

Regulatory Uncertainty and Corporate Response: How China's Environmental Enforcement Is Catching Up to Regulation and How Business Can Keep Up*

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ABSTRACT

We develop a framework to analyze the closing gap between regulation and enforcement of environmental protection in China and present a number of resulting implications for doing business there. We identify three major dimensions that characterize change in regulatory systems generally: priorities and incentives, bureaucratic alignment, and transparency and monitoring. Using these dimensions, we first unpack the mechanisms that characterized China's prior period, during which enforcement of environmental protection was decoupled from regulation. These mechanisms include (a) the intense emphasis on economic growth leading to misaligned incentives and regulatory competition across regions, (b) fragmented bureaucratic organization, and (c) lack of transparency and monitoring, all of which undermined enforcement. Then we show how, in each of these dimensions, regulation and enforcement are becoming realigned or recoupled over time. We show how this results from (a) a change in national development strategy to focus more on sustainable development and a harmonious society, (b) reorganization of the bureaucracy, and (c) an increase in monitoring by both the government and the general public. Correspondingly, we advance managerial implications that stem from these recent changes, illustrated by recent MNC and Chinese domestic firm successes. To address changes in policies and incentives, firms should align with governmental signals and embrace environmental innovation. Regarding bureaucratic alignment, firms should avoid regulatory shopping and integrate local and global standards. Finally, to address transparency and monitoring issues, firms should be transparent and compete on reputation. We conclude with a more general discussion of the contributions of our framework to understanding managerial practice in emerging-market regulatory contexts.

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Regulatory Uncertainty and Corporate Response: How China's Environmental Enforcement Is Catching Up to Regulation and How Business Can Keep Up

While China has grown over the past three decades to be the second-largest economy in the world, numerous indicators show that the natural environment has paid the price for this progress. For example, in 90 percent of China's cities, the underground water supply is contaminated and, on average, about 54 percent of the waters of China's seven main rivers were deemed unsafe for human consumption between 2001 and 2005.¹ The rate of desertification nationwide is around 900 square miles a year, an area nearly the size of Rhode Island. China is now the largest source of sulfur-dioxide emissions in the world and Chinese factories emit approximately three times the airborne particulates and sulfur dioxide that U.S. factories do.²

However, as economic development has progressed, there has been increasing awareness among the government, business community, and general public of the importance of environmental protection. Environmental security is essential for China to continue growing, as there are substantial long-term and indirect costs of environmental damage. It is estimated that the use of higher-polluting, cheap coal cost China \$248 billion in 2007, the equivalent of 7.1 percent of GDP, mainly due to health impacts on workers.³

As a result, the central government has been paying increasing attention to environmental issues. In 2006, China implemented "The Renewable Energy Law" to change the structure of its energy supply and to protect its environment. Later that year, the 11th Five-Year Plan (2006-2011) addressed energy efficiency and the enhancement of environmental protection, setting targets such as the reduction of energy consumption per unit of GDP and the reduction of major pollutants by 20 percent and 10 percent respectively in 2010.⁴ In the latest Five-Year Plan, announced in March 2011, the central government

articulated an aggressive series of energy-saving goals: to raise non-fossil-fuel usage to 11.4 percent of primary energy consumption, to reduce carbon emission per unit of GDP by 17 percent, and to increase forest coverage to 21.66 percent. These and other government actions clearly signal a greater focus on environmental and resource sustainability and a shift to a growth model powered more by innovation and technological progress than by the traditional inputs—labor, physical resources, and capital.

Yet our qualitative research finds that this new clarity has created new uncertainty for businesses used to the old environment. China had stringent environmental protection laws even in the days of unbridled economic growth, but they were not consistently enforced.⁵ This situation, commonly observed in developing countries, is described as the “decoupling” of regulation and enforcement.⁶ Tough regulations are put on the books in response to globalization pressures,⁷ but, for a variety of reasons—culture, corruption, lack of funds, lack of expertise—they are not enforced.

It is the recent “recoupling” of regulation and enforcement in China that is creating significant uncertainty for business. Regulatory uncertainty has been shown to be a significant challenge for business⁸ and we argue that the uncertainty being experienced in China today among business actors is a natural outcome of the process of “recoupling.” Business actors accustomed to little or no environmental regulation (regardless of what might have been on the books) must now figure out which regulations are—or will be—for real and how to act in response to the changes.

We have developed a theoretical framework that illuminates not only the current situation but also its history—how it arose, where it will go, and what companies should do. We identify three important dimensions along which both the decoupling and the recoupling of environmental regulation and enforcement take place. These dimensions are (a) governmental priorities and incentives, (b) bureaucratic alignment within the government,

and (c) public transparency and monitoring. We also recognize that these dimensions reflect fundamental organizational processes for strategic decision-making, implementation of structures, and monitoring.⁹

Prior research on decoupling has typically not considered the diverse set of organizational mechanisms leading to it.¹⁰ Our research revealed that (a) misaligned priorities and incentives, (b) fragmented bureaucracy, and (c) lack of transparency standards have been the underlying mechanisms. The Chinese government's *priorities and incentives*, communicated through national development strategies and policies such as the Five-Year Plans, provide guidance for firms trying to shape their business opportunities and signal which business activities are appropriate. These priorities are also manifested in the promotion incentives that guide governmental leaders. *Bureaucratic alignment* is the extent to which the structure of the government allows national development strategies and policies to be consistently and effectively implemented. In some circumstances, the structure is fragmented and thus fosters competition or conflict between bureaucratic agencies rather than oversight. The third dimension is the collection of governmental and societal mechanisms for *monitoring* how policies are implemented and what businesses are actually doing (as opposed to what they might say they are doing or fail to mention they are doing). Information disclosure and transparency standards allow the general public to monitor firms as well. As we show below, examining change along these three dimensions aids in understanding the uncertainty that firms in China face.

In addition, while prior research has shown that change agents are key to understanding recoupling,¹¹ our research shows that the gap between regulation and enforcement has been closing due to mechanisms corresponding to those same three dimensions; that is, through (a) shifts in government priorities and leader incentives, (b) governmental reorganization, and (c) increasing pressure for transparency and monitoring. Our framework thus adds to the

emerging literature on “recoupling.”¹² Finally, we also identify some practical implications for doing business in China along those three dimensions.

We developed this framework based on 147 interviews with company leaders, business consultants, governmental officials, and civil society leaders across 63 organizations; original case studies of corporate environmental practices and strategies; and extensive archival research on environmental regulation and implementation in China. (See the Appendix for more details on our data sources and methods.)

Figure 1 outlines our general framework, showing (a) how, along our three dimensions, China has moved from a period of decoupling to the present recoupling and (b) what the current recoupling suggests for managerial practice in China. While this framework is based on our work in China, we believe that examining decoupling and recoupling along these three dimensions is increasingly important in general, as governments—particularly those in emerging economies—try to adjust to global norms.¹³

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THE DECOUPLING OF REGULATION AND ENFORCEMENT IN CHINA

Since opening its door to the outside world in the late 1970s, and particularly since joining the World Trade Organization (WTO) in 2001, China has increasingly implemented global regulatory standards in a number of realms, including labor, environmental protection, and product safety. This is consistent with sociological research on globalization that finds that, as nations increasingly become embedded in the international community, they adopt standard sets of practices, leading to global homogenization of governmental policies and actions.¹⁴ For instance, prior research has identified how particular governmental actions to protect the natural environment (such as passing an environmental impact law or initiating an environmental ministry) diffused around the world as countries joined international organizations such as the WTO.¹⁵

Some conclude that this apparent global harmonization process is often nothing more than decoupling: A country adopts regulations to appear legitimate, but the regulations don't fit in with that country's culture and institutions or the country lacks the money or expertise to implement and enforce them, so they are not implemented and enforced and very little changes occur.¹⁶ Our field research provides many examples of this decoupling phenomenon, particularly during China's initial period of rapid economic development when the focus was on growth.

