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MULTINATIONAL ENTERPRISES AND CLIMATE CHANGE STRATEGIES

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MULTINATIONAL ENTERPRISES AND CLIMATE CHANGE STRATEGIES

Climate change is often perceived as the most pressing environmental problem of our time, as reflected in the large public, policy, and corporate attention it has received, and the concerns expressed about the (potential) consequences. Particularly due to temperature increases, climate change affects physical and biological systems by changing ecosystems and causing extinction of species, and is expected to have a negative social impact and adversely affect human health (IPCC, 2007). Moreover, as a result of the economic costs and risks of extreme weather, climate change could have a severe impact on economic growth and development as well, if no action is taken to reduce emissions (Stern, 2006). This means that it can affect multinational enterprises (MNEs) active in a wide variety of sectors and countries. Climate change is not a 'purely' environmental issue because it is closely linked to concerns about energy security due to dependence on fossil fuels and oil in particular, and to energy efficiency and management more generally. Controversy about the climate change issue has led to a broadening of the agenda in some cases, with policy-makers targeting energy to avoid commotion about the science and politics of climate change, and firms likewise, also because addressing climate change in practice usually boils down to an adjustment in the energy base of business models.

Regardless of the precise motivation and focus, be it climate or also energy, the strategic impact of climate change has been surrounded with great uncertainty, for example, about the type, magnitude, and timing of the physical impact; about the best technological options to address the issue; and about the materialization of public policies. It has been a long time since the first deliberations on regulation of greenhouse gas emissions started, more than twenty years ago, until sufficient ratification and thus entry into force of the Kyoto Protocol, in early 2005. The adoption of the Kyoto Protocol in 1997 set some things in motion, such as an emissions trading scheme in the EU (the EU-ETS which started per 1 January 2005). For firms, however, the overall policy context has been ambiguous with a range of national and international initiatives, some binding, others voluntary, and with a multitude of actors involved. Moreover, as the Kyoto Protocol expires in 2012, there is large uncertainty as to future emission reduction targets and policy arrangements at the various levels. This also affects emissions trading and the Clean Development Mechanism that were approved as integral parts of the Kyoto Protocol.

While recent international climate conferences were supposed to result in a successor to the Kyoto Protocol, this has not materialised so far. The EU and several countries, including the US and emerging economies (including China and India), have committed individually to greenhouse gas reductions but an overall binding framework and a coherent international approach is still lacking. There are ongoing attempts to deal with the many unresolved issues on the table. These include the level of the emission reduction targets for both industrialized and emerging/developing economies; the future shape of emissions trading schemes and the relationship between them; the transfer of money and technology to less-developed countries; and of course the accompanying timetable and encompassing legal frameworks. The difficulties also stem from the multiple trade-offs related to climate change, involving social equity, development, innovation and competitiveness, relevant to MNEs as well.

Increasing societal and regulatory attention to climate change has led MNEs to consider how climate change affects markets in which they operate and has engendered a variety of responses, both market and non-market (political) in nature (Kolk & Levy, 2004;

Kolk & Mulder, 2011; Kolk & Pinkse, 2005, 2007, 2008; Levy & Kolk, 2002; Pinkse & Kolk, 2007, 2009). While MNEs clearly show awareness of the issue, they often tend to be cautious in taking steps in one particular direction. This is due to the fact that MNEs have been facing a complex international context of continuously changing climate policies, and partly related to this, doubt the flexibility of climate-induced investments and fear to make irreversible green mistakes (cf. Rugman & Verbeke, 1998). Moreover, tackling climate change might require firms to move away from existing technologies and build new, unrelated firm-specific advantages (FSAs) instead. For these reasons, the vast majority has only recently started to develop FSAs in response to climate change. Nevertheless, quite a few early movers, particularly in those sectors most confronted with it, hope to seize possible opportunities to gain a strategic advantage over their rivals. Climate change exemplifies an issue from which MNEs can learn how to anticipate future developments in a context of uncertainty and exercise leadership that combines societal and strategic concerns.

