population has been substantial. For more than fifty years, the annual average increase has been over 5% from about 50 million vehicles in 1946 to above 650 million in 1996 (Metz et al., 2001). Despite the historical growth, the future market for cars is estimated to be huge even if its relative position among the different mobility modes is believed to decline (Schafer and Victor, 2000). The private consumer, as well as society, has thus benefited from and enjoys increased mobility. And moreover, few want to be without it.

In the very beginning of the automotive era, there was an initial phase of competition between alternative technologies and the result was that the internal combustion engine (ICE) became preferred. Since then, the focus has been on developing and improving ICE-propelled cars (e.g. Hård and Jamison, 1997), resulting in technology development characterized by mainly

[5] http://en.wikipedia.org/wiki/European_emission_standards
[6] http://www.airqualitynow.eu/pollution_home.php

incremental innovations (e.g. Tushman and Anderson, 2004). The assumptions, concepts, values, and practices that follow, on the individual, the organizational and the institutional levels, form a paradigm – or a cultural pattern – within which, over time, these levels seem to have been trapped. The focus on ICE-propelled vehicles has taken place not only in industry but also in several other areas in society. A network of supporting services has developed and influenced, for instance, the educational system, the fuel infrastructure, service facilities, hotels, and so forth. Together these areas have formed a large technological system (e.g. Hughes, 1987) with considerable inertia to change. Consumers and society not only enjoy the benefits from cars but also become engaged in various forms in the development, production, homologation, distribution, sale, consumption, servicing, road infrastructure provision, fuel infrastructure provision, fuel supply, and end-of-life treatment of vehicles.

Society's knowledge about the negative externalities from consumption of auto-mobility was generally low when the industry emerged 100 years ago. Over the years, however, society has learnt about several negative externalities through observations. When, gradually, various effects of the accumulation of by-products from consumption of mobility became observable and consequences known, society, the business and the consumers came to realize that something must be done. Today, negative externalities from motor vehicles are a sincere global concern because of noise, accidents, congestion, toxic emissions, greenhouse gas emissions, hazardous waste and the like. The automotive industry has hitherto displayed difficulties in reducing or eliminating these negative externalities voluntarily. Alternative technologies are, like most existing technologies, often initially more expensive and less efficient and therefore may find it hard to successfully compete against the established ones (Kemp et al., 1998). Alternative technologies have to reasonably fit the established technological system to become accepted in the market (Hård and Jamison, 1997; Newton, 2002). Similarly, consumers in general show unwillingness to pay for improved environmental performance (Diekmann and Preisendörfer, 2003; Tyler et al., 1982). The situation is not necessarily an expression of bad morals, lack of knowledge or ignorance, but may to a greater extent be caused by inertia developed in the system over time that causes change to be perceived as tremendously difficult. Some suggest that governmental intervention is required to reduce these negative externalities (e.g. Norberg-Bohm, 1999; Porter and van der Linde, 1995), otherwise no change will occur. Others suggest that entrepreneurial abilities to "rethink" may be the way[7] to achieve the required transformative change.

ONE CAN GENERALIZE THE EVOLUTION OF THE LOCK-IN SITUATION FROM THE ABOVE CASE:

First, there is a *knowledge problem*. To improve a common good or reduce a common bad requires knowledge about what it is that is good or bad. Such knowledge is not always readily available. Society tends to learn about these issues through observations, which means that the knowledge of what is bad is not available until a sufficient amount of what is bad has been produced and has had time to create an effect that can be observed. The time required from the initial production

[7] http://www.ted.com/talks/johan_rockstrom_let_the_environment_guide_our_development.html viewed 2010-09-07

of a potential "bad" until observations have been made and discussed in the scientific community so that knowledge can be claimed on the issue is often substantial. The time between initial production of the "bad" and validated knowledge that the "bad" really is bad can be several decades. In the automotive example, the bad may be NOx, HC, CO, VOC or CO_2 just to mention some emissions.

Secondly, there is a *lock-in problem*. While society unconsciously awaits knowledge on the issue, the production of the "bad" continues. Since it is a by-product from production of appreciated goods for paying consumers (in the automotive example it is torque from the engine), investments are made, production is scaled up, technology is chosen and becomes dominant, competitors establish themselves, customer preferences are formed, the market grows and the product establishes its role in society. Technology and organizations mirror each other more and more on both meso- and macro-levels in society. This whole development tends to create lock-in effects.

