The Environmental (Un)sustainability of the Base-of-the-Pyramid (BOP) Philosophy: A Governance Perspective

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Frank Wijen

Department of Strategic Management and Business Environment

Rotterdam School of Management, Erasmus University

P.O. Box 1738

3000 DR Rotterdam

The Netherlands

E-mail: fwijen@rsm.nl

Phone: 31- 10- 408 1985

Fax: 31- 10- 408 9013

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The Base- or Bottom-of-the-Pyramid (BOP) philosophy has rapidly gained currency in business, following seminal articles and books in the popular management literature (Prahalad and Hammond, 2002; Hart and Christensen, 2002; Prahalad, 2005; Hart, 2005). The thrust of the BOP philosophy is to achieve economic and social development to four billion persons with very low incomes through a practical business model that proposes decentralized, often small-scale production and consumption activities that are tailored to the needs of the poor. The BOP philosophy has appealed to many in the business (education) world (World Business Council for Sustainable Development, 2007; Aspen Institute, 2007; Economist, 2004). By contrast, the academic research community has clearly lagged behind. The rare publications in scholarly journals have focused on the economic and social dimensions of the BOP philosophy (Kandachar and Halme, 2007). While its viability and merits have been questioned (Karnani, 2007a, b; Landrum, 2007), the continued exploration of the socio-economic potential of the BOP business model, with a number of demonstrated 'success stories' (Prahalad, 2005; Center for Sustainable Global Enterprise, 2007), is definitely worthwhile – especially against the backdrop of the lack of success of alternative models (Sachs, 2005; Stiglitz, 2006).

Curiously, the academic debate has largely ignored the environmental dimension of the BOP phenomenon. Allusion has been made to the environmental opportunities and threats (Hart, 2005; Prahalad, 2005), but a systematic conceptual analysis of the environmental repercussions of widespread BOP-driven development has so far lacked in the academic literature (Kandachar and Halme, 2007). This is, however, a pertinent question since massive

BOP-framed economic activities would constitute a formidable challenge to the Earth's capacity to provide sufficient natural resources and absorb polluting substances. The objective of this essay is to fill this void by providing a theoretical argument of the compatibility of the BOP philosophy and environmental sustainability, with the latter referring to enabling long-term socio-economic development within the boundaries of the Earth's carrying capacity (World Commission on Environment and Development, 1987; Daly, 1990). In particular, I focus on the different governance options that have the potential to mediate the relation between economic development and environmental performance in the BOP context. Adopting a 'realist' – rather than a normative – perspective, my guiding question is whether different environmental governance instruments are likely to mediate massive BOP-driven economic development in such a way that it will be environmentally sustainable.

The essay is structured as follows. I start with an analysis of major environmental effects of economic activities (extraction of natural resources and pollution), tailored to the idiosyncracies of the BOP context (development problems, size, and economic geography). Next I discuss the possible instruments to govern the environmental challenges that ensue from BOP-driven development, split into market-driven mechanisms (market clearing, corporate innovation, and corporate social responsibility or CSR) and non-market options (government regulation, industry self-regulation, and civic action). I will finally summarize the main outcomes and draw some conclusions as to the environmental (un)sustainability of the BOP philosophy.

ENVIRONMENTAL CHALLENGES IN THE BOP CONTEXT

The environmental consequences of economic development in general, and the BOP context in particular, will be analyzed in the first part of this section. The second part will

address the environmental impact of two key characteristics of BOP markets: small scale and geographic dispersion.

Environmental Effects of Economic Activities in the BOP Context

The impact of economic activities on the natural environment encompasses a lot of aspects, including global climate change, more local pollution (of air, water, and land), biodiversity, the exploitation of depletable natural resources, biodiversity, and space use (United Nations Environment Programme, 2007). For reasons of analytical parsimony, and in line with Tietenberg (1988) and Meadows, Randers, and Meadows (2005), I confine myself to two major environmental dimensions: the extraction of natural resources and (local and global) pollution (Tietenberg, 1988).