This chapter gives an overview of MNEs and climate change, to give insight into one of the 'new topics in international strategic management' included in this volume. In the framework of this contribution, it is not possible to deal extensively with all the dimensions of the issue; we refer to our earlier work for those interested in understanding more details, including empirical findings and the array of research avenues. The chapter will present the main factors relevant to MNEs and climate change, considering particularly those that play a role at the sector, firm and country levels. Table 1 summarizes the main elements that influence corporate positions on climate change and that have come to the fore in our research over the years. This chapter will not specifically examine issue-specific factors. We included them in Table 1 as they have been important in shaping the issue arena. Moreover, factors like these may also be relevant for those interested in exploring the implications of other environmental and social topics that emerge in international strategic management, such as water, poverty or health.

Table 1 around here

Below we will discuss sector-specific, firm-specific and country-specific factors, consecutively, to arrive at a synopsis relevant to MNEs. Before addressing some of the elements of Table 1, particularly with an eye to their importance for MNE competitiveness, first a brief overview of the relevance of climate change for different categories of firms will be given.

DIFFERENT CATEGORIES OF FIRMS IN RELATION TO CLIMATE CHANGE

In the field of climate change, a distinction has been made between different categories of firms related to the degree to which they are affected by climate change and also, related to this, for which it can be a potential source of competitive advantage (Kolk & Pinkse, 2008; Kolk & Mulder, 2011) (see Table 2). Most confronted are firms in high-salience industries such as oil & gas, automobiles and utilities as their core activities are at stake, with their fossil-fuel based business models being threatened. At the same time, an early change to develop new key capabilities in a lower-carbon direction may transform climate change into a driver for future profitability and growth, particularly if firms are early movers.

Table 2 around here

Automotive and oil & gas MNEs will have to reorient strategically in response to climate change, given that the issue directly threatens their core activities but also offers new competitive opportunities (Kolk & Levy, 2004). Power generation is central to a move to a lower-carbon economy as well, but utilities and electricity networks are more attached to location than the other sectors. Moreover, the introduction of renewables in electricity production means intermittent generation instead of the constant generation that characterises conventional fossil-fuel based power plants, which creates a barrier as transmission networks need to be changed. This gives incumbent utilities, which most often own these fossil-fuel based plants, a clear argument to stick to their established business model and resist changing course as opportunities are not obvious. Thus, while crucial for climate change, utilities face a somewhat different situation than oil and automobiles, sectors where change is assumed although it is unclear which technology will prevail in the coming years. As a result, investments in transition technologies, and exploration of other options, have predominated so far.

Continuous reflection on the development of firm-specific advantages via internal investments (dynamic capabilities) seems also important for those firms that specialize in goods or services that can help to mitigate climate change impacts, or to anticipate, influence or respond to climate policy developments (Kolk & Pinkse, 2008; Kolk & Mulder, 2011). This includes, for example, emissions trading and offsetting firms, which in a sense profit from other firms' lack of knowledge on how to deal with the Kyoto-related mechanisms, and insurance firms. Firms in this category develop new products and services that help, *inter alia*, to facilitate emissions trading, develop offset projects, trade certified emissions rights themselves or act as an intermediary for other firms. In addition to specialized firms, banks, brokers, exchanges, consultants, auditors and legal services providers can also fall in this category if they focus on climate change (Kolk & Mulder, 2011). This also applies to diversified firms such as General Electric and Siemens that supply energy-related technologies, including renewables.

For the remaining firms, climate change is not likely to be a main source of profitability and growth, but they may gain legitimacy if they act visibly on the issue (Kolk & Pinkse, 2008). For them, there is no compelling reason to develop FSAs internally in managing climate change. Their route for addressing the issue will go through external markets, for example, purchasing greener and productivity-enhancing technologies, adopting externally-developed tools and routines (such as on mitigation, emissions trading, measurement instruments), and 'outsourcing' certain activities to outsiders (who can, for example, take care of lobbying and stakeholder management). This category includes those firms operating in low-emission sectors such as media and retail. In this situation, FSAs may arise from 'internalization arbitrage' (cf. Ghemawat, 2003; Rugman & Verbeke, 2004) in the sense that MNEs obtain an advantage from proximity and easy access to multiple external markets that offer such best available practices.

