Linking Sufficiency and Business: Utility Systems Engineering in Producer-Consumer Networks

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ABSTRACT

The challenges for Green Management originate from ecological risks induced by economic activities. It needs to address ecological, societal and economic conditions while focusing on the firm's value-creating operations. Sufficiency as strategy is argued to be the proper perspective in overcoming the overtly strong focus on increasing eco-efficency with technical means. Placing consumers and their user behavior of products at the center of inquiry, this contribution is arguing for the joint design of systems of want satisfaction between producers and consumers: collaborative utility systems engineering. Building on the empirical example of carsharing in the case of individual mobility, new insights from social systems theory dealing with societal and organizational change will provide a conceptual outline of how to engineer utility systems in a new form of joint collaboration: producer-consumer-networks.

Keywords: Sufficiency, Sustainability, Utility Systems

INTRODUCTION

"Business and industry, including transnational corporations, play a crucial role in the social and economic development of a country... Business and industry, including transnational corporations, should recognize environmental management as among the highest corporate priorities and as a key determinant to sustainable development." (Agenda 21, Chapter 30) The demand for sustainbility in the economy and its firms is a fact for both management theory and practice. However, there is no general accepted definition of what 'Green Management' exactly is. It surely is not just environmental or waste management. The concept of Corporate Social Responsibility (CSR) is taking this into account, yet it fails unto this day to deliver a coherent managerial framework beyond communication strategies. In this contribution we are proposing a radically different approach: focusing on less products, less material throughput by a change in the wider context of product use. This so-called sufficiency strategy towards sustainable development, at first, runs contradictory to existing techno-economic rationalities of 'more of the same'. However, we place this strategy within a business context aiming to ensure competitive advantage and a 'green rent' for nature, society and the firm. The means to achieve this is by joining producers and consumers in networks, which then become the organizational form for changing the view from product-orientation to utility-orientation.

GREEN MANAGEMENT STRATEGIES

The challenges for Green Management originate from ecological risks induced by economic activities. According to Mathis Wackernagel and others (1996) and the Ecological Footprint Network, humanities impact on the Earth's ecosystems is exceeding its carrying capacity by

about forty percent: “In 2008, humanity used about 40% more in one year than nature can regenerate that same year. That means it takes over a year and three months for the Earth to regenerate what humanity is using in one year. This problem – using resources faster than they can regenerate and creating waste faster than it can be absorbed – is called *ecological overshoot*.“ (Footprint Network, 2009) Climate change, depletion of natural resources, diminishing quality of ecosystems’ services are all symptoms of overshooting of ecological limits. Following this, Daly (1996) is arguing for a change in economic policy, from an “empty world” view, where resources are abundant and opportunity costs of economic expansion are insignificant, towards a “full world” view, where material production and consumption processes ecxeed natural limits (Daly, Farley, 2004). Ecology thus turns into the limiting factor which then needs to be “economized” i.e. taken into focus of policy and management decisions.

For as long as 1972, since the publication of *Limits to Growth* and its subsequent follow-ups (Meadows et al., 1972, 2004), the problems of economically induced ecological overshooting and the need for economic activities “beyond growth” are under discussion. In order to combine seemingly conflicting goals, the United Nations Conference on Environment and Development in 1992 proclaimed the concept of “sustainable development” as a guiding vision for integrating ecological, economic and social issues. This so-called tripple-bottom line (Worldbank, 1992) can be seen as an operationalization of the abstract notion of sustainable development which is held to be “development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of ‘needs’, in particular the *essential needs of the world’s poor*, to which overriding priority should be given; and the idea of *limitations imposed by the state of technology and social organization* on the environment's ability to

meet present and future needs." (WCED, 1987; emphasis added) The emphasis on limitations regarding technical solutions and social organization is framing the road to sustainability as a managerial issue.

What context does any kind of Green Management need to address under these circumstances? First, the ecological conditions can be described in terms of *substition* (quality of natural resources used) and *limitation* (quantity of natural resources used). Substition on the side of ecological sources like energy and raw material calls for switching to renewables, whereas waste and other byproducts of economic activities need to be assimilable for ecological sinks like air, water and soil. An example for the latter is the substition of products based on haloalkanes like chlorofluorocarbons – which cannot be assimilate by the Earth's athmosphere – with e.g. carbon dioxide – which can be assimilated by the Earth's athmosphere. This example, however, is directly pointing to the issue of quantitative limitation of resource use and pollutant releases: renewable sources can only be used within their natural growth rate, the so-called maximum sustainable yield (MSY), whereas the use of natural sinks needs to consider what is termed the carrying capacity of ecosystems, e.g. what emission rate of greenhouse gases can be assimilated by nature. Second, being part of the larger social system of society, Green Management has to take societal conditions into account. This is mainly because any economic activity lives on prerequisites it cannot supply itself with: it cannot supply itself with laws and a judicial system, or political institutions and public infrastructure, or education and potential employees, or families, friends and emotional stability, and so forth. Third, being after all also economical management, Green Management needs to address the issue of liquidity, the fundamental economic *sine qua non*: any economic organization hinges on its ability to discharge its liabilities at all times (Luhmann, 1988). Herein lies a certain tension and maybe a limitation for any Green Management. Following