Thirdly, the *tragedy of the commons has developed* among actors trapped in the paradigm. The continuous striving for each and every firm in industry to stay competitive or improve competitiveness is shown by a continuous effort to deliver improved good to the paying customer. Initially, the production of "bad" is an unconscious but interdependent by-product from the produced private good. The unconsciousness can, at least partly, be explained by the initial general lack of knowledge on the issue in society. The interdependence between the produced private good and produced common bad creates reluctance against any voluntary reduction of the "bad" once it has been identified as being bad. The reason for this reluctance is the interdependence between the now identified "bad" and the long-established delivery of private good. Since the "bad" is common (for instance externalized through the car's tailpipe) and the good is private and there is competition in the marketplace, the tragedy of the commons rules among the producers. Every firm will pursue its own best interest, which means that if there is any cost associated with reduction of the common bad, no one will voluntarily reduce it. The tragedy of the commons also applies to consumers. If a reduction of the "bad" can only be made at a cost for the paying consumer, each individual in the collective of consumers sees limited reasons to make voluntary personal sacrifices. It also applies to many countries. As the industry grow and becomes an important contributor to GDP growth, a country seldom wants to lose the business to less environmentally stringent countries, especially not if externalities are global like CO_2. Our understanding of why the reluctance to change is significant increases by applying the view that products are physical embodiments of the organization's knowledge, and that the "bad" and the "good" often are co-produced in the product's technology[8]. Changing knowledge in an established organization like Ford or GM (including historical investments they have made in factories etc. because of the knowledge profile developed during the second phase above) is not done easily or quickly[9].

[8] An example: torque (good) and CO_2 (bad) are "by definition" co-produced in an internal combustion engine if the fuel contains carbon.

[9] For more information on the highly interesting concept "absorptive capacity", suggested starting points are:
Cohen, W. M. and Levinthal, D. A. 1990. Absorptive Capacity: A New Perspective On Learning And Innovation. *Administrative Science Quarterly* **35**: 128.

Knowledge of how to reduce/remove the "bad" must then develop. Ostrom points out that we are dealing with complex systems where "ecological and social sciences have developed independently and do not combine easily" (Ostrom, 2009:419), i.e. the knowledge has not accumulated sufficiently regarding SES. Any alternative technology using resources and/or producing wastes of any kind may be the candidate for new, future eco-environmental problems if one does not ensure it is *truly* sustainable. Due to our limited understanding of SES's complex mesh of interrelations, it may be difficult to verify. One method to help develop more sustainable alternatives is Backcasting (Holmberg, 1998) which is described in Chapter 5. In the work to find solutions without any known "bad", important issues for the entrepreneur are what kind of knowledge and what combinations of knowledge will be required now and in the future, as well as whether the knowledge has to be within the organization or not – issues of accessibility and exclusivity of various types of knowledge. Grant suggests that the critical source of competitive advantage is access to knowledge and knowledge integration rather than knowledge itself (Grant, 1996).

LOCK-INS AT THE THREE SYSTEM LEVELS

There are primarily three levels where lock-in effects can be observed in the system comprising society. These levels are the individual (the micro-level), the organizational (the meso-level) and the societal (the macro-level). Up to now, the main illustration of a lock-in effect has been on the organizational level, i.e. the meso-level. Lock-ins on the individual level and on the societal level will now be illustrated.

MACRO-LEVEL LOCK IN

We will start with the macro-level, lock-in of the whole society:

One role of the government is to provide an unbiased market, preferably a "perfect market" i.e. a market where no single actor or set of actors is favored over others. A transaction between a buyer and a seller in a perfect market is supposed to involve only these two parties and ensure that any third party is unaffected. If any such side effect occurs, the government's role is to offset any such effect by using taxes or legislation – i.e. the market price for any merchandise is supposed to cover all its costs, both direct and indirect.