Widespread application of the BOP business model is likely to lead to an *absolute* deterioration of the natural environment. Economic activities involve the use of energy, minerals, wood, space, etc. Companies and households also pollute the surrounding air, water, and land during production and consumption processes. This has led neo-Malthusian academics to predict that further economic expansion will lead to a collapse of natural ecosystems (Meadows, Meadows, Randers, and Behrens, 1972; Meadows et al., 2005; United Nations Environment Programme, 2007). Against the backdrop that 20% of the world population consumes about 80% of the world's natural resources (United Nations Development Programme, 1998), affluence for four billion poor citizens is likely to dramatically increase the pressure on the natural environment. The environmental pressure is likely to further exacerbate by the expected 2.6 billion person increase in developing countries over the next four decades (United Nations, 2005).

Next to sheer size, the nature of economic activities provides reason for concern. In their quest for survival, many BOP consumers focus on basic necessities such as securing

food and shelter (Banerjee and Duflo, 2007). Only when these 'lower needs' – in Maslowian terms – have been satisfied, will consumers pursue more 'luxury' goods such as environmental protection (Winsemius and Guntram, 2002). Even if producers and consumers in BOP countries were actively searching to satisfy environmental needs, widespread ignorance – a corollary of the lack of good (environmental) education – keeps them from taking well-informed decisions (Karnani, 2007b; Banerjee and Duflo, 2007). The difficulty to effectively govern the natural environment is further enhanced by the large size of the informal sector in BOP countries, rendering (environmental) regulation an arduous job (De Soto, 2000).

In sum, BOP-driven economic development within the confines of the Earth's carrying capacity constitutes a major challenge given the number of actors involved and the nature of their economic needs.

Environmental Impact of Size and Geography

While BOP advocates see a significant role for (cooperation with) large corporations, they advance especially small-scale economic activities as a way of accommodating the low purchasing power and working capital of poor consumers and entrepreneurs (Prahalad, 2005; Hart, 2005). Supplying products in small units (such as single-serve packages of washing powder and shared use of mobile phones) renders these products accessible to consumers who cannot afford the conventionally supplied products. BOP entrepreneurs, who typically cannot access regular financial markets, set up small businesses for which the modest capital requirements do not represent a major hurdle. Micro credits are the financial enablers of such small-scale consumption and production activities (Yunus, 2007). Smallness of scale is also related to the socio-geographic reality of many BOP markets. A large number of prospective consumers and producers live in remote rural areas, which brings about logistic difficulties

against the backdrop of large distances and an often poorly-developed infrastructure (Banerjee and Duflo, 2007). Furthermore, BOP actors face divergent atmospheric, geophysical, and socio-cultural conditions, making universal products manufactured at a large scale inappropriate. Decentralized products and processes tailored to the idiosyncratic needs of local actors are, therefore, an important element of the BOP philosophy (Hart, 2005; Prahalad, 2005).

Small-scale, decentralized activities involve three aspects with environmental consequences: scale (dis)economies, shared use of economic resources, and local orientation. Scale economies arise when large size of procurement, production, and marketing leads to lower (environmental) costs ('static economies') and when learning effects progressively reduce (environmental) costs ('dynamic economies'). The small scale of BOP activities leads to a number of static diseconomies (Karnani, 2007a), including environmental ones. The procurement of small quantities of inputs involves a larger number of logistic movements and a greater environmental load – more energy consumption, more air pollution – than the same overall quantity transported in larger batches. Production diseconomies exist because environmental equipment that makes sense for large-scale activities (for example, a large hotel purifying its effluent water) may not be affordable or cost-efficient for micro-scale activities (such as lodging in private backyards). Diseconomies in the field of marketing include inefficient packaging (many small units require more packing material than the same overall quantity of products sold in larger packaging), as well as more logistic movements. Dynamic diseconomies also exist, because small static scale leads, ceteris paribus, to a smaller number of cumulative units purchased, produced, and marketed per BOP (production) household and thus – in the absence of active information exchange between households – to more restricted learning opportunities for BOP households to improve upon their (environmental) performance (Argote, 1999). The scale diseconomies can, to a certain extent,

be overcome through bilateral alliances with large (multinational) organizations (Hart, 2005; Prahalad, 2005) and multilateral (local) networks of small firms (Rocha, 2004), although the transactional barriers to the realization of such collaborative platforms – in terms of partner selection and governance – are considerable.