Our theoretical framework shows how growth orientation leads to decoupling along the three dimensions previously introduced. Along these dimensions, the decoupling takes the form of (a) misaligned incentives and regulatory competition, (b) fragmented authority within the bureaucracy, and (c) lack of transparency, monitoring, and reporting standards.

Priorities and Incentives: Intense Growth Orientation Leads to Misaligned Incentives and Regulatory Competition

In China, over the past three decades, promoting economic growth has been the primary goal of governments, and the careers of local government officials were linked to local economic growth.¹⁷ For example, a study of provincial leader turnover in China between 1979 and 1995 found that a leader's chances for promotion increased—and the chances of termination decreased—significantly with his or her economic performance.¹⁸ Such political incentives generated dynamic regional competition for economic growth, which led to “competitive liberalism,”¹⁹ wherein local governments competed aggressively to offer advantageous conditions to investors. Consistent with prior research on decoupling that has shown aligning monitoring and incentive mechanisms with goals to be crucial for implementation,²⁰ it was in local government's best interests to ignore or violate national environmental regulations.²¹

Such a dynamic, in which local governmental actors compete to offer positive

economic conditions for corporations, is also identified in the legal literature showing that subordinate political jurisdictions aim to create vibrant political economies and thus establish local regulatory regimes that are favorable to corporations and economic activity, a condition that has created the euphemistic “race to the bottom.”²² Our research uncovered numerous cases of firms moving production from the East Coast of China, where environmental regulation is more onerous, to the middle or the west of the country, a practice known as “regulation shopping.”²³ For example, in 2006, the Xiamen city government officially approved the construction of a plant to make Paraxylene (also known as PX, an important ingredient in polyester), with a US\$10.8 billion investment, the city’s largest industrial project. PX had already been shown to be harmful to aquatic organisms and evidence suggested that excessive exposure may affect the brain, digestive system, and reproductive system in unborn children.²⁴ The plant became notorious for pollution and contamination of the nearby region and, following local residents’ protests, was forced to relocate in Changchow, a more remote region in Fujian province. The Changchow government knew how environmentally damaging the plant would be, but aggressively sought the relocation for its economic benefit and even changed the project’s name to mitigate the media backlash.

Our interviewees spoke frequently of local governments’ lax enforcement of environmental provisions, even at the expense of local residents’ health, because the polluters were the main source of revenue and employment. For instance, from 2003 to 2006, nonferrous metal manufacturers in Gansu Province were found to be responsible for lead poisoning in an estimated 80 thousand residents, who had appealed to their local governments several times in vain. In September 2006, hundreds of children were sent to the hospital with abnormally high blood-lead levels. Yet the company responsible for this was included in a key “protection list” of companies that were exempt from inspection by governmental entities, including the Environment Bureau, so it evaded prosecution.

Bureaucratic Alignment: Fragmented Authority of Agencies

The alignment of a government entity's goals and strategies and its place in the larger structure of the government affects how well regulation and enforcement are coupled.²⁵ In China, besides the incentive structure that impedes implementation of environmental protection policies, there is also an important alignment issue within the bureaucracy, leading to conflicts between the fragmented elements of the government. As illustrated in Figure 2, provincial governments, China's Ministry of Environment Protection (MEP), and economic development agencies such as the Ministry of Industry and Information Technology, the Ministry of Commerce, and the State Assets Supervision and Administration Committee (SASAC) are at the same bureaucratic level and do not have power over their counterpart agencies. Their administrative goals, however, are very different and frequently contradictory. MEP's efforts, for example, are frequently undermined by other government agencies, particularly those responsible for promoting local economic development. Even within local governments, there are economic development agencies (such as the bureaus of industry and IT, commerce, and transportation) and regulatory agencies (including environment protection agencies) with similar hierarchical status but with opposing missions. Economic development agencies are frequently able to obstruct the efforts of environment protection agencies in the name of local economic development; the local governments, frequently hungry for economic advantage, take their side. In the metallurgical sector—universally considered a pollution-intensive industry—the MEP enacted emission reduction measures. However, this industry is one of the major economic development drivers in areas such as Jiangxi and Hunan Provinces, so the metal industry commission (a branch of local government) and the provincial government typically were able to override MEP's provisions.

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The central government, MEP, and several other government agencies have developed

a number of well-publicized environmental protection policies, such as the Green Credit Policy, but these policies lack coercive measures to ensure backing by other government/legal agencies in China's federated legal system and therefore are not strictly enforced. The Green Credit Policy established more stringent bank-lending standards, requiring companies—mostly in the pollution-intensive papermaking, coke processing, pharmaceuticals, iron and steel, and brewery industries—to prepare environmental assessments and to implement environment-protection regulations. However, Taiwan Xianglu Corporation, owner of the Xiamen PX project, was able to evade the Green Credit Policy by assembling a collection of loans which it claimed had been made before the policy's promulgation. Agriculture Bank of China loaned 3 billion renminbi (RMB), China Merchants Bank loaned 1.5 billion RMB, and Everbright Bank loaned 1 billion RMB for this project. These were large loans, so deferring or suspending the PX project would have had severe repercussions on the balance sheets of these banks. Because the interests of the Changchow government were well-aligned with those of the Xianglu Corporation and the major investing banks, but were not aligned with those of the government agencies concerned with protecting the environment, Xianglu was able to evade the Green Credit Policy.²⁶ Our informants also reported that the local environmental department even developed media campaigns to educate the residents on how to face this issue “correctly.”

Bureaucratic units focused on economic development have traditionally been MEP's chief organizational rivals, revealing a tension between economic growth and environmental performance. The logic that environmental protection inherently contradicts economic growth has enabled other administrative agencies to obstruct the MEPs' efforts to implement environmental laws and regulations. Thus, fragmented authority among governmental agencies has weakened the implementation of environment protection regulations in China, making it possible for corporations and local governments to decouple from the central

government's stipulations.

Transparency and Monitoring: Lack of Reporting Standards

A growing set of research has shown that selective information disclosure by organizations creates an opportunity for decoupling.²⁷ For example, some firms that have promoted a public image of environment friendliness have later been shown to be major polluters. In the West, such inaccurate self-presentation on environmental issues is known as greenwashing.²⁸ In China, lack of transparency has been seen as a serious impediment to the implementation of the Green Credit Policy. In 2008, for example, Bank of China provided 0.45 billion RMB in financing to Dongling Corporation, the largest privately owned mining company in Shanxi Province. Although the loan specified Dongling's compliance with the Green Credit Policy, the company was subsequently exposed by local residents for extensive lead-poisoning of the surrounding areas.²⁹

As the regulatory environment in China became more rigorous—at least on paper—more firms began to issue corporate social responsibility (CSR) or sustainability reports and to display their environmentally conscious projects and technology on the Internet. However, without established standards for what should be included in a CSR report, many firms publicized the positive while concealing the negative. China National Petroleum Corporation's 68-page 2010 CSR report had much to say about the company's safety and energy-saving practices, but only mentioned in one sentence that it had been responsible for a recent pipeline explosion near Dalian; experts estimate the 1,500-ton oil leak will require 3 to 10 years of decontamination.³⁰ Even the positive claims in some CSR reports have been found to be exaggerated or false.³¹

In closing, our theoretical framework and research has identified a number of important mechanisms that have led to the decoupling of regulation and enforcement in China over the last three decades of economic growth. Our framework highlights how, at a general level, the

conflicting incentives for local officials and competition across regions, structural misalignment of the bureaucracy, and lack of transparency standards led to decoupling. Next, we consider how, more recently, there has been a recoupling process along the major dimensions proposed.