Let us take the tobacco market as an example. The collective of smokers needs more health care than average, because smoking negatively affects one's health. If tobacco is sold only at market price without any tax, third parties would be affected in terms of having to pay health-care tax also for the additional health care of smokers. The role of the government is therefore to put a

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Zahra, S. A. and George, G. 2002. Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management. The Academy of Management Review* **27**: 185.

Organizations also develop path-dependences that affect their inertia to change.

tax on tobacco that covers the required additional health care of smokers. Only when the market price includes all direct and indirect costs can consumers make correct choices. When it comes to smoking and tobacco, many countries in the world have now realized the need for taxes in order to keep the tobacco market unsubsidized.

In 1998 in the USA, the price for gasoline at the pump was about $1 per gallon. An estimate if all indirect costs (such as anthropogenic greenhouse gases) were included pointed at a price of somewhere between $5.60 and $15.14 per gallon[10]. The difference is externalized from the seller and the buyer of gasoline to society and to coming generations. Such a huge difference between the "true" price and the experienced price may lead consumers to travel more, use less public transport, choose bigger cars, and prioritize acceleration and torque over fuel economy. The market is biased and it becomes impossible to compete with car technologies that at a more correct price may have become market successes.

The release of anthropogenic greenhouse gases is now known to contribute to climate change in cost-increasing ways. Not least the Stern report[11] shows that the cost of reducing these gases is significantly lower than the cost of doing nothing[12]. The use of fossil fuels release anthropogenic CO_2, which is a greenhouse gas. Society knows about it but almost nothing is done. In a world where the "market economy" is almost universally preached, the market for fossil fuels is indirectly subsidized in most countries. The lock-in of society in a "thought model" where we do not consider this indirect subsidy becomes evident in newspaper headlines like "Wind Power: Subsidies Are Nice, But Strong Winds Are Nicer"[13]. As long as we continue to indirectly subsidize the fuel sources that alternatives compete with, it will be quite difficult to judge whether these alternatives can compete without subsidies or not.

Then why is society locked-in on fossil fuels but not on tobacco? Consider the tremendous dependence on fossil energy in all parts of society compared to tobacco. The issue is perceived as much more delicate and includes many and powerful actors with considerable self-interest in fossil energy.

A POTENTIAL DILEMMA WITH SUBSIDIES

A government normally tries to create subsidies that are "technology-neutral". However, from a pure knowledge perspective, a subsidy may affect entrepreneurs' and inventors' attention in certain directions. An illustration is the Swedish law that fuelling stations above a certain size must also offer at least one type of biofuel. Since a pump for biogas costs about ten times what a pump for ethanol costs, the effect is that ethanol is relatively easy to find for car drivers while

[10] http://www.icta.org/doc/Real%20Price%20of%20Gasoline.pdf
[11] http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm
[12] Relevant claims are found in the four pages in the section "Summary of conclusions". http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/media/3/2/Summary_of_Conclusions.pdf
[13] The Wall Street Journal blog March 2, 2009. http://blogs.wsj.com/environmentalcapital/2009/03/02/wind-power-subsidies-are-nice-but-strong-winds-are-nicer/

biogas is not, unintentionally biasing the market in favor of ethanol over biogas. An alternative, although perhaps not so popular, would be to avoid promoting what one may believe is the future (for instance, we don't know the potential of inventions not yet made) and instead to punish what is known to be the problem, for instance by introducing or increasing a specific tax for that substance.

A DISCUSSION ON A POSSIBLE SOLUTION OF THE MACRO-LEVEL LOCK IN

Most people do not like taxation because it reduces their disposable income. Can the indirectly subsidized market for fossil fuels be corrected without negatively affecting the disposable income of the collective of consumers? A NASA researcher, James Hansen, has suggested one solution to the dilemma, which he calls "carbon tax and 100% dividend"[14]. A carbon tax is put on the fossil source proportional to the carbon content. The tax income to the state is then paid out to all citizens on a per-capita basis. The effect will be that prices of all merchandise will better reflect the carbon content required for it to be produced and to reach the stores' shelves. The collective of consumers will retain its purchasing power since the total tax is paid out to them. A consumer with a high carbon footprint will, however, lose while one with a low carbon footprint will gain. Consumers will face more correct prices and the market will be less biased. Over time, consumption will most likely change to a lower carbon footprint because of the stronger relation between a product's price and the CO_2 emissions it causes.