Sharing economic resources with other small producers or consumers has a relatively beneficial environmental effect, because it prevents the multiplication of resources for a given level of economic activities (Von Weizsäcker, Lovins, and Lovins, 1997). For example, when farmers share a tractor or citizens use a joint cell phone, a smaller number of tractors and cell phones (with their concomitant natural-resource use and manufacturing-related pollution) is required than for individually owned artefacts, given a particular level of agricultural production and phone calls. Since resource sharing reduces the outlay per (financially constrained) user, and the joint purchase and exploitation of a private economic resource is relatively easy to organize among geographically and socially close actors (Coleman, 1988), it is a feasible option with definite environmental advantages.

Decentralization has a mixed environmental effect. Local markets that are self-reliant preclude the need to transport products over large distances, thus avoiding natural-resource depletion and pollution in relation to long-distance transport (Schumacher, 1973). In a globalized economy, many products cross the world throughout their value chain (say, a garment sold in Germany was manufactured in China on the basis of cotton grown in Mali and spun in India). The global nature of these transport activities involves a huge consumption of fossil fuels and concomitant (air) pollution. Locally self-reliant economies perform environmentally better in this respect. A negative environmental aspect is that the geographic dissemination of activities, especially in the field of manufacturing, will lead to the multiplication of the number of polluted areas. From an environmental viewpoint, it may be

preferable to have economic activities, especially highly polluting ones, concentrated at a few controlled places, rather than dispersed over numerous decentralized sites.

To recap, the environmental performance related to the small scale and decentralization of BOP activities is mixed. Shared resource use and the relatively restricted geographic action radius have a beneficial effect, while pollution dispersion, more limited environmental learning opportunities, as well as scale diseconomies related to a larger number of traffic movements, investment thresholds, and resource efficiency lead to poorer performance than similar activities at a larger scale. I now consider the prospects of different governance mechanisms in effectively mediating the relationships between economic activities and environmental performance in the BOP context.

ENVIRONMENTAL GOVERNANCE IN THE BOP CONTEXT

A variety of private and public options exist to govern the environment. Since BOP advocates highlight the importance of the market, I will start by analyzing market-driven governance mechanisms and then consider the feasibility of non-market instruments.

Market-Driven Environmental Solutions

In this section, I analyze the extent to and ways in which the market will safeguard environmental sustainability while spurring economic development. Three possible market solutions will be considered: market clearing, corporate innovation, and CSR.

Market clearing. Raw-material use and pollution impact the behaviour of economic actors in different ways (Tietenberg, 1988). Both effects involve externalities, since they lead to costs or benefits for others than those directly involved in the transaction that engenders the externality (Katz and Shapiro, 1985; Liebowitz and Margolis, 1994). The nature of these

externalities is, though, substantially different. Non-renewable natural resources are inelastic in nature, implying that their availability irreversibly falls upon exploitation. While renewable resources (such as rice plants) can be replenished after consumption, the decrease of a finite stock of non-renewable resources drives up the market price of the remaining resources of the same kind. This pecuniary externality induces customers of non-renewable natural resources to moderate their demand by using the focal resource more parsimoniously or by substituting the resource with alternatives that are less scarce. For example, the soaring oil price has recently fuelled the demand for more efficient car engines and has stimulated the installation of coal-fired power plants (Economist, 2007).

In the BOP context, consumers are very price sensitive owing to their low purchasing power. Therefore, they will strongly react to higher prices by procuring products that employ scarce natural resources to a lesser extent. Rising prices of highly demanded natural resources thus provide a market-clearing mechanism that prevents a natural resource from exhaustion (Tietenberg, 1988). One important exception are common pool resources: natural resources whose property rights are ill-defined or ill-enforceable and who have a 'natural' tendency to be overexploited because suppliers of those resources (such as ocean fish or fresh water) have an incentive to extract and market more of the remaining resources before other suppliers who can access the same (finite) common pool resources will do so and exhaust the entire stock (Kölliker, 2005). In the latter case, there is no market mechanism that prevents suppliers from unsustainable natural-resource extraction.