It is crucial to take differences between categories of firms into account when examining the relevance of climate change for MNEs. While the categorization overlaps to a considerable extent with sector boundaries, particularly in case of those with high emissions, this is not necessarily the case as some firms may seek opportunities while others from the same sector did not (e.g. some banks engaged in emissions trading and in the development of offset projects, others did not; Kolk & Mulder, 2011). This means that we

will consider sector separately, followed by firm-specific and country-specific factors, and then discuss implications for MNE competitiveness.

SECTOR-SPECIFIC FACTORS

Variance between sectors stems from several factors, as the overview in Table 1 shows, which shape the room for manoeuvre in developing a climate change strategy. One factor that determines how the impact of climate change differs between sectors is the technological change that its emergence brings about. A complete integration of climate change and a transition to a low-carbon economy ultimately asks for a competitive reconfiguration (or replacement) of several of the most powerful sectors, namely those that supply fossil fuels and/or have products that demand massive amounts of fossil fuels (Holdren, 2006). Firms in the carbon-intensive sectors have received much attention in the climate change debate because they are significant emitters. At the same time, they also hold the key to finding (technological) solutions, but this is not without its complexities as quick and easy solutions are not so often at hand. While it is widely recognised that a much greater deployment of low-carbon or carbon-free alternatives is needed, it is not at all clear what should replace the prevailing fossil-fuel based technologies – there is no technological ‘silver bullet’ solution at the moment. Alternatives are being explored but problems usually come to the fore when they are scaled up. This leads to the broader question of whether the focus should be on addressing limitations for further deployment, thus trying to fully exploit existing know-how and technologies to scale them up, or on developing new possibilities that may imply a departure from the current energy infrastructure and technological trajectories. In most cases, there is not just one ‘solution’, however.

For example, there are various options for investing in renewables, ranging from more mature to much less well-developed technologies (Neuhoff, 2005). Most mature are hydropower, biomass combustion, solar boilers and geothermal technologies, which in specific, beneficial circumstances are already cost-competitive with conventional sources. Wind and solar are seen as emerging technologies that are not yet really cost-competitive under current market conditions and macro-economic models. And there are renewable technologies that are still in the R&D phase – e.g. specific forms of solar power, ocean energy and advanced bio-energy – which completely lack market penetration, and largely depend on public R&D programmes for further development. It should be noted that the level of technological dynamism in a sector also shapes the room for manoeuvre, as illustrated by the difference in R&D patterns between the power generation and the automotive sectors (Margolis & Kammen, 1999). R&D intensity in power generation has been notoriously low, due to the fact that innovation involves massive capital investments combined with limited opportunities for product differentiation. In automobiles, the technological environment is much more dynamic and therefore there is greater pressure as well as opportunities to develop alternative drive-train technologies, such as hybrids, electric vehicles and fuel cells.

In addition to technology, the issue of how to develop new markets should be considered. There are various routes, with pros and cons, for a move to a non-fossil fuel based economy: via the development of niche markets that allow opportunity to experiment, or via incremental changes and transition technologies. Automobiles can serve to illustrate both. The fact that the fuel cell vehicle was long predestined as the ultimate solution was partly because it followed the route of niche development; this, however,

meant that has been difficult to move beyond the niche into mainstream markets, also because a sequence of market niches requires many resources (Raven, 2007). Transition technologies, on the other hand, may become dominant themselves and then stand in the way. A case in point is that the success of hybrid cars might have serious consequences for the further development of the fuel cell vehicle. The fuel cell's main advantage compared to the internal combustion engine – that it performs much better in terms of emissions – almost completely fades away compared to hybrids and may not weigh up to the much higher costs of bringing the fuel cell vehicle to the market. In other words, because resources for new technology development tend to be scarce, there is a trade-off between developing carbon-efficient transition technologies for mainstream markets and developing carbon-free end-points for niche markets.

