

LUMES Master Thesis 2005
Lund University Master's Programme in International Environmental Science

**Environmental regulation and economic competitiveness:
Evidence from the textile industry in Vietnam**

Minh Tran
LUMES
Lund University
P.O. Box 170
221 00 Lund, Sweden
E-mail: tranminhvkt@yahoo.com

Thesis supervisor
Dr. Mats G E Svensson
Centre for Environmental Studies, MICLU
Lund University P.O Box 170
221 00 Lund
Telephone: +46 0703 89 82 20
Email: Mats.Svensson@miclu.se

Thesis for the fulfillment of Master of Environmental Science
Lund, Sweden, November 2005

Acknowledgements

Firstly I would like to thank the Swedish International Development Agency (SIDA) for the financial support through the SIDA/SAREC program in Vietnam. I am deeply grateful to Dr Lennart Olsson and Dr. Anne Jerneck for giving me the opportunity to study in LUMES, Lund University.

I would like to express my most gratitude to Dr. Mats G E Svensson for his excellent supervision, patience and kindness. Your academic guidance, moral support and continual encouragement made my thesis come true. Thank you !!!

Asa Grunning, LUMES coordinator, thank you for all that you have done for me and LUMES family.

I would like to thank Mr. Cao Huu Hieu in Vietnam Textile-Garment Corporation (VINATEX) for his valuable expertise and for the working contacts he made for my field study in the textile firms in Hanoi and Namdinh. It is a pleasure to work with you and we both knew that we became good friends. All the best to you and your family.

I extend my thanks to the people I worked with in Vietnam's Ministry of Planning of Investment, Ministry of Industry, Ministry of Natural Resources and Environment, Center for Sustainable Development of Communities and Business Entities, Vietnam Institute of Economics, Institute of Textile and Garment, Institute of Trade for their invaluable information and unconditional cooperation.

LUMESians, for making a very friendly and warm learning environment; for the times we were together, always full of laughs. I will miss you a lot.

And finally, to my parents, my beloved wife and my son, thank you for all the love, encouragement and support you have given me during these years. How can I say how much I love you?

Abstract

Companies with their own pursuit for profits usually oppose the environmental regulation which is perceived as increasing the production cost. The Porter hypothesis represents that benefits from the compliance with environmental regulation will offset the cost through the technological changes and thereby improving the firm's production efficiency. How can it be? What are the determinants of responses by firms to environmental standards set by governmental authorities? Vietnam, a developing country, where the struggle between economic and environmental goals is becoming fierce, provides sufficient conditions to test this hypothesis and possible implications can be made to enhance the environmental quality.

This thesis is an attempt to 1) test the above hypothesis in the context of some Vietnamese companies (case study in textile industry); and 2) examine the current environmental regulations – how it is made and implemented in Vietnam. The author examines the pressures facing Vietnamese firms (environmental regulatory, economic and social) in an interrelated way and explores their motivations, practices, perceptions and opportunities of some industrial establishments in Vietnam and to uncover barriers to their willingness, if any, to improve their environmental performance. It is well known that in one hand developing countries have been introducing lax environmental regulations and in the other the effective enforcement is questionable.

The one month survey in Vietnam, covering textile companies, textile experts, environmental regulators, economic policy makers, NGOs led to some empirical results concluding that the pro economic growth in Vietnam is still a dominant paradigm that hampers the effective implementation of environmental laws in one way or another. Flaws in the environmental law itself are a major problem. Lack of institutional coordination, lack of funding and under-trained technical staff are among major obstacles.. When Vietnam is in a low stage of development, losing economic competitiveness is a very good reason for environmental authorities to treat “gently” and companies to avoid improving their environmental performance.

Kommentar [MS1]: Your work here...

Keywords: environmental regulation, economic competitiveness, Vietnamese textile industry, Porter hypothesis

Abbreviations

ASEAN	Association of South East Asian Nations
CAC	Command and Control
CLD	Causal Loop Diagram
CO	Carbon monoxide
CO₂	Carbon dioxide
DoNRE	Departments of Natural Resources and Environment
EU	European Union
GDP	Gross Domestic Product
IIRS	Institute of Industrial Research and Strategy
LEP	Law on Environmental Protection
MBI	Market based instrument
MONRE	Ministry of Natural Resources and Environment
MOSTE	Ministry of Science, Technology and Environment
NCSSH	National Centre for Social Sciences and Humanities
NEA	National Environmental Agency
NGO	Non-governmental organization
NO₂	Nitrogen Dioxide
R&D	Research & Development
SRV	Socialist Republic of Vietnam
SOE	State-owned enterprise
SO₂	Sulfur Dioxide
TCVN	Vietnam Standard
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
VEPA	Vietnam National Environmental Protection Agency
VIE	Vietnam Institute of Economics
VINATEX	Vietnam Textile-Garment Corporation
VINATAS	Vietnam Textile-Apparel Association