Luhmann (1989) and his remarks about *Ecological Communication*, the economy and its organizations can only address ecological hazards if translated into the language of prices i.e. opportunities and threats to liquidity. Firms will react if they are able to turn this hazards into profit opportunities and/or new markets and especially if they realize higher prices and thus a positive economic rent. From a systems theory perspective on Green Management it is clearly visible that most of todays activities under the term *Corporate Social Responsibility* (CSR), which focus primarily on societal legitimacy of economic actions and the firm's "licence to operate", fail to address this point. The danger with CSR is that it fails to target the firm's crucial operations that lie at the heart of its business model. Porter and Kramer (2006) are arguing for a stronger connection of CSR activities to strategy, actually to define CSR from a strategic perspective and turn it into a basis for corporate competitive advantage. Green Management cannot be about legitimacy issues or Corporate Citizenship or a kind of green communication strategy – at least not exclusively and surely not primarily.

Green Management thus, as we understand it,

- is about taking into account the diverse and often conflicting conditions emanating from ecological risks induced by economic activities,
- placing them at the heart of the firm's business logic in order to exploit new profit opportunities and markets,
- by means of restating and restructuring their goals, missions, organizational structures and boundaries, business models and taking both its internal and external stakeholders along the road to becoming a *Green Organization*.

The first point implies taking responsibility for what a firm is doing, for its impacts on the natural and social environment. The second point emphasizes that this is done not by engaging in moral dialogue with or appeals to legitimacy from society but in doing what an

economic organization is thought to be doing: business. The third point broadens the view for the means of tackling this challenge and reintroduces what has been excluded by the second point: by opening and loosening its boundaries, by changing its goals and missions and by becoming aware of its stakeholders and their views on what Green Management is, the firm cannot avoid to accept non-economic rationalities as well. The reason for this is purely functional: without this acceptance and openness, without the knowledge of diverse and often conflicting stakeholders, the firm cannot properly *decide* what to do. This calls not for an abandonment of economic logic as pointed out before, but for ensuring what Luhmann terms *system rationality*: taking into account feedback from the impacts of the firm's economic actions in its natural and social environment (Luhmann, 1989). Interestingly, this systems theory position arrives at similar conclusion as more agency-oriented views from Giddens (1990) and Beck (1992) do. The advocated concept of system rationality and its means of opening up boundaries resembles a process of increasing reflexivity in society about how to deal with self-induced risks, especially through interaction of stakeholders from different backgrounds.

In order to implement Green Management, at least three strategic choices focusing on the firm's operations and their output, can be distinguished. According to Fritz et al. (1995) these choices are *efficiency*, *consistency* and *sufficiency*. Although targeting mainly ecological issues i.e. reducing the ecological footprint of the economic activities, all three strategies have implications for other aspects of sustainability as well. *Efficiency* as strategy is the most common option, appealing to a techno-economic rationality of "more (of the same) for less". An efficiency strategy for Green Management aims at improving the ratio of benefit and costs with technical means, e.g. developing new fuel-saving car engines or installing energy-efficient lighting in factories. Traditional innovation efforts in firms regarding sustainability

issues are of this kind, most often because such a strategy does not question the dominating rationality and is highly ‘connectable’ to existing production programmes and innovation routines (Luhmann, 1989). However, this strategy runs into serious limitations, the most serious being not technically induced, e.g. limits to efficiency increase due to thermodynamics, but economically. William Stanley Jevons, one of the founding fathers of neoclassical economics, discovered as early as 1865 that technological progress allowing for more efficient resource use, tends to increase its absolute consumption (Alcott, 2005). This so-called Jevons paradox, or rebound effect, occurs because an efficiency increase in resource use (e.g. less gallons per mile) has the same effect as a decrease in price for that resource, which will ceteris paribus lead to an increase in demand. Instead on relative efficiency, *consistency* as strategy focuses on absolute efficiency: a reduction of material throughput in the economy or “scale”, as Daly (1996) terms it. Consistency describes a strategy that is consistent with natural ecosystem cycles, adhering to the ecological conditions of Green Management i.e. substitution and limitation. Examples are eco-industrial parks, where waste products of one firm become input factors for another, or recycling-friendly designed products and cradle-to-cradle approaches (Sterr, 2002). This strategy still emphasizes technology as the main means to tackle Green Management issues, however takes ecology as a limiting factor more into account than an efficiency strategy. Additionally, a consistency strategy implies organizational changes due to redistribution systems for waste and other products as well as cooperations with other firms, especially from waste management industries. Limitations to consistency arise mainly from thermodynamics (recycling vs. downcycling) and difficulties in designing and marketing cradle-to-cradle products. Nokia for example is selling the 3110 ‘Evolve’, an eco-friendly, recyclable mobile phone. However, this phone does not meet the usual multimedia and mobile internet standards consumers are used to, and might need a different marketing strategy than other Nokia products. These problems