In some cases more systemic, infrastructure-related change is required. For example, to be able to commercialize the fuel cell vehicle, the car industry needs the chemical and oil industries to supply the hydrogen necessary to attract prospective customers. This necessitates a major breakthrough in the production and distribution of hydrogen, which has not occurred yet because it is threatening to fossil-fuel suppliers as well. As the car industry will not be able to supply the hydrogen itself, it thus faces a major barrier in bringing the fuel cell vehicle to the market. It is basically a chicken-and-egg problem: oil firms will not scale up their hydrogen activities until automobile firms come with more affordable fuel cell vehicles, and the latter will only launch such models if there is a hydrogen infrastructure (Romm, 2006). A somewhat comparable problem exists regarding plug-in hybrids or electric cars, which need electricity networks capable of meeting (peak) demands to charge the vehicles and thus depend on utilities. For a more widespread use, there must also be a sufficient number of charging points and/or places to exchange batteries, which often requires cooperation with local authorities and electricity grid operators, and substantial investments. A crucial issue regarding electric/plug-in solutions is whether the electricity originates from fossil fuels or from renewables, because if the former prevails, a 'solution' to the climate problem has not come much nearer.

Finally, whether there are opportunities to create a market for new technologies with a comprehensive approach also depends on growth and concentration levels and the structure of a specific sector. The sector dynamic in which firms are involved in the interaction with their competitors also affects their behaviour vis-à-vis climate change. Firms compete for external funding on the best conditions, and want to increase market share, attract new customers and talented staff, and maintain good relations with investors. This leads to continuous efforts to be more 'attractive' and agile than competitors. Firms closely watch the behaviour of competitors, with a tendency to 'follow the leader' (cf. Knickerbocker, 1973) or to jump on the bandwagon (cf. Abrahamson & Rosenkopf, 1993), regardless or even despite of the fact that this may imply inefficiencies or losses. This behaviour is particularly pervasive in highly concentrated markets, dominated by a few large multinationals (Kolk & Levy, 2004), but it may also be a simple lack of knowledge about what the 'winning' approach will be. At the same time, given the complexity of the climate change problem, cooperation is usually needed as one firm (or other actor) cannot deliver solutions single-handedly. This raises the question of how far firms are willing to go in taking responsibility for climate change when they need responses from others to achieve a positive outcome, and also how they deal with the competitive dimensions involved. This is where firm-specific factors start to become crucial.

FIRM-SPECIFIC FACTORS

The factors as shown in Table 1 are important in shaping corporate decision-making about climate change strategies. It should be noted that, in balancing the various factors – in the context of broader firm objectives such as profit, growth and market share – managerial perceptions play a large role.

If we focus on those firm-level factors that have not come to the fore above already, the position of a firm in the supply chain stipulates the nature of the core products and services, and the responsiveness of customers to the climate change issue. Rethinking product design or developing new products or services is particularly valuable for firms that operate closer to markets for the end-consumer, where differentiation may pay off if consumers are environmentally conscious. Firms that are positioned higher up in the supply chain generally produce commodities instead of consumer products and do not have the same opportunity to differentiate their products. Whether the customer is an individual or another business will also affect the decision to develop a climate strategy. Whereas business customers are less known for demanding environmentally-friendly products, when they choose to do so, their demand will create more leverage, as they are more powerful than an individual consumer. In recent years, for example, firms such as Wal-Mart and McDonalds, which used to have rather bad track records on sustainability, have started to demand more sustainable products, thus creating large pressure on supplier firms. If a firm sells directly to end-consumers instead, this used to lead to a niche strategy, because the willingness to pay for climate products was often limited to a group of environmentally-conscious consumers. However, increased consumer awareness of climate change in recent years may start to lead to a change in this respect, and create the opportunity to service mass-markets with climate-friendly products as well (Bonini, Hintz, & Mendonca, 2008).