THE RECOUPLING OF REGULATION AND ENFORCEMENT IN CHINA

While the first few decades of research on decoupling focused on its causes,³² more recent research shows how it can evolve. A recent study of a post-communist agency in Eastern Europe, for example, showed that the demands of international actors were initially decoupled from the organization's operation, but over time, as the staff that implemented these procedures was replaced by newer employees, the organization increasingly came to follow international standards.³³ As the author of that study put it, the "ritual becomes reality."³⁴ Pretense becomes practice. In the United States, too, environmental laws were quite weak and favored industry before the creation of the Environmental Protection Agency in 1970, yet evolved over time as environmental goals became more institutionalized.³⁵

We argue, then, that the decoupling of environmental regulation and enforcement in China is part of a natural evolution, not a permanent state as frequently assumed (and feared).³⁶ We believe that identifying this process of recoupling at the nation-state level contributes to a dynamic understanding of the state's role in shaping markets and organizational behavior. We thus extend sociological theory of the complexities of state influences to suggest a number of more generalizable mechanisms of how the gap between regulation and enforcement closes—how what has been decoupled can become recoupled. Corresponding to the three dimensions of our framework, we specify three mechanisms by which recoupling of regulation and enforcement is being achieved in China: a shift in governmental goals and metrics, the reorganization of the bureaucracy, and increased scrutiny on environmental behaviors.

Priorities and Incentives: Shift in Goals and Metrics toward Sustainable Development

Recent research on decoupling has shown that the gap between regulation and enforcement is often a result of disagreement concerning the appropriate goals and metrics.³⁷ Recoupling, then, can depend in part on reaching a consensus on goals and metrics. The Chinese Communist Party's current official socio-economic ideology is focused on creating a "Harmonious Society" which incorporates sustainable development, social welfare, and increased democracy. Many new environmental laws have been passed (see Figure 3). In 2011, at the press conference after the meetings of the two main political bodies in China, the National People's Congress and the Chinese People's Political Consultative Conference, Premier Wen Jiabao announced that China will stop pursuing rapid growth at the cost of environment degradation and natural resource deprivation. In the new Five-Year Plan, the target for GDP growth will be lowered from 7.5 percent to 7 percent. This was widely taken as a sign that the national leadership is ready to accept a slower GDP growth rate and will focus on welfare improvement and on socioeconomic sustainability.

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Local governments have followed the central government's lead. For example, in order to achieve the 11th Five-Year Plan's target of emission reduction, some local governments adopted dramatic measures such as drastically reducing electricity or heating system usage. The provincial governments of Hebei, Guangxi, Jiangsu, and Zhejiang Provinces shut down a number of plants in high-polluting industries such as iron and steel. In Zhejiang province alone, about 1,160 enterprises were shut down for 15 days. Our informants disclosed that the central government has threatened to use an environmental "career veto," whereby provincial leaders will see their careers sidetracked if they do not meet reduction plans. As a result of various energy reduction measures, during the 11th Five-Year Plan China achieved an average annual GDP growth of 11.2 percent while energy consumption only grew by 6.6

percent annually.³⁸

Environmental indices have also been used to evaluate the performance of local governments and officials. In 2007, the MEP and the State Statistics Bureau began incorporating Green GDP—a measure of sustainable development that includes items such as local environmental costs, costs of contamination, and other environmental impacts—into the performance evaluation system. In addition, in the latest 12th Five-Year Plan, 8 out of 24 indices measure sustainable development: cultivated land protection, water consumption per unit of industrial added value, water efficiency of the agricultural irrigation systems, non-fossil-fuel usage, energy saving per unit of GDP, carbon-emission reduction per unit of GDP, major pollutants emission reduction, and preservation of forests (see Figure 4).

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The Chinese government is focusing on green investment as an incentive for sustainable development. Various energy-saving strategies were devised for different industries; for example, manufacturing focuses on using advanced production facilities to replace backward technology, transportation focuses on prioritizing public transportation and on a better combination of various means of transportation, construction focuses on restructuring old buildings and developing green and smart buildings, and green practices are encouraged in everyday consumption.³⁹

The government invested the equivalent of US\$12 billion in sustainable development from 1998 to 2007 and the 2009 economic stimulus package included 210 billion RMB (US\$32 billion) for energy conservation, pollutants reduction, and ecosystem protection projects and 400 billion RMB (US\$61 billion) for new energy-efficient housing that will use environmentally friendly materials. The stimulus plan was by no means perfect—it encouraged some polluting industries—but "green investment" accounted for 14.5 percent of the plan, indicating the government's determination to shift its values from traditional "profit

maximization" to "welfare maximization."

The central government issued fiscal subsidies for specific industries. For example, starting with the 11th Five-Year Plan, major electric power plants undertaking desulfurization renovations were allowed to charge an extra 0.015 RMB/kWh. Local governments then issued similar policies to encourage desulfurization renovation of local power plants. For example, Jiangsu Province set the electricity price for renewable power generating plants at 0.509 RMB /kWh, while traditional power generating plants could only charge 0.494 RMB /kWh. Liaoning, Jilin, and Heilongjiang Provinces undertook similar fiscal measures to spur development of the solar and wind industries in China (and the related equipment manufacturing); by 2007, China's solar-panel output had reached 1188 MW, one-third of the global output (3436 MW).⁴⁰ In 2010, the central government announced a subsidy for people who buy energy-saving or new-energy vehicles in six trial cities (Beijing, Shanghai, Changchun, Shenzhen, Hangzhou, and Hefei). In Shenzhen, individual customers can get a subsidy of up to 120,000 RMB for buying a vehicle that uses hybrid technology or some other renewable source.

Bureaucratic Alignment: Reorganization of the Bureaucracy

In recent years, the government has taken significant steps to repair the fragmentation and misalignment of its bureaucracy in order to strengthen enforcement of environmental regulations. Since 2008, the MEP has been "promoted" from a subordinate organ of the state council to a component of the state council. Some scholars and research institutes suggest that the MEP should be vertically supervised (by the central government) rather than laterally/horizontally supervised (by local governments) to further discourage local protectionism. While this measure has yet to be adopted, our informants noted that MEP's expanded power of enforcement has already been felt by local governments.

In early 2006, the central government had MEP set up 11 branches to independently

monitor and investigate environmental issues, free from local government interference. The branches include five environmental supervision centers in the cities of Nanjing (for east China), Guangzhou (south), Xi'an (northwest), Chengdu (southwest) and Shenyang (northeast), tasked with investigating serious pollution cases, helping to solve cross-regional environmental disputes, and supervising law enforcement in national nature reserves, forest parks, and key scenic spots. In 2008, for instance, MEP collected over 25 million national environment inspection records, which help the agency to implement environment protection measures. Meanwhile, MEP set up a professional environment-monitoring bureau.