Residual substances emitted by companies during production or by customers during consumption constitute another type of externalities. Pollution is a non-pecuniary externality: the reduced well-being due to polluted air, water, and land is not automatically reflected in market prices (Tietenberg, 1988). While it may rewarding for producers and consumers to employ products and processes that are more efficient than their 'dirty' counterparts and thus

save money while preventing pollution (Hart, 2005), there is no systematic evidence that 'cleaner' practices will indeed pay off (Vogel, 2005). As a result, emitters of polluting substances do not have a 'natural' incentive to amend their behaviour and reduce pollution levels.

One important proviso to the shortfall of the market with respect to pollution abatement is that economic actors may show preferences for environmental protection and thus voluntarily exert a demand for 'cleaner' products and processes. The environmental Kuznets curve, which is the statistical observation that the pollution levels of countries initially rise but then fall when national incomes rise, embodies this idea by suggesting that developing countries will 'automatically' become 'cleaner' once they reach higher stages of economic development (Cole and Neumayer, 2005). The philosophy underlying the environmental Kuznets curve is that composition and technique effects prevail over scale effects at higher levels of economic development. While countries initially face the dominance of negative scale effects of increased production (with concomitantly rising pollution levels), they convert the composition of their production from pollution-intensive (especially heavy industry) to pollution-extensive (especially light industry and services) when their incomes rise. Furthermore, higher income levels provide the financial resources to invest in 'cleaner' production and consumption technologies. Once countries have thus met their basic needs, they will increasingly 'clean up' their economic activities. It may thus be argued that once BOP markets prosper, pollution levels will automatically fall. The environmental Kuznets curve has, however, been criticized, both on statistical grounds (Stern, Common, and Barbier, 1996; Ekins, 1997) and on conceptual grounds (Grossman and Krueger, 1995; Suri and Chapman, 1998). In particular, the idea of ceasing pollution-intensive activities is a pitfall, because the practice of shifting 'dirty' activities to lower-income countries and importing 'dirty' products back from those countries cannot be sustained if and when low-income

countries are to develop themselves to escape from the pollution trap. In other words, to where should dirty activities who remain in high demand (such as basic metals, chemicals, and paper and pulp) be reallocated if there are no longer prospective low-income countries (Cole and Neumayer, 2005)? Recent evidence (United Nations Environment Programme, 2007) suggests that 'dirty' productive activities in emerging economies have led to sharply increased global pollution levels.

In sum, the market for many natural resources is self-clearing because rising demand for natural resources will lead to higher prices that prevent those resources from exhaustion. By contrast, the market falls short when it comes to the extraction of common pool resources and the control of air, water, and land pollution. One possible escape route from massive pollution looks like a dead end because the practice of shifting dirty activities to low-income countries cannot be replicated when those markets start developing themselves.

Corporate innovation. Disruptive innovations are considered corner stones of effective BOP development. Prahalad (2005: 30, 33) states that "The BOP market opportunity cannot be satisfied by watered-down versions of traditional technology solutions from the developed markets. The BOP market can and must be addressed by the most advanced technologies (…) Solutions *must* be sustainable and ecologically friendly" (italics added). In a similar vein, Hart (2005: 69-70) argues that "Clean technology refers not to the incremental improvement associated with pollution prevention, but to innovations that leapfrog standard routines and knowledge. (…) Thus, rather than simply seeking to reduce the negative impacts of their operations, firms *can* strive to solve social and environmental problems through the internal development or acquisition of new capabilities that address the sustainability challenge directly" (italics added). These quotes illustrate that environmentally benign innovations have an important role to play in the BOP philosophy. At the same time, they show that the

environment is the BOP's soft underbelly because normative and discretionary qualifications such as 'must' and 'can' are by no means guarantees that BOP actors will actually come up with market-driven solutions that do not adversely affect the environment.