Many MNEs that are vertically integrated may also consider spillover effects throughout the value chain, and thus whether climate-induced changes affect the upstream (back-end) or downstream (customer-end) activities or both (Kolk & Pinkse, 2008). For example, one possibility is that climate change may help a firm to create an FSA from developing a climate-friendly technology through upstream R&D activities, which is then commercialized by way of existing downstream FSAs in market-related activities. However, it may also lead to a change in downstream activities for the customer-end of the value chain including sales, marketing, and distribution. By developing FSAs in downstream activities, such as green marketing, an MNE could not only commercialize existing technologies that have previously unexploited green attributes, but also create an FSA out of a purchased technology. In both instances, climate change can have a positive impact on MNEs, because they can leverage some of their existing upstream or downstream FSAs, which creates a buffer from competitors (Tripsas, 1997). A more challenging case, however, is when climate change disrupts FSAs throughout the whole value chain. If MNEs are able to adapt both upstream and downstream activities simultaneously, this will contribute more to a sustainable competitive advantage, because such investments will be more difficult to imitate, and lead to higher-order capabilities of combining technological (upstream) and nontechnological (downstream) FSAs (Rothaermel & Hill, 2005). However, it will also be riskier for MNEs to accommodate the change because they cannot leverage existing FSAs and thus open the door to new entrants. Hence, MNEs may also have an incentive to attempt at obstructing such a change (Tripsas, 1997).

There are other firm-specific factors that shape the specific approach taken. This

includes, for example, top management commitment and the degree of internationalisation of top management (Levy & Kolk, 2002). In addition, organisational structure plays a role, as this influences the strategic planning process and the extent to which decision-making about an issue such as climate change is centralized or decentralized. Moreover, organisational culture and a firm's specific history shape the perception of climate change. For example, one of the reasons that ExxonMobil was rather reluctant to invest in renewable energy sources was because it made huge losses on such investments in the 1980s when the Reagan administration suddenly stopped granting large subsidies instigated by the preceding president, Carter. This, combined with the fact that decision authority had been highly centralized as well, left hardly any room for local initiatives that went against the reactive stance of top management (Kolk & Levy, 2004).

Whether or not climate change becomes a strategic issue depends in the end on how it is perceived to affect a firm's main value proposition (Porter & Reinhardt, 2007). Even though firms typically emphasize the business opportunities related to climate change rather than the risks, it is not always the case that climate change is necessarily an issue of strategic importance. Nevertheless, the corporate emphasis on the business opportunities in relation to climate change is not that surprising as it reflects the overall trend that 'win-win' views have started to prevail (Kolk, 2000; Rugman & Verbeke, 1998). Of course not all firms have adopted this win-win mentality in the same way. On the one hand, the approach may be that climate change is evaluated just as any other business issue, which means that it has to compete (at some stage) with other investment opportunities on the same financial criteria. On the other hand, the moral case for climate change may prevail, which means that climate-related activities are pursued, preferably but not necessarily to make a profit (Berger, Cunningham, & Drumwright, 2007). It is here that stakeholder concerns and other country-specific factors come into play as well.

COUNTRY-SPECIFIC FACTORS

As already indicated in the introduction, climate change has aroused considerable stakeholder concerns and public debate – in some countries more than others and with variety over the years. Traditionally, stakeholder pressure for taking action on climate change has been highest in the developed countries, but concerns have been growing elsewhere as well, given increasing environmental, pollution and health problems in large cities in, for example, China. Amongst developed countries, which agreed to emissions reductions under the Kyoto Protocol, the US has been notable for its heated domestic debate about the 'science' and relevance of the issue, and for its refusal to ratify the Kyoto Protocol. Countries' positions on climate change, as taken in international negotiations in the past decades, has been influenced by economic, geographical and political factors (as summarized in Table 3). These will not be further examined here, as we concentrate on current 'outcomes' in terms of national and international policies to assess the implications for MNEs.

Table 3 around here

Most important in the context of this chapter and the current international policy debate is an upcoming differentiation in three broad types of countries – developed, emerging and developing economies. Differences relate to emissions reduction requirements and related

constraints likely to be imposed on MNEs based in these contexts, on the one hand, and the opportunities resulting from (clean development / green) funds transferred from developed to other countries, on the other. Under the Kyoto Protocol, emissions reductions only applied to developed countries, but the policy debate is, albeit with much difficulty, moving towards the extension to emerging countries. This reflects economic growth patterns and industrial expansion of particularly China, but also India and Brazil. Funding for green technology, mitigation and adaptation to climate change initially applied to all non-developed countries, but as the Clean Development Mechanism turned out to mostly fund projects in emerging countries, most notably China and India, a new green fund aims to help developing countries specifically.