directly lead to the third strategic choice for Green Management: *sufficiency*. The addressee of a sufficiency strategy is the consumer of the firm's operational output, her consumption behavior and user patterns. The shortcomings of efficiency and consistency can partially be tackled when consumers are changing their behavior and show willingness to use (and pay for) eco-friendly products and services. There is no single definition for sufficiency, for some it is about consuming differently or more efficiently; for others it means consuming less (Bond, 2005). But in either view sufficiency is pointing into the direction of consumer learning and the becoming aware of consumption impacts on natural ecosystems. Following the argument from Beck and Giddens above, sufficiency can be seen as a means of increasing reflexivity on products and their use. This coincides with the trend of consumer awareness, that consumers are no longer indifferent to the circumstances products have been produced or to their ecological impacts (Kaufmann et al., 2008). Especially in consumption clusters like food and mobility, consumers have a substantial influence on the ecological footprint associated with their consumption choices (Lorek & Spangenberg, 2001). Some authors argue that behavioral and lifestyle changes may lead to greater improvements as regards ecological performance of products than only technological innovations (Dürrenberger & Patzel, 1999). Sufficiency alone is surely not a 'sufficient' strategy in itself; it needs efficient and consistent products as well. However, it is a necessary strategy: without sufficiency no efficiency and no consistency, and definitely no reduction of ecological risks induced by economic activities.

What still is missing is a coherent and integrated framework for combining production and consumption on the firm level under the heading of Green Management. The focus on product use appears to be a viable starting point.

PRODUCT USE AND UTILITY SYSTEMS

Influencing use patterns and consumption behavior is at the heart of any sufficiency-oriented strategy. The underlying theory adapted here is the cultural view of the firm as developed by Pfriem (FUGO, 2004). A simple model can illustrate the determining factors of product use and how these are connected to its ecological footprint.

Insert figure one

Ultimately, the choice what to consume is rooted in the underlying socio-cultural context; the political, historical, economical background of a society, its habits and aesthetic tastes as well as its implicit and explicit codes of 'proper' behaviour. Within this context, basic human needs, like security, freedom or community, are turned into (economic) wants. These wants, e.g. the need of freedom transformed into the want for mobility, are then selecting different available technologies for want satisfaction. Depending on the choice of technology, different ecological impacts arise, thus tying wants to specific ecological footprints. However, wants are rarely selecting technologies directly. The want for mobility might select a car, but a car is not a solitaire artifact. First of all, it needs a producer with a value chain, it needs development, production and marketing efforts, and it needs the proper infrastructure with roads, filling stations, and traffic laws. These architectures of want satisfaction can be termed "utility systems" and are mediating the selection of certain technologies. A utility system describes a certain practice of want satisfaction, translating these abstract wants into hard technologies, services and infrastructures (Paech, 2005). The human need for e.g. relaxation

can be satisfied by going for a walk in the local park or a recreation area close to home. It can also be satisfied by spending the weekend in, let's say London or Monte Carlo. Depending on the socio-cultural context and the availability of utility systems, different ways of realizing these wants are possible. Taking a walk or going to a nearby recreation are involves foot, bike or some sort of short distant transport (e.g. public transport). Going to London or Monte Carlo, for most of us, needs air travel infrastructure. Again, depending on these options certain products and technologies can be used which have different ecological impacts. Traditionally, the focus for improving green performance has been on the technological level (effciency strategy). However, while socio-cultural settings are hard to change in a deliberate way, especially for the single firm in the case of Green Management, utility systems appear to be the stage on which changes and innovations might occur easier and are more subject to management.