Several other powerful government agencies, including the National Development and Reform Committee (NDRC) and the Ministry of Industry and Information Technology, are also responsible for environmental issues. The NDRC, besides its macroeconomic regulatory function, is responsible for promoting China's sustainable development strategy, coordinating overall energy conservation and usage, carrying out environmental planning, and coordinating ecological construction and clean production. Local governments have also become responsible for environmental protection, which makes it easier to coordinate efforts across government agencies and actors. Our interviews show that, under the more powerful MEP, local governments become reluctant to intervene in a local firm's environmental activities. And in some regions—particularly developed regions—local governments began to participate actively in environmental protection.

Transparency and Monitoring: Increasing Standards and Monitoring of Environmental Disclosure

Consistent with the decoupling research on environmental greenwashing, scrutiny from outside actors serves as an effective disciplining mechanism.⁴¹ In China, the last few years have seen increased scrutiny in transparency issues—from governmental actors and the public—in the form of reporting, monitoring, and giving the public a voice.

Reporting. A number of entities in the Chinese government have been promoting environmental reporting standards. For example, the State Assets Supervision and Administration Committee encourages the largest state-owned enterprises (SOEs) to publish sustainable development reports and to submit quarterly, six-month, and annual environment statements. These disclosures then play a role in promotion decisions for SOE executives, so there are incentives to forego false claims and to avoid actual accidents.

In 2009, Shanghai launched its first province-level CSR standards, incorporating environmental responsibility, green statistical methods, technology innovation, and cleaner production.⁴² Local governments provide incentives—such as favorable foreign-exchange management, financial subsidy, and prompt annual inspections—to firms conforming to this standard. As of early 2011, 2000 out of 15,000 companies in Pudong New Area had adopted this standard and 500 more companies had applied to the government for official appraisals.

Beginning in 2008, the Shanghai Stock Exchange (SSE) required three types of listed firm to publish CSR reports: firms in the corporate governance sector and the finance sector and firms also listed in overseas stock markets. The Shenzhen Stock Exchange demands that certain listed firms issue CSR reports independently. As of April 30, 2010, 471 Chinese listed firms had published their 2009 CSR reports. The SSE also introduced a quantified index, “social contribution value per share,” computed by adding net profits, taxes paid, labor costs, net interest expenses, and donations; subtracting environmental costs; and dividing the result by the number of shares. In 2008, 76 listed firms disclosed this index, ranging from 8.42 RMB /share to RMB 0.15 RMB /share and averaging 1.97 RMB/share.⁴³

While the increase in reporting mandates is clear, it remains to be seen if the results are something more than elaborate greenwashing. Firms may still be focused on communication mechanisms rather than on substantive action. For this reason, the rise of monitoring processes to verify implementation is still a critical part of China’s recoupling.

Monitoring. China has made various efforts to establish more extensive monitoring of sustainability performance. Early in 2008, the MEP took a major step toward a "green securities policy" by stipulating that highly polluting companies must pass environmental inspections when applying for an initial public offering (IPO) or for refinancing. The regulation, building on a China Securities Regulatory Commission requirement that companies planning IPOs should include an MEP assessment with their application, targeted companies engaged in power generation and steel, cement, and aluminum production and companies in what are called "double-intensive" industries—high energy consumption and highly polluting industries such as metallurgy, coal, textiles, and paper. Companies that operate in only one province can seek assessments from local authorities, while those that operate in multiple provinces need MEP approval.

MEP and environmental protection agencies at other levels have been investing extensively in environmental-monitoring systems which can provide a basis for enforcement. By 2008, there were 131,000 environment-monitoring devices, 3,793 air-quality-monitoring spots, 9,635 water-quality-monitoring sections on land, and 1,203 water-quality-monitoring spots offshore. 1,021 cities had initiated quality monitoring of their drinking-water sources. In addition, in 2010, a monitoring network was further established throughout the country, including an automated real-time system to monitor surface water and an automated air-quality detection system covering 113 key environmental protection cities. As of 2011, there are 2,492 environmental monitoring institutes, with 53,000 staff, across the country.

Policies to Give the Public a Voice. The Chinese public is becoming increasingly aware of and concerned about environmental abuses and is exerting increasing pressure on corporations and the government to improve standards. In 2006, the MEP released the Environmental Impact Assessment (EIA) process, the first official act in China to encourage broad public participation in environmental issues. It clarifies the rights and obligations of the

public, developers, and environmental groups in the EIA process and specifies five vehicles for public participation: opinion surveys, consultations, seminars, debates, and hearings. Project developers or their commissioned EIA agents are required to represent a broad range of regions, occupations, and expertise when selecting individuals or groups to review their reports. They are also required to make these assessments clear, concise, and widely available to the public.

Global studies have found that societies can experience a rise in environmentalism both as a direct response to increasing degradation of the environment⁴⁴ and as an effect of rising affluence.⁴⁵ In this latter case, environmental quality is viewed as a luxury good that a country pursues once its citizenry has accumulated sufficient wealth to meet more basic needs.⁴⁶ In China, it is not only those directly affected (for example, by polluted water) that have started to voice their complaints; the general public is increasingly expressing concern for the natural environment. NGOs, environmentalists, and the consumer movement are all putting pressure on polluting firms. In 2001, environmental protection agencies at various levels received 369,712 letters of complaint/reporting, but by 2008, the number had risen to 705,127.⁴⁷

The general public uses numerous media channels to provide and obtain information on environmental issues. The Internet, in particular, plays an increasing role in the growing public pressure on those issues.⁴⁸ After the 2010 Dalian oil spill, for example, the afflicted fishing residents kept appealing to higher authorities for financial compensation and Internet users disclosed subsequent events to increase the publicity. There were 420 million Internet users in China in 2010 and the number is expected to climb to 750 million by 2015. These users access an increasing wealth of information (for example, from miniblogs, called “*weibo*” in Chinese), including information about direct threats to their health.

For example, the hidden danger from the Xiamen PX plant discussed earlier was

disclosed by an academic at the Chinese Academy of Science and was disseminated to the general public through the Internet, emails, and cell phone messages. In response, Xiamen citizens held a large-scale demonstration to protest against the PX construction project. The local government then used the Internet to conduct a public opinion poll and held a public symposium, inviting civil representatives, members of major political bodies such as the Consultative Conference, and the local media. Eventually, the PX project was forced to leave.

In summary, the recoupling of regulation and enforcement is gaining momentum in China. Mechanisms include a shift in government priorities from economic growth at all costs to sustainable growth, an increasing alignment of government entities so that environmental protection efforts are not consistently undermined, and a rise in the availability of environmental information and the establishment of standards for disclosure by businesses. This transition from decoupling to recoupling creates tremendous uncertainty for business. Under the old paradigm of decoupling, economic growth dominated all other objectives, so all levels of government had a pro-business orientation.⁴⁹ Businesses therefore operated in a relatively certain environment in which environmental issues were seldom salient. The recoupling process, however, can increase firm uncertainty. Economic growth is still important, but sustainable development is gaining ground. Economic development still matters for official promotion while new incentive packages, intended to promote sustainable growth, take time to develop. New policies are implemented to different degrees in different regions, where there are different balances of bargaining and lobbying power amongst sectional interests, consumers, community residents, and other stakeholders.