While the trichotomy parallels the division made for sustainability and corporate responsibility more broadly in terms of risks and possibilities for the development of FSAs by MNEs (Kolk, 2010; Verbeke, 2009), climate change may be special in some respects. First, the deadlock in the discussions on an international climate treaty means that boundaries between the three categories are becoming more fluid: not so much in the negotiations themselves (where they are very vivid), but in the actual domestic policies implemented, as national priorities will and can prevail at that level. Second, compared to social and ethical issues, where cultural traditions play a larger role, climate-related technological gaps may be easier to bridge. It is here where entrepreneurship can be important, but also the enabling environment in terms of government incentives.

Industrial policies have come to the fore particularly in the aftermath of the financial crisis, when stimulus packages adopted in a range of countries included often substantial climate-related components (Robins, Clover, & Singh, 2009). Relevant to MNEs have been concerns about (implicit) protectionism and the fact that measures appeared to favour incumbents that struggled rather than stimulating new (innovative) ventures. Much attention focused on incentive schemes to scrap old, energy-inefficient cars earlier and boost demand for more efficient ones. They induced a large debate about distortion of competition in a range of countries, including Germany, France, Japan and the US (Kolk & Pinkse, 2010). This extended beyond cash-for-clunkers schemes; in the case of wind energy grants handed out by the US government in the Fall of 2009, more than 80% went to foreign turbine manufacturing firms, suggesting that the majority of jobs was created abroad despite funding set up for domestic purposes (Luce, 2009).

This brings us to the importance of country-specific advantages (CSAs) for MNEs, considering both home and host locations. The final section of this chapter will discuss the implications for competitiveness (based on Kolk & Pinkse, 2008), with a specific focus on geographical factors related to climate change as these define the specificities of MNEs. The strategic complexity for MNEs is that they have to combine FSAs and CSAs, which usually means adapting FSAs, to attain optimal FSA-CSA configurations (cf. Rugman & Verbeke, 2003).

IMPLICATIONS FOR MNE COMPETITIVENESS

There may well be particular geographical factors that are conducive to the development of climate-related FSAs, which can also mean that benefits for the MNE arise at a specific location only. A clear location-specific factor has been national regulation, which has varied considerably, for example, between the US and Europe (respectively rejection of the Kyoto Protocol versus the EU ETS). Climate change policy in the home country may help MNEs to

develop technologies that give them a competitive advantage over their rivals if that country is at the technological frontier. However, host-country locations can also form a potential source of CSAs as MNE subsidiaries may tap into local external knowledge. The broader institutional framework also plays a role. The presence in the local context of a network of other firms or non-profit organisations that are in the process of developing climate-friendly technologies can be complementary to an MNE's own FSA development. Local consumer awareness of climate change may also form a CSA as it makes them responsive to green marketing campaigns and products with green(er) qualities. MNEs may benefit from climate-related CSAs either because they already have facilities in this particular location or because they move to these locations in an effort to seek strategic assets to complement their existing FSAs (Dunning, 1998). The locus (or loci) of origin of FSA development thus depends on the geographical spread of an MNE, as it is partly determined by the 'local' institutional context.

The impact of climate-related CSAs on the way in which MNEs transform existing or develop new FSAs depends to a large extent on the geographical origin of FSA development. If an MNE perceives climate change as a global issue, decision-making power on this issue will be at the level of its headquarters. In this case, an MNE believes that the consequences of climate change will have a significant impact on the organization globally, which is therefore dealt with at the highest management level. Headquarters' support considerably increases MNEs' potential for becoming global leaders in tackling climate change. However, since the worldwide institutionalisation of climate change policies is still quite fragmented, many MNEs may also deal with the issue through their regional centres or national subsidiaries. It then becomes a matter of local responsiveness to climate-related institutional pressures from regulators, NGOs, or the investment community. The more localised the decision is, however, the less likely it is that climate change will have a significant strategic impact on the MNE as a whole, because it will be quite difficult for a local subsidiary to convince MNE headquarters that climate change requires a proactive response. Instead of a global leader, an MNE may then produce local heroes at best.