A MICRO-LEVEL LOCK IN

Lock-in on the individual level (micro-level, consumer level) emerges from the "defining power" of established technologies in (1) symbolic, (2) organizational and (3) behavioral structures (Hård and Jamison, 1997). In order to be considered by consumers, alternatives to established technological paradigms need to become socially embedded in these structures (Hård and Jamison, 1997; Newton, 2002). In addition, they should not challenge too many of these structures simultaneously (Chen, 2001). "An alternative technology seldom succeeds if it poses an alternative at all three levels" (Hård and Jamison, 1997:148). The product performance in these three structures constitutes its value perceived by the consumer, i.e., what the consumer considers "private good". This is true within an existing paradigm.

There is also an asymmetry in consumers' perception of gains versus losses, such that the perceived punishment of losing is greater than the joy of winning an equal amount of value (Kahneman and Tversky, 1979). One example is "the observed discrepancies between the amount of money people are willing to pay for a good and the compensation they demand to give it up" (Tversky and Kahneman, 1986). Outcomes are perceived as gains and losses rather than as states of wealth, that is, gains and losses refer to some kind of reference point (Kahneman and Tversky, 1979). Product alternatives to established technological paradigms may

[14] http://www.columbia.edu/~jeh1/mailings/2008/20081229_Obama_revised.pdf page 5 and onwards.

suffer significantly even from relatively small product attribute deteriorations. The potential for the firm to get paid also depends on the consumer's possibility to find a reference for comparison (Sjöberg, 2005) – i.e. without a reference, the chance of getting paid increases.

There are several "parallel" theories on how to decrease the impact of a reference for comparison. Some address the issue by approaches aiming at breaking loose from the existing paradigm, i.e. to create an uncontested market space. One is the *blue ocean strategy* (Kim & Mauborgne, 2005) approach while another is the *design-driven innovation* approach (Verganti, 2008). Others worth mentioning on the same theme are Christensen (1997) and Hamel and Prahalad (1994). While the authors proceed from quite different theoretical frameworks, they converge around the theme of (radical) innovation of product meaning for consumers. New product meaning can be created by you and/or by your customers.

Knowledge of consumer behavior on common good issues and on the product's social meaning may thus be important for organizations that want to voluntarily and profitably go green.

A DISCUSSION ON A POSSIBLE SOLUTION OF THE MICRO-LEVEL LOCK-IN

Unlocking on the individual level is suggested to be done sequentially, i.e. not on all three levels simultaneously since it will challenge the perceived private value of the product too much.

Let us look at cars when illustrating the symbolic domain of a product's "value". A car has a very significant symbolic value. Chrome, leather, engine power, size, and even price are some car attributes that help the owner to shape his/her identity in society.

In the organizational structure there is, for instance, an infrastructure of fuelling stations for petrol and diesel and service stations with staff trained to repair and maintain cars with internal combustion engines.

Behavioral structures may contain expectations regarding load capacity, range on one tank of fuel, comfort, noise level, acceleration and so forth.

A more eco-benign car, possibly small in size, with a weak engine, running on a fuel not found at regular fuelling stations, may thus find it hard to successfully penetrate the market. Anyhow, this was a route first taken by at least two car manufacturers in their initial efforts to "go green" and they failed, not surprisingly (Williander, 2006). Here follows a brief excerpt from the comparison between two "green" offers – a methane-fuelled car vs. a hybrid car from that article:

> In the case of methane-fuelled vehicles, the consumer sees a range of cars where the bifuel or dedicated methane is an engine variant in a certain car model. The offer is hitherto based on the weakest engine, but at an additional cost of typically $4000 or more. The car will give the consumer either a range close to a traditional car, but then dedicated to only methane and possibly with reduced trunk space, or if a bifuel (means running on either of two fuels, methane or petrol) with a range roughly half of a traditional car for each of methane and petrol. After 23 years of methane-fuelled vehicle offers in the US, the infrastructure of stations providing methane fuel there is about 1600 unevenly distributed stations, where almost half of them are private, compared to more than 175 000 petrol stations. In Sweden one can find methane fuel stations unevenly spread in the southern part of the country.