Innovations are the product of the drive and the capacity to come up with new combinations of products and processes (Fagerberg, 2005). Innovation is thus contingent on the motivation and the cognitive and material ability to realize new products and processes. As argued above, incentives for environmentally relevant behaviour differ per type of environmental effect. In the BOP context, there is a 'natural' incentive to come up with disruptive innovations that save natural resources, especially scarce ones, because poor people will prefer products that are inexpensive in purchasing price and use. Products that take few natural resources to be produced and consumed will, therefore, be preferred to alternatives that require more (scarce) natural resources. For example, inventive products on the basis of recycled raw materials, such as bags and shoes made from worn car tyres, can be readily observed on BOP markets. This drive to realize products and processes that are parsimonious of precious natural resources will be particularly large in the case of massive BOP development since large numbers of BOP actors will exert a demand for similar natural resources. The scarcity of energy and minerals as a result of the exponential growth of emerging economies such as China and India has already led to major price increases of these resources (Economist, 2008). This effect will only be exacerbated when other BOP markets will massively follow suit.

By contrast, the market does not provide 'natural' incentives to come up with innovations that do not pollute. BOP actors are likely to primarily care for their immediate basic needs, such as food, shelter, and health. While innovative products and processes do not necessarily involve pollution, they will first and foremost be geared towards meeting basic needs at a very low price, which is already a major challenge in itself, and not towards the

'luxury' of a healthy living environment. Furthermore, since pollution is an environmental effect that often does more harm to others than to the polluters themselves, BOP market actors are unlikely to pursue innovations that are pollution-extensive. For example, many of the annual 13 billion single-serve sachets sold that render shampoo and other amenities accessible to low-income Indian consumers abound as uncontrolled and uncollected litter after use (Prahalad, 2005).

Next to incentives, the cognitive, technical, and financial capacity of prospective innovators is of critical importance. While examples can be provided of new products and processes that are environmentally benign (Hart, 2005), it still needs to be demonstrated that economic actors are capable of creating products and processes with little adverse environmental impact for a full range of basic human needs. Innovations are only feasible to the extent that they are materially possible (i.e., they are not at odds with physical laws and draw on sufficiently available natural resources) and are within the cognitive reach of human actors (i.e., the technical possibilities are realized and correctly understood). Since we are largely ignorant about the possible technical and cognitive BOP-related repertoires, it is dangerous to indulge in unbridled optimism. While the proposed direction of natural-resource-poor and pollution-extensive innovations (Hart, 2005) is the right one, we should beware not to conflate real but uncaptured innovative opportunities and wishful thinking. In the face of immense uncertainty as to the feasibility of environmentally benign innovations, promising yet unrealized innovations should not be oversold. An example of past unjustified optimism is the 'green revolution' that never realized its promise to feed the hungry through innovative crops and cultivation methods (Drèze and Sen, 1991). Furthermore, the proposed environmentally benign innovations in areas such as biotechnology (Hart, 2005) are highly capital-intensive, placing them well outside the reach of most BOP entrepreneurs. The proposed solution of alliances with large multinational companies (Hart, 2005) may be viable,

but adds at least significant governance complexity to the realization of such innovative ventures.

To recap, technological innovations have an important potential role to play, which is more likely to materialize for parsimonious natural-resource exploitation than for pollution prevention and abatement. The contribution of corporate innovations to effective environmental governance should, therefore, be interpreted with caution.

Corporate social responsibility. While Prahalad (2005: 6) stresses that BOP markets "cannot merely be relegated to the realm of corporate social responsibility (CSR) initiatives", there might be good business reasons for companies to engage in CSR. Companies may voluntarily reduce their environmental impact to enhance the legitimacy of their societal stakeholders and attract customers seeking 'green' products (Holliday, Schmidheiny, and Watts, 2002). The empirical status of 'doing well by doing good' is contested: certain studies find a positive correlation between socio-environmental initiatives and financial performance, while others report inconclusive or mixed evidence (Margolis and Walsh, 2003). Vogel (2005) and Reich (2007) conclude that there is a weak empirical business case for Western companies to reduce their environmental load, except for specific cases where 'greening' also yields other benefits (such as increased health for consumers). In the BOP context, where care for the environment may be considered a 'luxury' against the backdrop of mere survival, the business incentives for corporate greening seem to be even weaker.