This is not to say that a local response is of no use at all, however. If, through their subsidiaries, MNEs are located in countries that have been frontrunners on climate change, they have been facing climate-related pressures for a longer period of time already. This could have enabled them to start learning from the issue from an early stage on. Therefore, if a country initiates new regulations to curb emissions this will probably be a much greater shock to domestic firms than to MNEs. Nonetheless, experience with climate change in a specific location will only create a cross-border advantage if MNEs are able to transfer FSAs from other locations. One of the main challenges for MNEs is whether they will develop different types of location-bound FSAs that fit with CSAs of individual countries, or non-location-bound FSAs that can be transferred and deployed globally (Rugman & Verbeke, 2004). The peculiarities of MNEs particularly arise from the potential to leverage non-location-bound FSAs. Similar or identical procedures for every subsidiary facilitates the exchange of experiences, it breeds internal consistency, enables for benchmarking and is clear to outsiders. Some MNEs, therefore, strive to harmonise their environmental management system and standards at all locations. Yet, the situation in specific countries, for example, as a result of stakeholder or government pressure, may create location-bound FSAs as well (related to local responsiveness). In some cases these can only be used in the country in question; in others they might help to increase MNEs' competitiveness elsewhere.

The transferability of an FSA typically depends on the attributes of the knowledge bundles that establish it; the higher the tacitness of the knowledge, the less transferable it becomes (Kogut & Zander, 1993; Singh, 2007). A higher level of tacitness may be due to the extent to which an FSA results from linkages with external parties (e.g. governmental bodies, universities, or NGOs). These linkages are in general much better in an MNE's home country (or region), which explains findings that many MNEs are organized on a regional basis (Ghemawat, 2003; Rugman & Verbeke, 2004). Host-country attributes also determine transferability of an FSA to a foreign location. Transfer of FSAs to relatively 'distant' countries (Ghemawat, 2001) in terms of dissimilarity of environmental policies usually results in higher adaptation costs of alignment with the CSAs of these particular host countries. In other words, transfer of environmental best practices is not always without problems (Tsai & Child, 1997). A global approach to environmental management usually relies on advanced technologies, but their successful implementation in developing countries can be very expensive due to a lack of adequate infrastructure there.

If climate-related CSAs stimulate specific R&D that translates into new technological FSAs these would, on the face of it, be non-location-bound. It should be relatively easy to transfer a technology to other geographical locations, regardless of whether it originates from corporate headquarters, a regional centre or a national subsidiary. A public-policy driven CSA such as a subsidy or tax break for the development of renewable energy technologies typically only has a function at the start of the lifecycle of an FSA; once the technology is incorporated in products it can be redeployed to other locations (Helfat & Peteraf, 2003), thus becoming a non-location-bound CSA. Climate-friendly technologies, for example related to hydrogen or fuel cells, are no longer of a tacit nature or tied to external parties such as local governments, and sourcing and production of these technologies can take place anywhere in the world (Rugman & Verbeke, 2004).

However, if the CSA continues to be of value further down the lifecycle, transferability becomes more difficult. For example, for some specific technologies related to renewable energy, the location of production depends on a country's natural capital. Such geographic-site specificity is crucial for hydroelectric and wind power, which require mountainous areas and sufficient wind speed respectively (Russo, 2003). Such an FSA cannot simply be redeployed, but needs to be combined with a similar CSA in another geographical location (Helfat & Peteraf, 2003). Nevertheless, most technologies for climate-related FSAs are more likely to strongly depend on CSAs when they have further advanced in the lifecycle and have moved downstream and reached the sales stage. A lack of transferability of FSAs is thus not necessarily the result of the tacitness of the knowledge on which they are based and local geographical circumstances, but is also linked to the ability of MNEs to create market acceptance for new technologies to realize global sales (Rugman & Verbeke, 2004). In other words, although MNEs may have some influence on market acceptance through marketing campaigns, it largely depends on CSAs related to consumer responsiveness to climate-friendly products and services, and the availability of the necessary public infrastructure.