In Sweden and the US, most stations providing methane fuel only provide methane and not petrol, so a bifuel car has to be refuelled at two different locations. In addition, the fuel price difference in Sweden may result in an economic payoff first after more than 10 years of ownership for a normal household. The residual value in Sweden and the US has been lower than for similar petrol vehicles.

The price addition in a hybrid car is in the same range as for a bifuel vehicle. The reduction in fuel consumption roughly translates into the same fuel cost savings as when driving on methane in Sweden and the US (October 2003). The Prius brand exists only for the hybrid, which means a Prius owner is a hybrid owner and the reference price is obscured. The Prius can be seen as a bundling of common and private good into a unique product where it is impossible for the consumer to separate the two. The product proposition does not challenge any of the symbolic, behavioural or organizational dimensions of the existing dominant technology. No alternative fuel is required, and range cannot only be equalled but also potentially improved due to the car's higher energy efficiency. A unique body style, high-tech interior features combined with the hybrid technology marketed as high-tech create a symbolic value. In various ways, the consumer is continuously reminded that Prius represents leading edge technology, fuel savings and eco-environmental performance combined.

The difference in consumer acceptance of these two types of product offer, where the price addition and fuel savings are about the same, becomes obvious. Ford officially confirmed on 30 January 2004, that they would stop offering methane-fuelled vehicles in the US after the current 2004 model year. Volvo continues to sell some thousand bifuel vehicles annually, mostly to fleet operators while consumers' growing interest in the Toyota Prius II, launched outside Japan in 2004, prompted Toyota to decide in August 2004 to increase production by 50%, and in March 2005, 'the popular Prius gas-electric hybrid mid-size sedan recorded its best-ever overall sales month with 10 236 units, an increase of 160.9% over March 2004' in the US (noted in 2005).

LOCK-IN ON THE MESO-LEVEL

Lock-in on the meso-level (i.e. among competitors) can be quite good for an unlocked entrepreneur. There are in fact several ways to "make competition irrelevant" (Kim and Mauborgne, 2005) by using a reconstructionist strategy that seeks to shape the environment (market) rather than a structuralist strategy that assumes the operating environment is given[15]. Innovations can be either competence-destroying or competence-enhancing for the established industry (Tushman and Anderson, 2004). By designing a "blue ocean" strategy, preferably based on competences not common among competition, small firms with limited resources may out-compete significantly larger and more resource-intensive firms, for the simple reason that competence is not easily changed.

[15] http://www.blueoceanstrategy.com/ . The reconstructionist view may create what is called a "blue ocean" indicating an uncontested market space. A structuralist view tends to stick to the current "red ocean" – the name suggesting that competition is "bloody".

A DISCUSSION ON OPPORTUNITIES FROM THE MESO-LEVEL LOCK IN

Apple is one example of a firm that has repeatedly succeeded with "blue ocean strategies" and radical change of product meaning. In the established market of MP3 players, when firms competed with battery life and storage size, Apple unexpectedly entered the market and launched its ultra-slim rechargeable iPod with a unique and intuitive user interface. Combined with iTunes in the computer, one could easily manage one's music as well as buying more on the net – something lined with hurdles at that time[16]. By challenging the symbolic structure of the established market with its unique design and the behavioral structure with its intuitive interface and iTunes, Apple reduced consumers' perceived importance of battery life and storage space, attributes closely connected to the competence profile of the established MP3 manufacturers, and increased the importance of attributes more closely connected to the competence profile of Apple. After some time, Apple decided to enter the mobile phone market and launched its iPhone. By providing a mobile phone with a unique user interface, in this case a touch screen with many features combined with smoothly integrated third-party applications, they managed once again to make competition irrelevant.

If one can repeat the exploit of Apple with more eco-benign products from a firm with sufficient knowledge on how to build its business from an eco-sustainable business model, it will create "one of the biggest business opportunities in the history of commerce" (Hart and Milstein, 1999:25) for that firm. Referring to the car industry, which even today mainly continues to sell "a dream" (in terms of a lonely car on a curvy road without speed limits), an open question is what alternative meanings can be created with the reality that most of us experience, while developing through those alternative meanings a better mobility experience for customers and simultaneously an uncontested market space and increased profitability for the firm.