These abstract remarks on utility systems can be substantiated by the already mentioned example of the car. Moving beyond efficiency or consistency strategies of developing, producing and marketing ‘greener’ cars, a sufficiency-oriented Green Management would focus on product use and the design of its utility system. Carsharing is an alternative example of individual mobility, but with a ‘public’ car, where consumers have access rights to a fleet of, mostly eco-friendly, vehicles on an hourly basis. Carsharing was first introduced in Switzerland in 1987 and shortly thereafter in Germany. In North America, carpooling can be seen as its predecessor. However, in the distinct form of carsharing (where you do not own the car unlike carpooling) it arrived via Quebec City in 1993 (The Car Sharing Network, 2009). Characteristically, this new kind of utility system is based on membership within a carshare organization, be it a private association or a company. Once a member, you can reserve any car you like in advance not limited by office hours, usually via phone or the internet. Reservation,

pickup and return are self-service and demand high-consumer involvement. In contrast to car rental, vehicles can be rented by the hour as well as by the day (I-GO Car Sharing, 2009). Thus, carsharing is especially of interest to users who are not depending on owning a car, e.g. who can use public transportation services for commuting (Behrendt & Sahdari, 2000). Pricing systems predominantly consist of a monthly membership fee – depending how often the car is used –, and a mixture of hourly/daily as well as mileage-based fee. Insurance, cleaning, fuel costs and maintenance are included and handled by the carshare operator. Most operators bill their members monthly, providing itemized details of each trip, just like phone companies do (City CarShare, 2006). Besides providing cost-efficiency for users, carsharing can also help to reduce congestion and pollution. Carshare vehicles replace an average of four to eight cars on the road (bcs, 2008a). Moreover the fleet of most carshare operators consists of compact cars, which are newer, more fuel-efficient, and on average less motorized than private-owned cars. The utility system of carsharing does lead to fewer emissions (bcs, 2008b), and has the additional external benefit of allowing municipalities to use land for housing, commerce and parks, helping to reshape urban areas, instead of building parking lots and garages (City CarShare, 2006; bcs 2008a).

Successful carsharing has tended to be associated mainly with densely populated areas such as city centers and more recently universities and other campuses. As William Clay Ford Jr., Chairman of the Ford Motor Company stated: “If you live in a city, you don´t need to own a car” (Eartheasy, 2009). This is pointing to the ‘architectural view’ of carsharing as utility system: it does not only consist of cars and a service operator, but also of close connections to public transport as well as biking or walking, thus demanding the availability of suitable and comfortable alternatives (bcs, 2008a). Studies show that carshare users increase other means of transportation like walking, biking and public transport (I-GO Car Sharing, 2009; Loose et al. 2004). Moreover studies show that carsharing households do substitute their previously

owned car with carsharing (Cervero & Tsai 2003; bcs 2008a). For example, 29 percent of City CarShare members have sold at least one car, compared to 8 percent in a control group of non-members. Carsharing thus really is a sufficiency-oriented alternative that changes the utility system design of ‘individual mobility’.

Realizing a more sustainable society changing consumer behavior is essential (UNCED, 1992). But carsharing does not work everywhere or with the same success. Population density is one of the most important factors determining the viability of carsharing. In those areas fewer cars are owned, good public transportation system as well as local shops and services exist, and therefore the choice of living without a private-owned car is much easier taken. Also, in densely populated areas getting conveniently to a carshare vehicle is of much higher probability, as density provides a measure of the potential user base (City CarShare, 2006). Nevertheless, there are already some programs, mostly in Europe, for providing carsharing in lower density areas. Another critically mentioned fact is that most car sharing vehicles are compact cars with low motorization.

Now, probably the greatest fallacy in sufficiency-oriented utility systems engineering would be to concentrate solely on the instrumental value of a product. A more sustainable solution like carsharing will fail to reach the consumer if it does not supply a symbolic value, with appeal to emotion. In the field of mobile communication, Apple’s iPhone is a good example for that, for it does not only supplying its consumers with the instrumental value of being a multimedia communication device (this is also the case for e.g. the Palm Treo and probably even better); moreover the iPhone has a large symbolic value for its consumers, in this particular case probably being much higher than its instrumental value. Now, changing product use with different, more sustainable utility systems implies losing maybe not so much instrumental value but symbolic value. Replacing your own car with carsharing does not

reduce the instrumental value; both utility systems get you from one place to the other. However the symbolic value, which is heavily influenced by cultural settings and corporate marketing activities, might differ significantly. As it is often mentioned, cars are status symbols to which people have highly emotional connections to. Most people driving Audi, BMW, Mercedes or Porsche do not want to 'downgrade' symbolically to a carshare vehicle. In order to reach these consumers, premium cars would need to be included with carshare services (CarSharing World, 2008). But even if so, one of the biggest problems with traditional carsharing remains: the lack of making one-way journeys. Normally, carshare vehicles have to be returned after use to its pick-up position.