What should firms do in this uncertain environment? How should they deal with each of the major areas identified?

**IMPLICATIONS FOR DOING BUSINESS IN CHINA:
EFFECTIVE ENVIRONMENTAL STRATEGIES
FOR CORPORATIONS**

While prior work on how companies address regulatory uncertainty focused either on particular regulations⁵⁰ or on particular organizational characteristics,⁵¹ our theoretical framework clearly identifies how companies can address the uncertainty stemming from changes in state priorities, structure, and actions. Such macro-environmental uncertainty is particularly important in emerging markets characterized by insufficient and ineffective market institutions and by lack of the rule of law.⁵² We build on prior theory that has found that perceived uncertainty may create an advantage for innovative firms.⁵³ In this section, we draw on recent examples, uncovered during our research, of how both multinational corporations (MNCs) and Chinese companies created successful strategies to address (a) shifts in priorities and incentives, (b) bureaucratic realignment, and (c) increased transparency and monitoring.

Strategies to Address the Shift in Priorities and Incentives

As described above, the shift of China's national development strategies from raw economic growth to more sustainable development brought changes in environmental regulation and enforcement. What follow are strategies for organizations to address this shift by aligning their goals with governmental signals and by embracing environmental innovation.

Align with governmental signals. Sociological research has identified that there are important normative features of governmental action whereby governments with weaker coercive features establish principles and signal values and priorities through their actions.⁵⁴ China is no exception, but what is unique about China is that it still has a powerful government that plays a critical role in allocating resources and business opportunities.⁵⁵ Thus, a corporation doing business in China should make a particular effort to *focus on the areas that the government has signaled to be important*, particularly in the area of industrial policy, in order to identify areas of future growth. Our informants revealed to us that

successful companies in China devote significant time and resources to analyzing the business implications of announced governmental plans and policies in order to detect opportunities. For example, Advantech, a Taiwan-based MNC, extensively studied the 12th Five-Year Plan, in which it found huge opportunities in smart devices connected to the Internet and in technical infrastructure in Western China. As a result, Advantech has enjoyed about 30 percent sales growth in the past two years. In the environmental realm, over 80 multinational and Chinese firms have joined the China Greentech Initiative in a collective effort to better understand—and profit from—the Chinese government’s recent attention to environmental issues.

Following the Chinese government’s signals, many foreign and domestic banks initiated environment-friendly credit policies. Bank of East Asia launched “Recruitment and Selection of Green Credit Program” activities to promote green business models. The private equity department of Development Bank of Singapore established a billion-dollar fund for investment in the environment protection sector and to encourage the promotion of new energy. Standard Chartered issued a Green Credit Policy targeting small and medium-sized businesses. Many foreign banks, such as ABN Amro, Deutsche Bank, and HSBC, developed new financial products addressing climate change and taking advantage of the Carbon Trading System. In 2010, China PingAn Group, an insurance and asset management company, launched its “Low-carbon Action 100” project, promoting sustainable development through financial products and services innovation. It details 100 concrete actions by which companies can reduce their energy consumption and carbon emissions. Such measures help these foreign banks win approval by the Chinese government and other authorities; China PingAn Group was named “Best Low-carbon Enterprise in China” by *Economic Observer* and the Economic Observer Research Institute, received the 14th Asian Insurance Award—Corporate Social Responsibility Award from *Asia Insurance Review*, and was

designated one of the "Top 100 World Low-carbon Environmental Driving Forces in China" by the World Economic and Environmental Conference.

Taken together, these examples suggest three ways for companies to better follow governmental signals:

Be preemptive in order to anticipate policy change. When the Chinese government first called for building a harmonious society, Vanke, a real estate company, realized that future government policy might require residential buildings to include levels for the rich, the middle class, and the poor. The company then set about developing mixed-income residential communities. This preemptive policy helped Vanke to stabilize its business during economic fluctuations and to become the largest real estate company in China.

Study policies extensively. As we saw with Advantech, careful study of government policies, such as the Five-Year Plans, can reveal huge business opportunities.

Do not overtly challenge the government's environmental policies. Partly due to China's colonial history, the Chinese government is very sensitive to MNCs challenging its authority. Google is a recent and prominent example of a foreign company losing business in China by openly challenging the government.

Embrace environmental innovation. In parallel to its focus on environmental protection, the Chinese government has encouraged environmental innovation, aiming to make China a leader in solar, wind, and battery technologies. Each of these industries has experienced rapid development in the past several years and has nurtured many companies.

Green technology innovation includes such fields as cleaner production technology, emission-reduction technology, and renewable-energy utilization technology⁵⁶ and has attracted a growing number of firms. Engine manufacturer Weichai Power, for example, developed a mission of "Green Power, International Weichai." In 2005, it designed and produced the "Blue Engine" line, the first 10- and 12-liter high-power engines based on the

European Union (EU) III emission standard. Compared to previous engines based on the national II standard, the “Blue Engine” reduces sulfur dioxide by half, total pollutants by 40 percent, and energy consumption by 5 to 10 percent—down to 3 grams/watt/hour and below the world record. China introduced the national III standard in 2009 and will adopt the national IV standard in 2012, but Weichai had already produced EU IV products in 2006 and EU V products in 2009, several years ahead of the Chinese government’s requirements. Such environmental friendly innovation going beyond governmental regulations not only brought Weichai various awards and a high reputation, but increased its market share and profits. By 2009, Weichai had over 40 percent of the Chinese market for trucks over 14 tons, more than 80 percent of carriers used Weichai engines, and the firm had become a credible challenger to Cummins.

Environmentally conscious projects range from forest-recovery to oil-erosion-restoration to pollution-source-control programs. For instance, a Chinese press published a book using 100-percent-recycled paper in 2008. The 50,000 copies of the book saved 313 trees, 1,840 cubic meters of water, 11,000 kilowatts of electricity, and 5,500 kilograms of chemical materials. The 2009 Beijing Book Fair saw dozens of publishers using more recycled paper; about 30 percent of the books were printed on “green” stock. In addition, Beijing Hongwenguan Press and Xianzhi Xianxing Press promised to print exclusively on recycled paper within three years.

Companies can also *promote their environmental awareness* to the public through their websites and CSR reports, through interactive media such as Internet forums and miniblogs, and at trade fairs and public events such as the 2010 Shanghai World Expo. Broad Group, for instance, built its six-story pavilion at the Shanghai World Expo in one day using a new sustainable prefabricated building technology that is five times more energy-efficient and six times more material-efficient than a comparable traditional building. The Broad Group

pavilion is also able to withstand a magnitude 9 earthquake and has an interior air quality that is 20 times cleaner than that of normal buildings. Such efforts build both corporate reputation and competitive advantage.

Strategies to Address Bureaucratic Realignment

As described above, the structure of the Chinese state bureaucracy has recently been reorganized and rationalized; the MEP has been elevated in importance and environmental protection efforts have been better coordinated. However, there are still conflicts between administrative levels and between agencies. To address this uncertainty, firms should avoid regulatory shopping and should integrate local and global standards.