A few exceptions should be noted. There may be (niche) markets for 'environmentally responsible' goods and services for relatively affluent, environmentally sensitive (Western) customers (Esty and Winston, 2006). Furthermore, (Western) multinational companies that want to perform well with respect to CSR – for example, to meet the demands of their home-country stakeholders – may engage in environmentally benign activities (with local partners)

in BOP countries (London and Hart, 2004). The prospects of CSR-inspired greening activities thus seem modest, with the exception of activities for and with environmentally sensitive affluent actors.

In conclusion, market-based governance mechanisms provide a weak to high potential for effective governance, depending on the nature of the environmental issue. The market copes well with natural-resource scarcity (with the exception of common pool resources) but falls short when it comes to pollution prevention and abatement. Non-market governance solutions to the problems of pollution and the depletion of common pool resources will be explored in the next section.

Non-Market Environmental Governance

Government regulation, industry self-regulation, and civic action are possible instruments in the arena of non-market governance. I will now analyze these options at different levels: macro (government regulation), meso (self-regulation), and micro (civic action).

Government regulation. Government intervention can be an effective remedy to market failure in the environmental arena (Tietenberg, 1988). Ill-defined property rights, adverse incentives, and pervasive uncertainty are major causes of short-falling markets (Kölliker, 2005; Tietenberg, 1988). Governments can wield a variety of policy instruments, including regulation, subsidies, taxes, and standards (Jordan, Wurzel, and Zito, 2005). These instruments can be applied at the local or national level (Peters and Pierre, 2006; Moran, Rein, and Goodin, 2006) and the international or supranational level (Wijen, Zoeteman, and Pieters, 2005; Dauvergne, 2005). Governments of developing countries typically fall short in protecting the natural environment (Opschoor, 2005; Sachs, 2005). Lack of implementation

capacity, corruption, and under-prioritization are important culprits in accounting for the relatively powerless visible hand in the BOP context (Kaufmann, Kraay, and Mastruzzi, 2007). The prevalence of the informal sector further erodes government's power (De Soto, 2000). The consequences of failing government intervention can be readily observed, especially in newly industrialized countries. The poor air quality in many Chinese cities dramatically exemplifies government failure in the environmental arena (World Bank, 2007). As the factors thwarting effective public policy in BOP markets are likely to persist in the short to medium term, local or national government intervention is no safeguard for environmentally sustainable development.

In the international or supranational arena, the situation is somewhat different. Foreign governments of wealthy nation states may provide their less affluent counterparts with the financial and technical resources to implement policies to solve boundary-crossing environmental problems. The transfer of funds and know-how to developing countries in order to mitigate climate change, occurring within the framework of the Kyoto Protocol, is an example of potentially fruitful international collaboration (Wijen and Ansari, 2007). A related option is conditional financing by supranational bodies, in particular the 'Washington consensus' (i.e., the World Bank and the International Monetary Fund). These bodies may make the availability of loans and donations contingent on the environmental performance of the projects for which the financed projects have been earmarked. Reality teaches us, though, that the environmental performance of projects financed by the highly politicized Washington consensus has so far not been convincing (Stiglitz, 2006; Von Moltke, 2005).

International and supranational collaboration thus offers the potential for more effective government intervention in BOP markets, although this potential will only be realized if and when affluent foreign actors actually wield their economic and technical power to steer local and national BOP governments.

Self-regulation. If (local or national) governments fall short in effectively designing and implementing environmental regulation in BOP markets, companies may decide to collectively take the lead themselves and voluntarily assume sector-wide environmental measures. Indeed, self-regulation in Europe and North-America has become a common phenomenon that offers the potential of a significant reduction of an industry's environmental load, while granting companies the flexibility to take the measures that best fit with their idiosyncratic conditions (Delmas and Terlaak, 2001; Terlaak, 2007). The environmental effectiveness of environmental agreements has, though, been questioned since companies engage in self-regulation to pre-empt government regulation and confine their actions to highly visible 'greenwashing' initiatives to 'keep the watchdogs quiet' (Howard, Nash, and Ehrenfeld, 2000). Furthermore, self-regulation without sanctions leads to opportunistic behaviour and thus lacks effectiveness (King and Lenox, 2000; Lenox and Nash, 2003). Since the stick of government regulation is not a credible threat in the BOP context, it is thus unlikely that self-regulation will induce BOP firms to behave in an environmentally benign way.