German-based Daimler AG may have solved this problem. In October 2008, the first pilot phase of the carsharing project 'car2go' was launched in Ulm, Germany. Car2go provides an answer to both increasing traffic densities and to problems of carsharing in the past. Smart *fortwo* vehicles can be rented anywhere and anytime all over the city. Based on the carsharing concept, users can rent a vehicle for as long as they like. The differences to traditional carsharing are significant. First of all, all users can rent cars without becoming a member and paying a membership fee. What is needed is an internet registration and a seal by the city council of Ulm on the driver´s license. After registering, users can select any car, either by reservation or on first-come-first-served basis, when in sight of a Smart vehicle with the car2go logo. The vehicles are most of the time available within just a few minutes walking distance in the inner city. At the end of the journey the rented smart is simply left on a parking space within the city zone, enabling one-way-trips within the area covered by the project. The use of the car is charged only on the basis of time not on distance. Therefore a minute-for-minute basis is used, likely as it is known from the mobile phones. For a longer use hourly or daily prices are also available (Daimler AG 2008a; Daimler AG 2008b). Whether or not this

concept will yield wider success has yet to be shown. Despite this open question, something else might be having a much greater impact on carsharing as a sufficiency-oriented strategy for Green Management. For the first time, an OEM takes over this concept, exploring new business models with which traditional product- and production-based views can be complemented and maybe even substituted (bcs 2008c).

As exciting as these remarks might sound, there appears something to be lacking: the consumer. Everything that has been said about them, e.g. carsharing users, and what ecological benefits arise from using a different utility system, is still going in a one-way direction. Consumers are starting to reflect about their behavior independently before and/or after they switch to a new utility system that has been built by someone else independently of them. However, empirical research in the case of mobility has shown that cooperation and collaboration between producers and consumers of mobility services, products and utility systems bears some highly significant benefits (Siebenhüner 2005; Siebenhüner et al., 2006). Initiatives explicitly addressing consumer needs and demands for convenience help to raise acceptance of new alternatives for satisfying these needs. In the case of developing complex solutions based on access and sharing, collaboration between producers and consumers provide important information for both and can assist in mastering the proper use. In the case of carsharing, the concept is still unknown to many potential users, least to say how to actually ‘use’ this ‘product’. Several concepts for building producer-consumer-collaboration are on the market, e.g. lead user method, customer-as-innovators approach (Thomke & von Hippel, 2002), visions for customers and back-casting (Young et al., 2001), to name but a few. From what has been said, it becomes clear that a change towards sustainable utility systems needs close interaction between producers and consumers. Both are benefiting from this in several ways. Information and knowledge exchange as well as acceptance on the side of the consumer

have already been named. Another crucial factor for the success of new and sustainable utility systems is security for both actor groups. Producers need security as regards their investments in product and service development as well as in supporting infrastructure; consumers need security as regards connectivity to existing lifestyles. Especially the last point is of great importance, because otherwise it will lead to the well known paradox that the majority of people claim to be concerned about environmental issues, although they remain deeply reluctant to make any changes in their everyday lives (DEFRA, 2002). Thus, the transformation to sustainable utility systems does not resemble a giant leap but a series of low-threshold steps producers and consumers can adapt to. All these remarks are pointing into the direction of what we term *collaborative utility systems engineering*. This forces the question what kind of organizational form and what kind of management would be necessary in order to be successful. The answers we are advocating are producer-consumer-networks

FROM INDUSTRIALIZATION TO THE NEXT SOCIETY

Our argument developed until here is, that successful Green Management has to build and organize producer-consumer interaction and collaboration for designing sustainable utility systems. This is the core function of Green Management in order to operationalize a sufficiency-oriented strategy. By engaging in producer-consumer-networks, the firm ensures what we termed system rationality: taking into account diverse feedback from the impacts of the firm's operations. This demands the ability of considering more than only techno-economic rationality aiming at efficiency increase through technical means. With an opening up of boundaries and connecting to the firm's stakeholders in producer-consumer-networks, it will be possible to manage, at the same time, strategies of efficiency, constistency and

sufficiency under multirational conditions. Without sufficiency no efficiency and consistency and only taken together, these strategies are really delivering what is necessary to reduce ecological risks induced by the firn's economic activities. However, until now most management efforts concentrate on efficiency for reasons outlined above. This is very vulnerable to economic shocks, where e.g. eco-efficiency quickly is replaced with other x-efficiencies, mostly cost-efficiency or work-efficiency. Before further exploiting the conditions for collaborative utility systems engineering in producer-consumer-networks, the question has to be addressed, why the current economic rationality and business models cannot overcome this 'efficiency-lock-in' by themselves.