Avoid regulatory shopping. Both MNCs and domestic firms have taken advantage of China's regional competition and fragmented bureaucracy to "shop around" for lower—sometimes deliberately lowered—environmental and labor standards. But as China's bureaucracy becomes more aligned with national goals for environmental protection and environmental security, this is becoming increasingly difficult. Although Foxconn, a controversial contract manufacturer, recently shifted some facilities to interior provinces such as Henan and Sichuan to take advantage of lower cost and scrutiny in these regions, firms now risk losing public image and competitive advantage by being seen as exploitive. As China's interior areas develop, as national and local development strategies shift, and as the bureaucracy becomes more integrated, MNCs in particular should recognize that there are increasing long-term costs to regulatory shopping that may outweigh the short-term benefits.

Integrate local and global standards. The combination of bureaucratic realignment and increasing globalization requires MNCs to integrate local and global standards of environmental protection. MNCs can find themselves faced with a variegated institutional environment and competing stakeholder demands. For example, MNCs can benefit from China's lighter environmental regulation, low-cost labor, and government incentives such as

tax benefits, yet both the government and the public expect these firms to *contribute to China's development by bringing in advanced technology and higher standards of environmental protection, product quality, and treatment of labor*. Over the past several decades, some MNCs have capitalized on China's bureaucratic fragmentation to use the Chinese market as a place to dump products that would be considered inferior or outdated at home. This strategy has cultivated distrust and grievances and, as China's bureaucracy becomes more aligned, such strategies are increasingly out of favor.⁵⁷

The growing prosperity of the Chinese market has led many MNCs to shift their focus from supply chain issues to *engage more closely with local stakeholders in China*. For such firms, conducting R&D in environmental-friendly technology in China becomes a new competition strategy. For example, almost all MNCs in the automobile industry—including Toyota, GM, Volkswagen, Mercedes-Benz, Honda, Hyundai, and Ford—have established major R&D centers in China. One focus of these R&D centers is energy-saving technology. As early as 2007, Volkswagen (China) promised to reduce energy consumption and emission by 20 percent in all automobiles under its brand by 2010. Many MNCs started to publish China-specific CSR reports or at least to translate their global CSR reports into Chinese. GE's 2009 environmental report included China-specific information on resource consumption and emissions. We think that, as the Chinese state becomes more internally aligned, such integration of local and global standards will be a requirement for companies doing business there.

Strategies to Address Transparency and Monitoring

Both the government and the public in China are expecting higher standards of transparency and reporting from the companies. While for now this can create uncertainties for companies, their goal should be to meet—if not exceed—these expectations in order to build a robust reputation.

Be transparent. In the past, MNCs were reluctant to respond to local information requirements and complaints. But the increasing pressure from the government and the public, amplified by the Internet, have pushed MNCs and domestic firms to be more responsive and transparent. The Internet, because of its low cost, easy access, fast diffusion of information, and interactive posting, has become crucial to an organization's survival and success. At the same time, online "information" is difficult to verify and—due to the difficulty of regulating information flow on the Internet and the lack of rule of law in China—the harm caused by an online attack on a company's reputation can be swift, devastating, and hard to repair. The conventional business practice of trying to hide as much information as possible has become more and more untenable in the information era. MNCs doing business in China should therefore make sure to have a mechanism ready for managing transparency issues in an emergency. The global financial crisis has recently fired up the demand for transparency in the West,⁵⁸ but a combination of external and internal pressures are driving the same demand in China, where Western MNCs will be expected to lead the way in creating more open transparency norms. MNCs should therefore think well past damage control to promoting a high standard of transparency through their websites, CSR reports, environmental annual reports, news conferences, and so on.

Compete on reputation. Management scholars have demonstrated that reputation is a key intangible asset for a firm and that social and environmental activities are a way to gain reputation.⁵⁹ While the chaotic environment and informational asymmetry in China previously allowed widespread opportunism and irresponsible corporate behavior,⁶⁰ corporate reputation has become increasingly important with the transition to a market economy and the rise of the Internet. Companies doing business in China are less likely to get away with irresponsible behavior, including environmental abuse.

To compete based on reputation, firms must be consistent and ethical in their statements

and actions. Such a strategy begins with a *farsighted perspective when developing the firm's competitive strategy*. For example, when bribery was popular, particularly for real estate companies, Vanke consistently maintained its business ethics and developed its key business capabilities, which has proven to be an insightful and successful strategy in the long run. Broad Group, an air-conditioning manufacturer, was well known for its strict ethical standards, which prohibited any form of bribery for contracts by its sales staff.⁶¹ These firms have seen their good reputations become strong competitive advantages with the transition to a market economy.

Competition based on reputation, particularly for companies pursuing strategies of environment protection, also requires *environmentally aware corporate leaders*. The chief executive officer of auto maker BYD, for example, is described as an innovative and insightful technology fanatic whose innovations help save the environment. Since BYD first introduced its new-energy car, the F3DM, the company has gained policy benefits and government support. For example, in Shenzhen, an individual customer buying a BYD can have half the cost—some US\$19,000—subsidized by the central and local governments. Consequently, by 2010, BYD had become the fifth-largest automobile producer in China. Vanke, the real estate company, continuously makes efforts to reduce its carbon-dioxide emissions and emphasizes green as the key concept in construction largely because its chairman, Wang Shi, has a strong environmental consciousness; he even participated in the 2011 Copenhagen climate change summit as an independent business leader.

Lastly, *being consistent in word and deed is crucial for reputation*. As environmental issues became more important in China, many firms began to display their environmental awareness in corporate reports, company websites, and elsewhere. But when their actions did not live up to their claims, they were left wide open for attack by competitors, customers, and the general public. Ford, for example, invited more scrutiny from activists about its

environmental responsibility than its competitors did because its leadership had pledged publicly to create an environmentally friendly auto company.⁶² After the Sichuan earthquake in 2008, some MNCs were criticized as “iron roosters” (*tie gongji*, a Chinese idiom for stingy people) in part because their donations to the recovery did not strike people as matching their public claims to be socially responsible companies. The main reputational difficulty for Mengniu, a dairy company implicated in the 2008 melamine-tainted milk scandal, was not simply the scandal itself but the gap between Mengniu’s involvement in the scandal and its former CEO’s public presentation of the company as a pioneer of corporate social responsibility.

CONCLUSION

In this paper, we have analyzed the decoupling and recoupling of the regulation and enforcement of environmental protection in China and have presented major implications for doing business there. The theoretical framework we developed highlights three core dimensions of the changing situation in China: priorities and incentives, bureaucratic alignment, and transparency and monitoring. Identifying these dimensions helped us unpack the common mechanisms leading to the decoupling of regulation and enforcement, including incentives, regional competition, fragmented bureaucratic organization, and lack of transparency standards, all of which undermined enforcement. The same three dimensions helped us unpack the common mechanisms leading to the current recoupling of regulation and enforcement, including the shift in national development strategy from raw economic growth to sustainable development and a harmonious society, the reorganization and realignment of the Chinese bureaucracy, and increasing monitoring on the part of the government, the media, and the general public. Finally, our three dimensions helped us provide managerial recommendations, including following the signals of the changing national development strategy, embracing environment-friendly innovation, resisting the

temptation of regulatory shopping, integrating global and local standards, practicing transparency, and building a sturdy reputation, particularly with respect to protecting the environment.