Civic action. Civic action is another non-market governance option. Citizens concerned about environmental degradation may organize themselves and pressurize producers and consumers to engage in environmentally more benign behaviour. Indeed, the history of social movements shows that the determination of concerned citizens has brought about important social and environmental improvements (Lounsbury, 2002; Rao, Morrill, and Zald, 2000). At the same time, it should be acknowledged that collective action is hard to organize. Individuals may want to free-ride on the contributions of other citizens (Olson, 1965), wait for others to take the lead (Marwell and Oliver, 1993), and consider their own contribution

materially insignificant (Fireman and Gamson, 1979). A collective-action problem germane to the BOP context is that the struggle for survival induces many actors to prioritize environmental protection less highly than actions that serve their direct material needs. The threat of collective inertia can, though, be overcome when stakes are high and interests are interrelated (Gray, 1999). Environmental problems that are perceived to severely harm the health of local citizens – in particular, observable and annoying pollution – are the most likely candidates for collective action. For example, a major reason of why the Ogoni community in Nigeria revolted against Shell was the perceived pollution of the Niger delta during oil extraction – a collective action that induced Shell to temporarily cease its Nigerian activities (Economist, 2000).

Next to local collective action, international or supranational civic initiatives may seek to influence the environmentally relevant behaviour of BOP actors. The number and influence of non-governmental organizations (NGOs) in Western countries aiming at worldwide environmental protection have rapidly risen over the past decades (Edwards, 2004; Van Tulder and Van der Zwart, 2006). These NGOs, such as Greenpeace and Friends of the Earth, expose the perceived environmental abuses of companies around the world, including those in BOP markets. Many companies, especially Western multinational enterprises selling branded consumer products, have been sensitive to NGO actions and have increasingly eschewed activities that have a visibly adverse effect on the environment (Spar and La Mure, 2003). International and supranational NGOs may thus significantly contribute to environmentally more sustainable business practices in BOP markets, although many actors – especially small, 'business-to-business', and non-Western companies – will largely remain outside the scope of such NGOs because their business activities will not be harmed by negative publicity or other civic actions.

The prospects for effective civic governance in the environmental BOP arena thus leave a moderate to fair potential for collective action, especially by international or supranational NGOs in specific sectors. To recap, the viability of local or national non-market instruments (especially governmental regulation and industry self-regulation) is low, while international or supranational non-market options (government regulation and civic action) are relatively feasible. Having identified the different pieces of the environmental governance puzzle, I will draw the 'bigger picture' in the final section.

SUMMARY AND CONCLUSION

The objective of this essay was to analyze the environmental governability of BOP-driven economic development. I focused on two major environmental dimensions (natural resource use and pollution) and argued that BOP-driven development will bring about important environmental challenges. I then analyzed the extent to which market mechanisms (market clearing, corporate innovation, and CSR) and a variety of other governance options (government regulation, industry self-regulation, and civic action) can be expected to function as effective safeguards for environmental sustainability.

Insert Table 1 about here

Table 1 summarizes the main outcomes of this study. It shows that massive BOP-driven development would engender a differentiated environmental impact. While the natural environment would deteriorate in an absolute sense (in terms of increased natural-resource extraction and higher pollution levels), not all environmental effects are necessarily unsustainable – in the sense that widespread economic development based on the BOP philosophy cannot be sustained by the Earth's carrying capacity. Highly demanded resources

will be substituted by more readily available alternatives and be used more parsimoniously through product and process innovations. A notable exception are common pool resources, for which few governance mechanisms can effectively halt the inherent tendency towards overexploitation. Pollution is another environmental problem that is hard to address in the BOP context, both because of market disincentives and the modest feasibility of other governance options.