The dream

Photo: Volvo Cars

Many people's reality

Photo: S. Alänge

16 Worth noting for entrepreneurs familiar with Geoffrey Moore's suggestions for how to "cross the chasm", this bundling of the iPod with iTunes made the offer more complete, which is precisely in line with Moore's suggestions on how to succeed with crossing. See Moore, G.A., 2002, Crossing the Chasm: Marketing and Selling Disruptive Products to Mainstream Customers. ISBN 9780060517120

With the above pictures in mind, could Ford and Volvo have developed and marketed their methane-based offerings in more successful ways than trying to compete on "The dream" battlefield? And where did the Toyota Prius fit in?

SUMMARY OF LOCK-IN:

In generalized terms, lock-in consists of three phases:

1) The "entrepreneurial" phase where focus is on the private good of a paying consumer and where some (consciously or unconsciously) unwanted by-products are externalized.
2) The growth phase where, under limited total knowledge, the private good is appreciated, the market and volume grow, investments are made and competition increases.
3) The "insights" phase where knowledge from complementary observations reveals unwanted consequences of the accumulated externalization of the co-produced by-products.

Lock-in can appear at all three system levels of society: the individual level, the organizational level and the societal level. Each of these three levels poses a threat and an opportunity for the entrepreneur. The question is:

WHAT CAN A SMALL ECO-ENVIRONMENTALLY INTERESTED ENTREPRENEUR DO?

As said, lock-in can appear at all three system levels and each of them poses a threat and an opportunity for the entrepreneur. The three phases of a lock-in also indicate that any business, *for instance your own*, may become locked-in if by-products are co-produced, externalized and later on shown to be a burden for society. So one question is: Is your own business model sustainable? To answer that question, you need to understand the SES you operate in. Ostrom suggests that SES are complex, so you probably do not have sufficient knowledge on your own. Many entrepreneurs ensure they have access to knowledge in economics, brand development, patents, trademarks and other IP-issues, law etc. for good reasons – knowledge is needed to run a successful business. However, most company boards or management teams hitherto lack knowledge on eco-environmental issues or lack access to the right knowledge[17].With reference to Grant (1996), one recommendation is to *develop a knowledge strategy and knowledge network*. With that in place, you may use for instance Backcasting and your network's SES knowledge to check your business model "health".

[17] A good illustration of this is found in Amodeo, R. A., 2005, "Becoming Sustainable: Identity Dynamics within Transformational Culture Change at Interface, Inc.", Organization Development, Benedictine University, Lisle, where she describes the story of Interface Inc. and its founder Ray Anderson on their path towards a more sustainable business model.

Is your market unbiased? Use your knowledge about lock-in situations and your knowledge network, and learn the conditions of your market. Is competition externalizing any costs? Can the accumulated cost be estimated? Is it a cost for contemporary society or coming generations? A recommendation is to learn your market from an eco-environmental point of view: *Identify any market biases and, on that basis, develop a debate plan and an SES initiation plan.* An encouraging conclusion from Axelrod and Cohen (2001) is that single actors may have disproportional effects in complex systems, for instance entrepreneurs like you. Hence, don't let the relative size of your business or "voice" discourage you regarding your chances to influence the market conditions. Make conditions work *for* you.

Some of the threats and opportunities for the eco-environmental entrepreneur from lock-ins of others may be listed as follows (see also the figure below):

Meso-level: Any inferior resource position an entrepreneur may experience against competition may be offset by a blue ocean strategy, possibly combined with a knowledge strategy based on Grant's suggestion that the critical source of competitive advantage is knowledge integration rather than knowledge itself. Given that the entrepreneur is not locked-in to the same mental "thought model" as the competition, the lock-in of competition is in fact a significant opportunity, especially if the lock-in has its roots in the competence profile of the firm since a change of competence profile carries a significant inertia.

Micro-level: Lock-ins of customers may constitute a threat and an opportunity. A significant problem may be the high cost of communicating with the market, as well as having sufficient knowledge and understanding of the symbolic, organizational and behavioral structures of the current market to develop a successful blue ocean of uncontested market space. Finding solutions to those issues (such as using "free of charge" social media and the like) may create significant opportunities, also for resource-weak companies when consumers starts unlocking at a speed higher than the competition can follow. Once again, a relevant knowledge strategy may help turn this into an opportunity.