Most of current business models and their organisational forms have their origin in a model of competition that focus on reducing costs on mass markets, cheap labor and automation (Jovane, Westkämper & Williams, 2009). Green issues are predominantly tackled – and thus avoided and not solved – by applying techno-economic rationality which in itself is an evolutionary accomplishment of industrialization. In the age of Industrialization three highly intertwined developments accelerated societal progress under the assumptions of economies of scale and technological progress.

The occurrence of *large-scale corporations* made it possible to organize decisions by replicating a 'sacred' order – of hierarchies like in medieval courts, the clergy or armies, with a clearly identifiable 'head' –, thus providing them with the ability to define and redefine purposes *independent* of other purposes in the rest of society. The difference to institutions in the Middle Ages is the strict linkage of organizational purposes to a single functional system of society like economics or politics (and not both). The firm has the economy as system of reference, which implies a primary focus on coping with scarcity (Luhmann, 1988). Drucker

(1964 [1946]) takes the organization of General Motors as prototype of the large corporation and outlines its main internal structure in accordance to societal "beliefs and promises" and its relationship between "corporate purposes and social function". The result can be narrowed down to the insight that the inner yardstick of every corporation is efficiency and profit under the conditions of societal accepted free-enterprise economy, providing the rest of society with affordable goods. The main problem that is solved by this form of organization and its guiding rationality is the harmonization of "the self-interest of the corporation […] with the interest of society in the corporation" (1964: p.25). With Taylor's *Scientific Management* it became possible to manage workers and machines in special accordance to each other: programming human bodies and machines via algorithms in order to jointly maximize efficiency of work processes (Taylor & Tompson, 1912). Today we know that the management system of monetary stimuli and hierarchical power had enormous effects on productivity in manufacturing. Taylorism's impact was the long-standing – and unrivaled – success of mass production and mass consumption. The present anatomy of industrial order was additionally enabled by an increase in mechanization and automation of production. The Fordian *assembly line* connected Taylorism with automated factories and further strengthened the stability techno-economic rationality.

The successful interplay of large-scale corporations, Taylorism and Fordism, engraved the pattern of techno-economic rationality in industrial organizatins for an entire century. Today however, we can observe a fundamental change within society that challenges the survival of large-scale cooperations and their business models of mass production. Again it was Drucker (2002: p.237) who captured the nature of this change: "Borderlessness, because knowledge travels even more effortlessly than money. Upward mobility, available to everyone through easily acquired formal education. The potential for failure as well as success. Anyone can

acquire the ‘means of production’, i.e., the knowledge required for the job […].” Following Drucker, the rise of new media of success (e.g. knowledge) and a different allocation of means of production can lead to new forms of doing business. Placing this in a wider view of societal evolution, the outlined change and its effects depend on the predomenant distribution media of communication (Baecker, 2007; Reichel & Scheiber, 2009). The arrival of computers and the internet, the turn from text to hypertext, introduces such a new distribution medium. Being a technical artifact, its character as a medium is founded on causal simplification: by algorithmization much more information can be stored, activated and disseminated than ever before. The range of communicative accessibility increases dramatically, while hypertext enables non-linear communication. Society is pressured to find new cultural forms in order to deal with the challenges imposed by this new medium. An increase in restlessness as regards goals and chosen means, bounded rationality and temporally formation (and disbandment) of social systems like virtual organizations or networks, might be viewed as some early ‘answers’ to this change. In fusing these thoughts with the more speculative parts of Niklas Luhmann’s (1996; 1998) social systems theory, Dirk Baecker (2007) is arguing for a new structuring principle of society that goes beyond differentiation into function systems like economy or politics. He is turning attention towards the implications of new communication media, especially the networked computer in its most visible form, the internet, and the excess possibilities of meaning production it provides. Typical first examples for this kind of ‘*Next Society*’ (Drucker 2002; Baecker 2007) are globally organized, de-central social movements which connect over electronic media and emerging electronic social networks. These new movements have significant impact on the economy, as the diffusion of the Linux computer operating system and the successes of Wikipedia have shown. The ‘*Next Organization*’ (Reichel, 2008) will have to adapt to these changes, and the only way it seems feasible is to deliberately blur its boundary and partially

hand over direct control of its management processes to the new society around it: “Dispersed physically but connected by technology, workers are now able, on a scale never before even imaginable, to make their own decisions using information gathered from many other people and places.” (Malone, 2004: p.4) The organizational structure which provides these requirements nowadays is the much cited network organization (Aderhold, Meyer & Wetzel, 2005). Networks started mostly as a form of intercorporational cooperation. But today they clearly show the possibility of organisational coupling between organised and non-organised social systems as a main difference from past forms. Especially the ‘*wikinomization*’ (Reichel, 2008) of business models can be seen as a “pre-adaptive advance” (Luhmann, 1998: p.512) to a new mindset of organisation. More often hierarchical corporations turn to self-organised business-webs, wherein a plurality of customers, members, suppliers, business partners and also competitors collectively create values without direct management control (Tapscott & Williams, 2006).