The overall environmental impact will depend on the actual magnitude of the numerous, interrelated factors that determine BOP-driven development, including the number of BOP actors involved, the level of productive and consumptive activities these actors will develop, the average size of BOP companies, the extent of geographic concentration (especially of highly polluting activities), the frequency and length of transport movements, the nature of consumer preferences in BOP countries and export markets, the choice of (innovative) production technologies, the profitability of CSR activities, the power of NGOs and other civic watchdogs, and the influence of international and supranational authorities. The question of whether the BOP philosophy is compatible with environmental sustainability thus cannot be firmly answered upfront, since it is contingent on the empirical magnitudes of the above factors. Based on the above conceptual analysis of the key factors and their interrelations, I conclude that international collective action (supranational regulation, international civic action) is probably the most feasible governance mode to address the many negative environmental effects that are not absorbed by market forces, although these effects are particularly hard to address in the BOP context. A prerequisite for effective international collective action is that prosperous and well-organized members of the world community not only take the lead to addressing environmental problems in BOP countries but also show a firm commitment to actual solutions by providing significant financial, technical, and managerial resources. Linking environmental issues to socio-economic needs and mobilizing

bandwagons to enroll large numbers of participants are important collective-action mechanisms for furthering the environmental agenda (Wijen and Ansari, 2007). One example is providing supranationally (United Nations) coordinated subsidies and know-how to BOP production facilities in return for emitting low levels of greenhouse gases. Another example is international NGOs pressurizing Western retail chains to join the ranks of those competitors that market only sustainably logged tropical timber.

The choices of whether the negative environmental consequences of BOP-driven economic development are acceptable should be made by those who bear these consequences, who are primarily but certainly not exclusively actors in BOP markets. My objective was not to assess, whether the BOP philosophy is good or bad from an environmental viewpoint, but rather to provide conceptual insights that will facilitate informed decisions. The analysis of the different elements and their interrelations will need to be further elaborated and quantified. Future analyses may also incorporate other environmental effects, such as biodiversity and space use. The essay's thrust was to provide a balanced view, striking a middle ground between deterministic pessimism (Meadows et al., 1972, 2005; United Nations Environment Programme, 2007) and unbridled optimism (Prahalad, 2005; Hart, 2005) as to the possibilities of economic growth in a finite natural environment.

The environmental impact of the BOP philosophy has so far not only remained under-researched (Kandachar and Halme, 2007) but has also been insufficiently subject to a critical analysis of the underlying causal mechanisms. The BOP research field will only mature if both its bright and dark sides are fully disclosed (Walsh, Kress, and Beyerchen, 2005). By deconstructing the multifaceted environmental landscape, I have tried to contribute to the further development of the largely unexplored BOP field, whose promises and pitfalls are numerous. Capitalizing on its opportunities while containing its environmental threats will be a tremendous challenge.

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Table 1: Summary of Environmental Impact of BOP-Driven Economic Development

Economic factor	*Environmental effect*	*Potential remedy*	*Feasibility of remedy*	*Sustainability outcome*
Increased demand for private natural resources	Depletion of private natural resources	Market clearing Corporate innovation	High High	Decreased but not depleted stock of private natural resources
Increased demand for common pool natural resources	Depletion of common pool natural resources	Corporate innovation CSR Civic action	Low Low (except for niche markets) Low (except for globally relevant resources)	Depletion of common pool resources (except for niche markets and 'global' resources)
Increased production Increased consumption	Pollution	Local/ national regulation Supranational regulation Self-regulation CSR Local civic action International civic action	Low Contingent (higher for visible trans-boundary issues) Low Low (except for niche markets) Low (except for directly harmful issues) Fair (for visible globally relevant issues)	Moderate to high pollution (higher for less visible, indirect, inter-temporal effects)
Small size	Increases pollution and	Ally with large (multinational)	Moderate	Increase of pollution

	use of natural resources (diseconomies) Decreases use of natural resources (sharing of economic resources)	organizations or with other small (local) actors		Increase or decrease of natural-resource use (contingent on relative importance of opposing forces)
Decentralization	Decreases pollution (less transport) Multiplication of polluted production sites	Local/ national regulation	Low	Reduction of transport-related pollution Dissemination of production-related pollution