While conducting our qualitative research, we remained grounded in general organization theories and frameworks as applied to state influence on organizations. In one advance over prior theory and research, we view regulation and enforcement as dynamic and interactive, evolving over time. Such a perspective allows us to identify the key recoupling mechanisms that have recently led to greater alignment between environmental regulation and enforcement in China. While much research has examined decoupling and, more recently, a few scholars have begun to examine recoupling, the particular bureaucratic and structural mechanisms underlying these processes have not been well identified. Further, while recoupling studies have mostly examined how it is driven by individual change agents in an organization,⁶³ our macro perspective at the nation-state level highlights how national-level regulatory systems can also be recoupled over time. Thus, our framework, as presented in Figure 1, provides important insights on how regulatory systems evolve over time, a fine-grained perspective which allows us to generate strategic recommendations for business leaders.

Our approach also helps us understand regulatory and economic changes in other societies, especially those with emerging markets. The common perspective that environmental enforcement is decoupled from regulation in emerging markets⁶⁴ can now be augmented with an understanding of specific drivers for the decoupling and recoupling processes. Our theoretical framework and practical implications can therefore be used by both academic researchers and business practitioners in emerging markets where there is extreme regulatory uncertainty.

Companies doing business in China that fail to adapt to its rapidly changing

circumstances will increasingly fall behind. Our empirical findings also show that to be farsighted in linking internal and external strategies and actions is one of the keys to success in China. As one of our business executive informants put it, “You have to look to the future. Who could imagine what China would be like today 30 years ago? China is developing so fast. If you just focus on today, you will lose tomorrow.”

APPENDIX: Data Sources and Research Methods

Our data sources include both firsthand interview data and extensive secondary archival data. Between 2008 and 2011, we conducted 147 on-site interviews at 63 organizations in a broad cross-section of industries and at government entities, environmental NGOs, and business consultancies focused on sustainability issues. (See Table A1 for a numerical summary.)

The companies include a number of well-known private Chinese firms such as Vanke, China's largest real estate company; BYD, an automobile manufacturing firm which produces new-energy automobiles; and Broad Group, the leading Chinese air-conditioning manufacturer. We also studied some key Chinese SOEs, including Weichai Power, an engine producer; State Grid, the country's main power supplier; China Ocean Shipping; and Industrial and Commercial Bank of China. Among MNCs and other important market participants, we conducted on-site interviews at Advantech, a Taiwan-based industrial computer manufacturer; Tsing Capital, an environmental venture-capital firm; and the China Greentech Initiative, a sustainable development consulting firm. We conducted additional in-depth interviews at 20 small-to-medium-sized enterprises (SMEs).

For five of the companies mentioned above, we developed in-depth published case studies of their social and environmental management and reporting processes.⁶⁵ Developing these case studies allowed us to gain insight into the changes in China's environmental regulations and enforcement as well as into firm practices. As described in Table A-1, we also interviewed a number of consultants—including people from McKinsey, PricewaterhouseCoopers, Syntao, and Business for Social Responsibility—who were working with companies on their environmental management issues. We also interviewed a number of government officials to learn about the changes in environmental protection,

regulation, and enforcement. The majority of our interviews were recorded and transcribed, allowing us to refer to them while developing our theoretical framework.

In addition, we searched archival and media data extensively to better understand environmental management practices in China. Such archival data ranges from laws, regulations, and national policies to local government enforcement activities and the corporate responses to environmental actions. In particular, we searched various MEP archives, news reports, and hundreds of CSR reports. In many cases, archival research corroborated information we had already obtained in interviews. Where possible, we provide endnotes to our archival sources so readers can examine those cases in more detail. The combination of primary and secondary data gives us both breadth and depth; our knowledge of the facts has helped us identify the underlying generalizable mechanisms.

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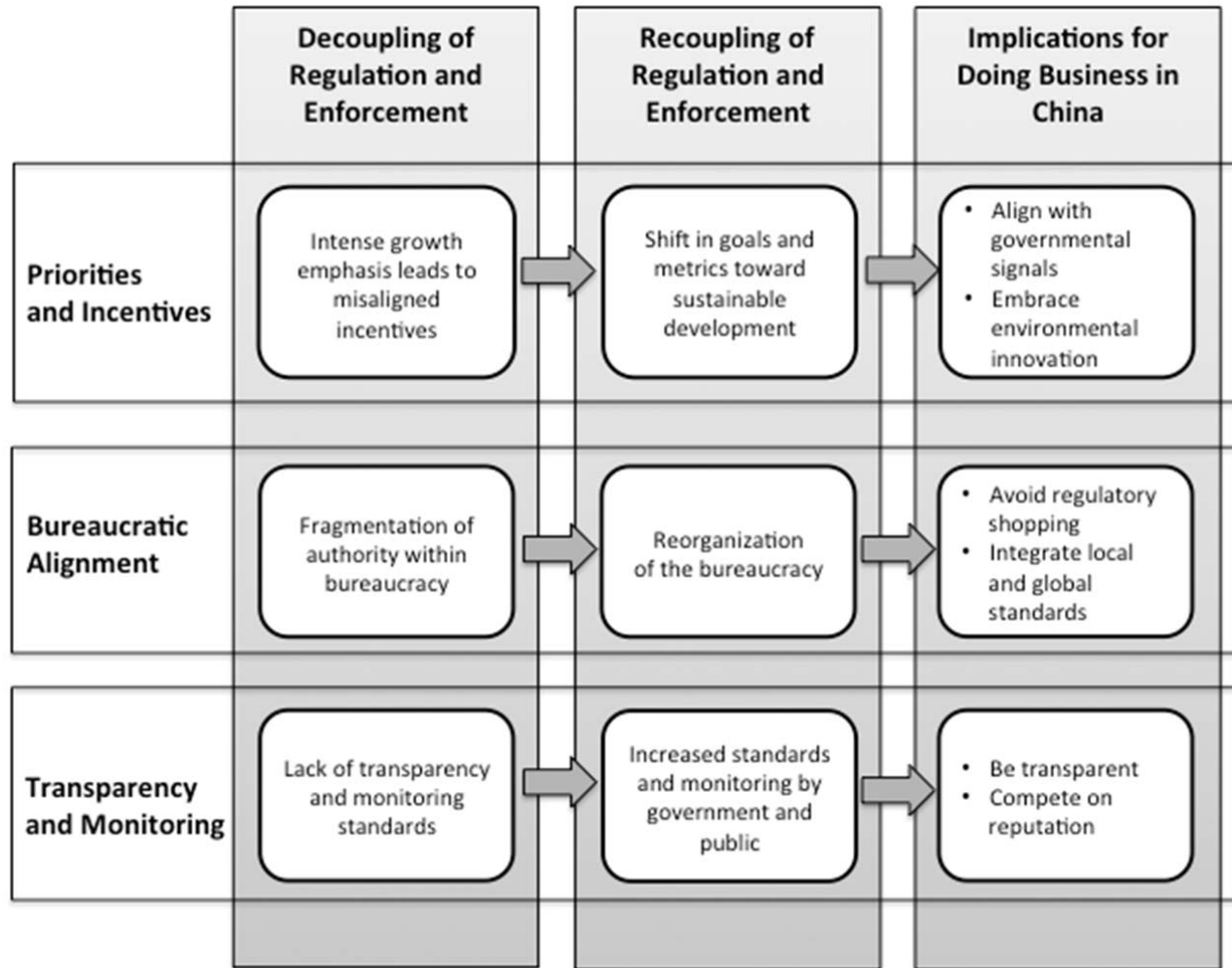
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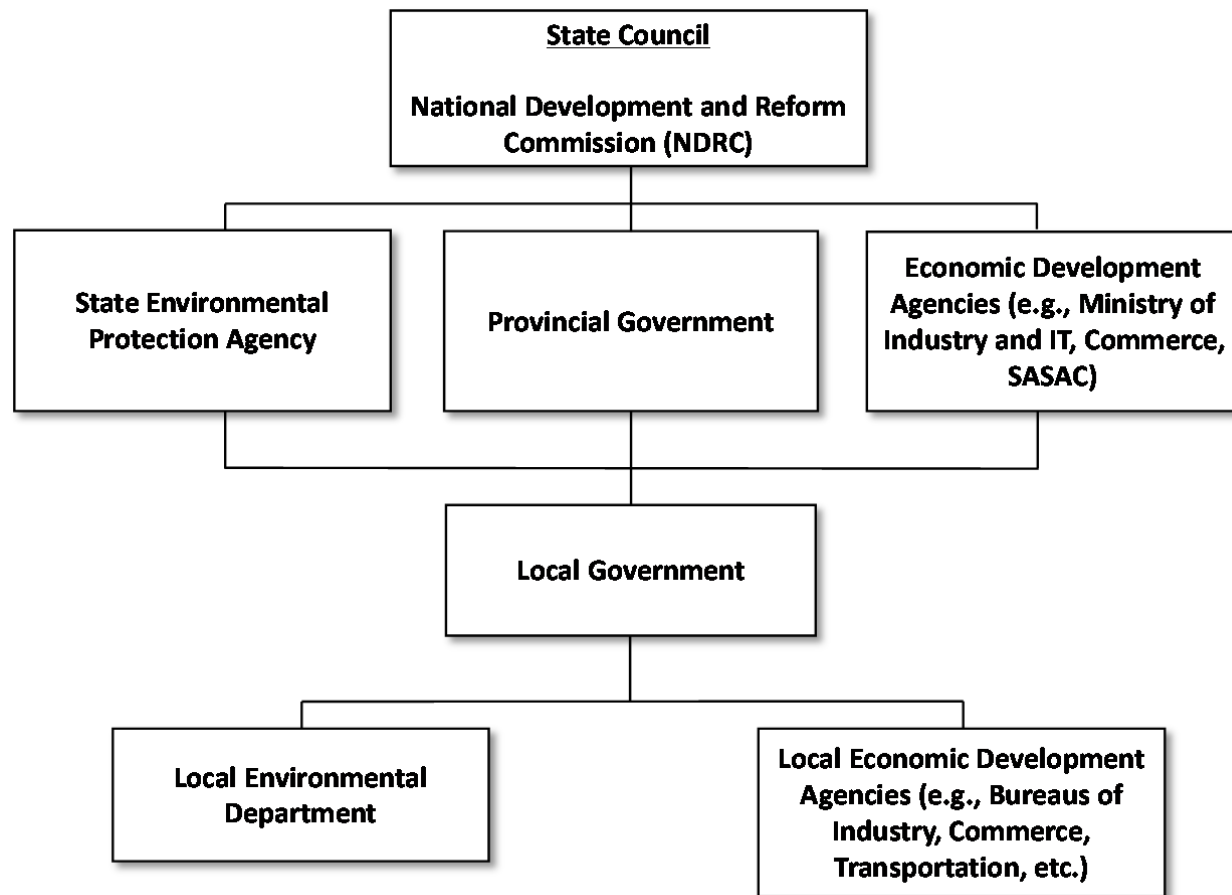
⁶⁴Frederick H. Buttel, "World Society, the Nation-State, and Environmental Protection: Comment on Frank, Hironaka, and Schofer", *American Sociological Review*, 65 (2000), 117-21.