In bringing together all these changes and concepts with the ecological constraints and societal demands, a new organizational form for Green Management emerges. Scarce economic, societal and ecological resources and organizational decisions with large impacts in all three areas, like environmental pollution and climate change or violations against human rights in production, mark a new competitive landscape in which economic, societal and ecological competition increases dramatically. This arena, encompassing economic, technological, ecological and societal forces, is the birth place of what we termed producer-consumer-networks: a truly sustainable organizational form, a social system parting from the old view on formal organization with clear boundaries and purely economic goals, giving way to new collaborative networks and incorporating a whole variety of societal stakeholders. This could be seen as a severe danger to existing business models and traditional ways of

producing as well as consuming goods and services. However, this is not how entrepreneurs in the Schumpeterian sense will see it and it is surely not how the sustainable organization will see it. In order to exploit opportunities for sustainable business models in this threefold competition, this new organization will need to connect to and build on stakeholder networks, with a special focus on consumer and sufficiency issues. This is also placing more emphasis on the responsibility of the firm how its products and services are being used. Within these networks, producers and consumers can jointly learn how to sustainably design, produce and use products and services – up to the point where probably no design, no production and no use is the product itself (Paech, 2005). Integration of ecological and societal aspects into the traditional mode of production will transform the classical production system into an ecosystem in which both economic and non-economic rationalities need to be balanced.

BUILDING PRODUCER-CONSUMER-NETWORKS

Producer-Consumer-Networks as a concept is both new and old at the same time. We know producer-consumer-interaction since our ancestors started with barter trading. It maybe was one of the most important achievements of societal evolution to develop professionalized institutions of markets, in which goods and property rights can be exchanged. Since the advent of money as exchange intermediary it is possible to translate scarcity of property into scarcity of money and vice versa. Markets act as starting points for economic dynamics by forcing equilibrium and disequilibrium simultaneously as stable and unstable states of the economy. Beside market transactions along with market competition, another mechanism to coordinate exchange between producers and consumers has been developed. Within hierarchies it is possible to mange transactions by directive. Normally, hierarchies like the

large-scale company are not linked with the image of producer-consumer-network. However, transactions within them can be observed as dyadic relationships between someone who supplies a service for someone else. This view has been translated into the idea of the internal customer, yet it provides a valid image across many scales. Warnecke (1993) proposed producer-consumer-fractals as the building blocks of any kind of economic transaction, be it within hierarchies, networks or markets.

The concept of the network is a popular metaphor to describe certain ways of organizing communication in a social system. Networks can be observed as forms of communication between markets and hierarchies (Sydow, 1992). Important features are loosely coupled dyadic relations that rely on trust and reputation to follow their goals. Additionally, networks can be observed as 'parasitic', meaning that they operate in between organizations or markets, while at the same time depending on their functioning (Luhmann, 2000). With internet communication as a new distribution media, interaction within and across networks becomes much easier, because transaction costs decrease due to the innovation activities of hierarchies and markets. EBay, as an internet-based auction company, is one of the most typical examples for producer-consumer-networks enabled by internet technologies. The company itself can be seen as a host for the 'parsitic' network of numerous decentralized transactions of goods, performances and money: "The company uses the inexpensive worldwide communication infrastructure of the Internet to give millions of e-lance retailers the benefits of global scale in marketing and distribution without requiring them to give up freedom, personalization, and motivation of small-town store owners." (Malone, 2004: p.80). Both, the company and the network co-exist very successful.

Everyone who has the 'means of production' can easily join the network and can act as producer and consumer at the same time. The much cited *prosumer* (Toffler, 1980) or