Table of Contents

<i>Acknowledgements</i>	ii
<i>Abstract</i>	iii
<i>Abbreviations</i>	iv
Table of Contents	5
Part I Introduction	6
I.1 Research questions	6
I.2 Objective and Scope	7
I.3 Methods and Material.....	7
Part II Theoretical Background	11
Porter hypothesis of environmental regulation	11
Part III Vietnam industry with focus on textile-garment and Environmental regulation	15
III.1 The Current Growth and Industrial Environment in Vietnam	15
Growth in Vietnam	15
Industrial Water Pollution	15
III.2 The textile industry in Vietnam	16
III.2.1 Overview of textile-garment industry	16
III.2.2 Sectoral Competitiveness.....	18
III.3 The Environmental Institutional Framework in Vietnam	21
- Ministry of Natural Resources and Environment (MoNRE).....	21
- Vietnam National Environmental Protection Agency (VEPA).....	22
- Environmental Institutions at Local level	22
III.4 Environmental Legislative Framework.....	23
- Constitution	24
- Law on Environmental Protection.....	24
- Vietnamese Standard System	25
Part IV Results	25
IV.1 The current situation of the companies.....	26
IV.1.1 Economic performance	26
IV.1.2 Environmental Impacts.....	27
IV.1.3 Corporate Environmental Management.....	29
IV.1.4 Pressures on companies	30
IV.1.5 Remarks	33
IV.2 Analysis of Vietnam current environmental Regulation	35
IV.2.1 Shortcomings in the Law on Environmental Protection.....	35
IV.2.2 Ineffective Implementation of Environmental Laws – Problems of Institutional Framework	37
IV.2.3 Remarks regarding the legislation and corrective functions.....	40
Part V Conclusion	40
References.....	42
Appendix 1 Research Map – the North of Vietnam	45
Appendix 2 Terminology.....	46
Appendix 3 List of key informants and Companies	47
Appendix 4 Typical traditional silk making and waste flow in Van Phuc Silk Village (Simplified).....	48
Appendix 6 Images of working conditions in some textile firms.....	50

Part I Introduction

Pollution in Vietnam became noticeably severe since the introduction of market-oriented reform and opening of the economy in 1989. This reform, from the developmental view, helped Vietnam escape from the economic crisis in the mid-1980s and maintain its high annual GDP growth rate during the 1990s (NCSSH, 2001). Much of this development is attributed to the growth of the industrial sector and the exploitation of natural resources. On the other hand, it caused tremendous damage to the ecological environment, endangering human health and especially making the achievements of such economic reform unsustainable (VEPA 2002:9).

As seen in other developing countries, Vietnam's pollution situation should be placed in the context of many difficulties faced by the country in terms of urgent need for improved living standards, continuing pursuit of industrialization and modernization and an administrative-based macro management. Industrial firms are given policy priorities and natural resources to develop as fast as they can. Under such circumstance, legal and regulatory efforts have been exerted to curb the industrial pollution by imposing costs on firms but little success was witnessed.

In theory, however, a hypothesis called Porter hypothesis (Porter, 1991; Porter and van der Linde, 1995) suggests that a win-win situation is created where both firms and society's welfare would benefit from environmental regulation. It argues that environmental regulations stimulate innovation which, by enhancing productivity, increases firms' private benefits. Consequently, environmental regulations would not only increase the overall well-being of the society, they would also be good for firms.

It is interesting to test this hypothesis in the context of Vietnam as no similar attempt is ever made. Within limits of time and requirements for a Master thesis, a simple qualitative research is designed and Vietnam textile industry is chosen as a case study considering its development and serious pollution impacts. The thesis would bring some insights into the environmental legal regulation in Vietnam and the impacts they have on the industry.

I.1 Research questions

The thesis aims to answer the following questions, from the macro level of policy analysis to micro level of corporate management analysis:

- How the current environmental regulation works in Vietnam and under which socio-economic and political circumstances?
- Is there an implementation gap between environmental law making and enforcement? What are the reasons behind?
- What are the impacts that Vietnamese environmental regulations have on the economic performance of industrial companies?
- What are the motivations, practices, perceptions and opportunities of some industrial establishments in Vietnam and to uncover barriers to their willingness, if any, to improve their environmental performance?