Macro-level: A governmental lock-in that makes the market biased may be a considerable hindrance for the entrepreneur. A significant threat is often also the lobbying power of established business associations. One option is to actively engage in the contemporary public debate. It may often be relatively easy to get public attention when one's message is to speak for the improvement of the common good, pointing at how externalities from the established business create a common bad mainly to improve the private profit of that business. An important and potentially successful path for the entrepreneur is to take an active, if not leading, role in establishing a SES. This will be significantly easier if the entrepreneur has access to the required knowledge for suggesting SES criteria through a knowledge network with, for instance, academia.

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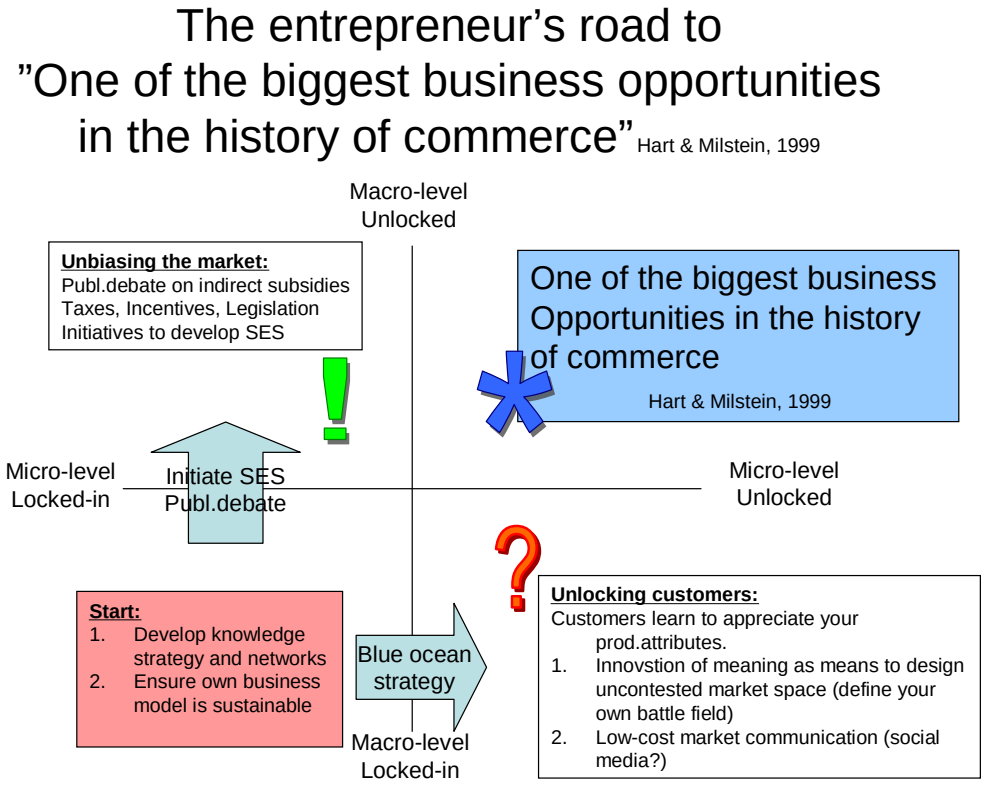

SOME FINAL REFLECTIONS

This chapter has had its focus on "greening of industry" – why it seems so difficult for some and what difficulties can be expected for those who decide to be among the first. The theories used have been developed by researchers not having eco-sustainability/"greening of industry" as a focus. Hence, the theories are more generally applicable than only to greening issues.

Greening may be seen as a subset of the more general issue of running a business without doing harm to any third party. The above theories and logics apply also to that more general topic. But in addition, the combining of the selected theories may help to guide any company that faces high competition, low profitability and low resources and hence needs to find a better business proposition and better conditions for that proposition.

If you take on the challenge of "going green", i.e. develop a sustainable business model for your firm, you will not only do good to society but in fact develop a competence and capability of how to be market-driving (instead of market-driven), which will ensure a lasting competitive advantage. So…go ahead!

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