produser may well be the biggest difference between producer-consumer networks and more traditional forms of transaction. An eBay manager describes the participative business model: „It is a process we follow every day. If there is a problem that we need to fix, we go through it together, creating these feedback loops that people can participate in before we ever hard-code anything in." (Malone, 2004: p.60) The phenomena of the prosumer is still not a fixed and well defined category. Especially the impacts on economy and society are still unclear. What we can expect, however, are incresead possibilities in providing more performance, services and goods which have been produced but insufficiently used, like e.g. private-own cars. But internet communication also contains the possibility to configure unused performance in large-scale networks. It is e.g. possible to share your local disk space on your computer with other users (see e.g. Wuala, http://wuala.com/de/storage). In returning to the car-sharing example, what if I can bring in my car into a carshare operator? The border of this organization then becomes unclear and empirically totally new forms of organizations like cooperatives, consortia or foundations can be found. This especially occurs wihin organizations dealing with information goods like software. The paradigm of "Wikinomics" (Tapscott & Williams, 2006), referring to non-hierarchical peer-production and openness towards new members as well as property rights, focuses on open and democratic networks that provide goods and services to their members, who are free to join and leave at any time. As bright and promising this new world might appaer, questions concerning the economically successful management of these networks are still unanswered: Who is the owner of the developed goods? Who is to blame if the product fails or leads to accidents? Are the workers paid a fair wage? Who decides? etc. Some remarks, however, might already be possible. Current research shows that new forms of organisation combine in their decision-structures media of success like money or power in a totally new way (Malone, 2004). Particularly power, money and reputation are processed along organizational democracies and organizational markets in

networks while their inefficiencies have to be dealt with by reputation and trust. In organisational democracy, binding decisions are made by voting and everyone has to accept the majority. In organizational markets, decisions are made by the mutual agreement of parties while everyone has to agree with decisions involving ones' actions. The incentive is to maximize individual profit: "The value of what you get minus the value of what you have to spend to get it." (Malone, 2004: p.105) Democracies and markets can fail. Reputation of members is used as a strong mean to avoid inefficiency and weakness of democracy and markets, and it maximizes the likelihood that every selection is acceptable. The democratization of business itself becomes possible because of the easily acquired means of production: "Today, in sharp contrast, user firms and increasingly even individual hobbyists have access to sophisticated design tools for fields ranging from software to electronics to musical composition. All these information-based tools can be run on a personal computer and are rapidly coming down in price. With relatively little training and practice, they enable users to design new products and services – and music and art – at a satisfyingly sophisticated level." (von Hippel, 2005: p.122) This already has become a reality, e.g. with the web-based innovation platform of BMW or ar as they call it "virtual innovation agency" (VIA, 2008).

For registered users, this platform acts as an interface between external innovation sources, namely the consumers, and BMW's own developers. Alexander Stern (Project Manager) explains the strategic view on this platform: "Today we cannot assume that all technical competences are available on such a high level only inside the organization. To search solutions and collaborations outside the organization is therefore an important step to be an innovation leader also in the future." (VIA, 2008) It seems that innovative organisations, which want to build producer-consumer-networks, have to adjust their structures to markets and democracies in networks as an answer to the impact of what the next society has to offer.

CONCLUSIONS

Very often the discussions on ecological dangers and the derivable ‘duties’ of Green Management start and – unfortunately – end either with moral-oriented declarations of agendas, or get only visible in efficiency oriented ‘number crunching’ that immediately stops when resources get cheap enough and substition technologies uneconomical. Morality, what is good and bad, is indeed much more about conflict than about ensuring change towards a sustainable development of society. On the other side the strict techno-economic rationality builds evolutionary cycles in which self-induced ecological problems are tried to be solved with ‘more of the same’. In this contribution, we argued for a different approach, linking the need for sustainability and Green Management with business beyond moral and purely economic reasoning. The starting point remains the avoidance of overshooting of natural limits and taking into account ecological risks induced by economic activities. The economy and its firms’, we further emphasized, need to develop sufficiency-oriented business models. Otherwise, innovation and new technologies, though more efficient and cradle-to-cradle eco-friendly, will fail to realize the ‘ecological rent’ of reducing material throughput onto a sustainable scale. These new business models demand a broadening of the view from product-centrism towards the entire user context: the utility system, comprised of technologies, products, services, infrastructure and, above all, an active consumer, which turns into a prosumer. Sufficiency then demands the full involvment of the consumer in producing her means of want satisfaction: collaborative utility systems engineering in producer-consumer-networks. Already existing empirical examples have been substantiated by new developments in systems and organizational theory. The concept of the Next Organization, with open boundaries and new ways of organizing performance in diverse and heterogeneous networks,

appears to be promising. Sufficiency-orientation implies a reduction in material throughput, thus less products. This implies an agenda for future management research:

How can *products* be built into the architecture of a utlity system, i.e. what kind of products need to be developed and how does this influence the firm's value chain (make-buy-connect)?

How can *consumers* be influenced in order to participate in collaborative utility systems engineering, i.e. how can they be integrated into the design process and how can they be brought to exchange ownership over things with ownership of utility?

Being a multirational approach, how can these producer-consumer-networks, in the light of open boundaries and heterarchies, be managed, i.e. *economically successful* be managed?

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Figure 1: Determining Factors of Product Use