CONCLUDING REMARKS

The role that climate change plays in MNE strategy is determined by a broad conglomerate of factors involving governmental as well as societal and market forces, working at different levels, (sub)national, regional and global. Climate change creates a geographically disparate

and moving target: while it may form a threat in one location, it can be an opportunity in another. Regardless of whether regional or local characteristics are seen as a potential advantage or disadvantage, liability or risk, geographical differences are something to be faced by MNEs and those firms that excel in doing this are the ones most likely to develop climate-related FSAs. Hence, learning from climate change does not merely mean that MNEs need dynamic capabilities to cope with technological change; constantly rejuvenating FSAs by being responsive to a wide range of climate-relevant CSAs is what gives them an edge vis-à-vis competitors as well. MNEs that are most responsive to a wide range of relevant locational factors may develop FSAs with implications for their profitability, growth and survival.

At the same time, it should be noted that climate change may not be of a strategic nature for quite some firms, given the nature of their activities and the inconclusiveness of policy-making at the international, and thus also the national, level. Systematic MNE responses to climate change are still emerging, also due to the uncertainties regarding proper institutional frameworks and future policies. This will continue to present challenges for both managers and policy-makers, and for researchers as well, as this emergent topic may be crucial for the future of the planet but rather difficult to study given its evolving nature and lack of systematic data. This does not diminish its relevance for international strategic management though, also in the years to come.

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TABLES AND FIGURES

Table 1. Factors that influence corporate positions on climate change

<i>Factors</i>	<i>Components</i>
Issue-specific factors	Impact of the issue on sectors, countries, locations Institutional infrastructure for addressing the issue Degree to which issue and regulation are global Complexity and uncertainty associated with the issue
Sector-specific factors	Nature and extent of threat posed by climate change Availability and cost of alternatives Degree of globalization and type of supply chain Political power of the industry Technological and competitive situation Growth and concentration levels
Firm-specific factors	Position within the supply chain; nature of value chain Economic situation and market positioning History of involvement with (technological) alternatives Degrees of (de)centralization and internationalization Availability and type of internal climate expertise Nature of strategic planning process Corporate culture and managerial perceptions Ability to anticipate risks, spread vulnerabilities and manage stakeholders
Country-specific factors	Societal concerns about climate change National policies on climate change National industrial promotion policies Geography / natural capital (e.g. in relation to possibilities for renewables) Societal views on the roles and responsibilities of firms Regulatory culture (litigational or consensus-oriented)

Source: Adapted from Kolk & Levy (2004), Pinkse & Kolk (2009).

Table 2. Relevance of climate change for different categories of firms

Category of firms	Impact of climate change issue
Firms in high-salience sectors	<ul style="list-style-type: none"> ● Strongly affected in view of energy intensity and dependence ● Early change in business models might be source of competitive advantage
Firms specialized in climate-relevant goods and services	<ul style="list-style-type: none"> ● Can profit by helping firms mitigate climate change impacts or to anticipate, influence or respond to climate policy
Remaining firms with low-emission activities	<ul style="list-style-type: none"> ● No main source of profitability/growth, may gain legitimacy from acting visibly ● Address issue via external markets, possibility for internalization arbitrage

Table 3. Countries' positions on climate change: Influencing factors

<i>Factors</i>	<i>Components</i>
Economic factors	<ul style="list-style-type: none">• domestic supply and demand, and costs of different sources of energy• current and expected energy efficiency and emission levels• economic importance of large energy producers and consumers• economic importance of those which expect to profit from emission reductions• competitive implications of emission reductions relative to other countries
Geographical factors	<ul style="list-style-type: none">• position of the country relative to the sea level• vulnerability for more extreme weather conditions• existing supplies of fossil fuels• suitability for alternative sources of energy
Political factors	<ul style="list-style-type: none">• political importance of large energy producers and consumers• political importance of opponents/proponents of emission reductions• public awareness of environmental issues• possibilities for arriving at political 'package deals' in which negotiations on climate are linked to one or more other topics• degree to which other countries are seen as taking measures with comparable 'sacrifices'

Source: Kolk (2000, p. 63)