⁶⁵ Christopher Marquis, Nancy Dai, Dongning Yang, and Hong Wu. "State Grid: Corporate Social Responsibility." *Harvard Business School Case* 410-141 (2010); Christopher Marquis and Nancy Dai. "China Environment Fund: Doing Well by Doing Good." *Harvard Business School Case* 410-142 (2010); Christopher Marquis, Lynn Yin and Nancy Dai. "Broad Group" *Harvard Business School Case* (Forthcoming, 2011); Christopher Marquis, Lynn Yin Laura Valez. *China Greentech Harvard Business School Case* (Forthcoming, 2011); Christopher Marquis, Dongning Yang and Lynn Yin. *COSCO Harvard Business School Case* (Forthcoming, 2011).

Figure 1:
Framework for Understanding the Decoupling and Recoupling of Regulation and Enforcement in China



**Figure 2:
Fragmented Authority within the Chinese Bureaucracy**



**Figure 3:
Major Chinese Environmental Laws since 2000**

Environmental Protection Laws	Summary of Main Provisions
Law of the People's Republic of China on Urban Real Estate Industry Regulation (2011 revised)	Land-use right, exploitation of real estate, real estate transaction (housing mortgage, transfer, and lease), real estate management
Law of the People's Republic of China on Water Pollution Prevention and Control (2008 revised)	Control pollution of drinking-water sources, industrial pollution, agricultural non-point source pollution, and ecological damage.
Law of the People's Republic of China on Energy Saving (2008)	To reduce energy consumption in all aspects of production, to achieve effective and rational use of energy.
Law of the People's Republic of China on Renewable Energy (2006)	To deliver renewable energy industry instruction and technical support, including economic incentive and supervision measures
Law of the People's Republic of China on Solid Waste Prevention and Control (2004)	Reduce Solid-waste emission, fully utilize decontaminated solid waste, promote clean production and recycling economy
Law of the People's Republic of China on Promoting Clean Production (2002 revised)	Clean-production instruction and incentive measures
Law of the People's Republic of China on Environmental Impact Assessment (2002)	Planning and implementation of environmental impact analysis, forecasting and assessment of construction projects
Water Law of the People's Republic of China (2002)	Development, use, conservation, protection, and management of water resources
Grassland Law of the People's Republic of China (2002)	Protection, use, and development of grassland, conservation of biological diversity, development of modern cattle husbandry
Law of the People's Republic of China on Air Pollution Prevention and Control (2000)	Air-quality monitoring, combustion-pollutant control, motor vehicles and vessels emissions control

**Figure 4:
Key Environmental Provisions and Goals of the 12th Five-Year Plan**

Key Priorities		Binding Targets Set for the End of 2015 (%)	
<ul style="list-style-type: none"> • Enforcing low-carbon regulations, including mandatory implementation(s) • Implementing performance accountability, adopting “green” indicators • Promoting energy-efficient technology innovation and use of renewable energy • Adopting pricing scheme on carbon emission and fiscal incentives on non-fossil fuels • Encouraging investment in ecological environment-friendly industries • Improving rural environment quality, promoting clean production • Advancing recycling economy and enhancing pollutant control 		Energy reduction per unit of GDP	-16
		CO ₂ emissions reduction per unite of GDP	-17
		Water usage reduction per unit of industrial added value	-30
	Emissions reduction of key pollutants	CO ₂	-8
		SO ₂	-8
		NO _x	-10
		Ammonia nitrogen	-10
		Non-fossil fuel consumption vs. total primary energy consumption	+3.1
		Forest coverage	+1.3

**Table A1:
Summary of Interviews Conducted by Organization Type, 2008-2011**

Organization Type	# Organizations	# Interviews
Consulting	11	20
Government	7	8
Multinational Corporation (MNC)	14	32
Nonprofit Organization	10	13
Private Chinese Firm	14	34
State Owned Enterprise (SOE)	7	40
Grand Total	63	147