I.2 Objective and Scope

The above questions form the analytical framework which includes objectives and scope of this research as follows:

- To provide an overall understanding of the law making process in environmental management in Vietnam;
- To assess the effectiveness of the implementation of environmental laws;
- To provide overall understanding of Vietnam textile-garment industry and its environmental impacts
- Choose some case studies in the textile to test the Porter hypothesis under the particular economic-social context and legal system of Vietnam.

Scope of this research is limited by these factors:

- *Space*: The field research is conducted in the North of Vietnam where a center of textile and garment locates; Hanoi, Haiduong Province and Namdinh Province are chosen as specific research spots.
- *Time*: The literature review covers the development of textile-garment industry since the beginning of Doi moi (Economic Reform) in late 1980s. The environmental regulation starts with the launch of Law on Environmental Protection in 1994. Interviews were made to capture the current situation.
- *Sector focus*: In order to see the exact environmental impacts of the industry, the research addresses the textile sector that is known for its pollution rather than the garment sector whose process is much less polluting. Consequently, emphasis is given to the body of environmental regulations dealing with industrial pollution instead going through the whole environmental laws and policies which are designed for monitoring many aspects: biodiversity, conservation of natural resources, agricultural pollution, afforestation, urban pollution etc. In the textile sector, in particular, concern will be concentrated more on wastewater and its impacts than on other sources of pollution.

I.3 Methods and Material

The methodology used in this research encompasses the following: 1) a literature search, 2) interviews with key informants, and 3) an analytical case study of some textile companies in the North of Vietnam. Steps 2 and 3 were conducted solely in Vietnam.

Literature search aims at:

I.3.1 Literature Search:

The literature search aims at:

- Collecting and studying related material in order to set the context and to gain insight on the relationship between environmental regulation and economic competitiveness which is widely observed elsewhere in the world.
- Collecting and studying relevant material on the development and state of environment within the Vietnam textile industry
- Collecting and studying the Vietnamese environmental policies and standards, especially those applying to the industry.

The search began with a review of existing peer-reviewed scientific articles, information in government reports, NGO reports, available data from private organizations, journals and periodicals, archives and the Internet websites.

I.3.2 Key Informant Interviews:

The research consists of 10 semi-structured personal interviews with state government officials who work in connection with environmental and economic matters, environmental experts in the textile industry such as research institutions, and non-governmental organizations (NGOs). I also unexpectedly interviewed one textile worker who currently works for the company I just visited in Hai Duong but the result was far from desirable since the person could not understand what I asked and was fear of being fired by the employer because the environmental aspect is among the “sensitive” questions for Vietnamese companies. It could have been more comprehensive if I could manage to have a deeper view in to the actual working condition experienced by textile workers and their understanding of the environmental matters (See *List of key informants* in *Appendix 2*).

Sometimes, the process to interview follows the Snowball approach. From a starting point of a few contacts working in the field of environmental regulation, one contact could lead me to another and the list built up over time. I did not do “sampling” in any way rather that I ask them to recommend someone they think relevant to my research topic based on their experience and knowledge of this field.

I.3.3 Corporate Case Study:

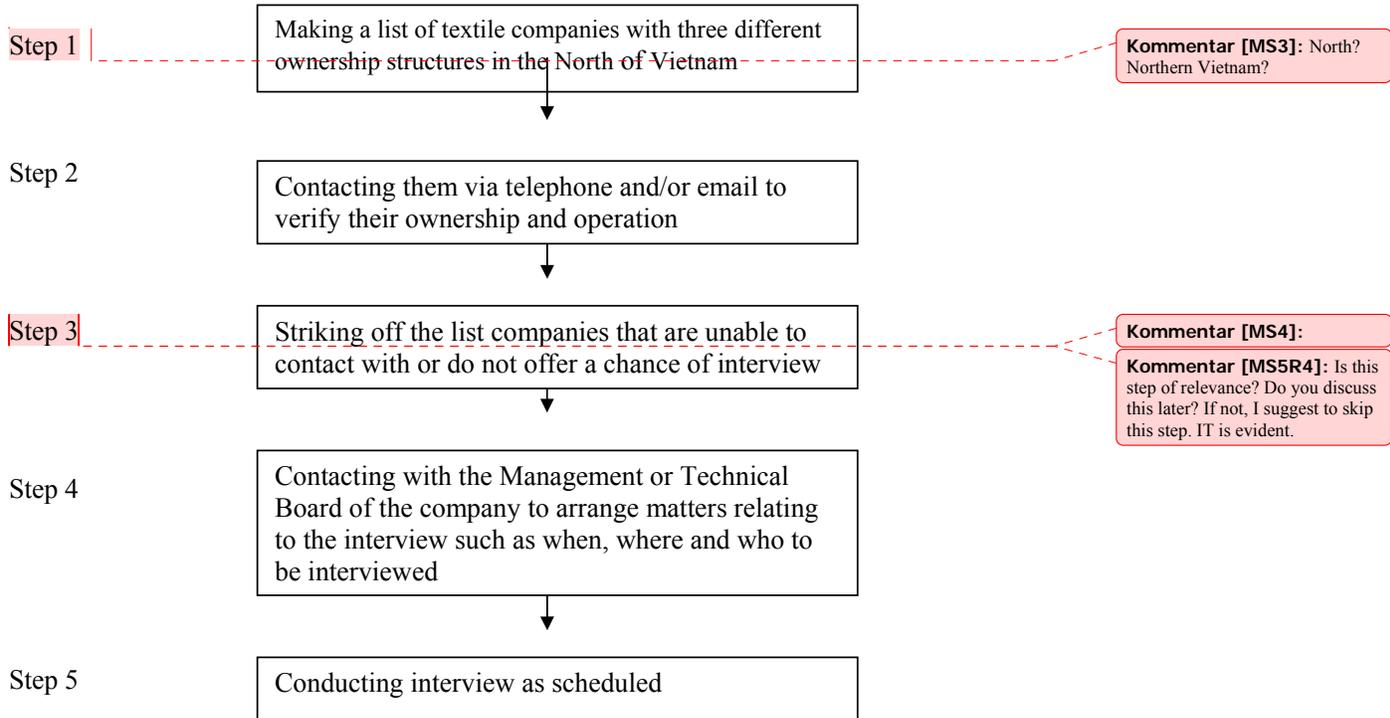
Textile firms were chosen to conduct interview for several reasons. *First*, its contribution to manufacturing output and employment is crucial. *Secondly*, it represents a geographical diversity; the textile firms are located all over the country. *Thirdly*, the industry is one of the most polluting industry using technologies that often is obsolete and environmentally unfriendly processes (Hill 1998). *Fourthly*, firms with various ownership forms- state, private and foreign owned - are operating in the industry. Along the thesis, garment sector and textile sector will treated as a whole industry when the author wants to show the economic upstream and downstream linkages between them. For the pollution analysis, only textile sector will be addressed.

Open-ended, corporate interviews with textile companies were conducted. This industrial sector was chosen for the fact that it is regarded as making great contribution to the economic growth, as one of the major export industries currently in Vietnam (VIE, 2001) and has also been identified as a highly polluting industrial sector by Vietnamese government authorities

as well as in a variety of literature (VEPA 2002, VINATEX 2003, IIRS 2001). Companies were classified and chosen in terms of their ownership to see the possible differences between their economic situations, environmental performances and responses to regulatory requirements.

Kommentar [MS2]: Inot what?

The process of doing interview with corporate establishments is described in the chart below



In case that the interview is postponed for any reason, either a questionnaire is sent out to the company or the interview is rescheduled in another time.

The corporate interviews have helped to identify motivations, practices and opportunities for improvement in their environmental performance in the context of harsh competition within the industry. More importantly, the interviews were conducted to investigate how they really perceived the impact of environmental regulations on their economic performance i.e. their short-term profits and their environmental performance. For example, the interviews investigate the reasons why certain companies have (not) chosen to improve their environmental operations, how much they invest in the improvement of machine, the environmental and economic benefits that they experience from doing so and how they actually deal with the inspections by environmental authorities. The difference in ownership (state-owned, private-owned and family-run) among investigated firms may imply correspondent differences in their responses to environmental standards.

All of the interviews were conducted in Vietnamese except for the one with a UNEP representative, and notes were taken continuously during the interviews. Shortly after each

interview, the responses were carefully translated from Vietnamese into English by the author. Each interview took approximately 1 1/2 to 2 hours.

Kommentar [MS6]: By whom?

I.3.4 Limitations of the survey results

Although the interviews were conducted in a face-to-face manner, the results were inevitably subjective in favor to the respondents. The limitations are the common disadvantages of open ended qualitative interviews. Understanding of these limitations enables a more objective and precise interpretation of survey results.

- Companies in general are unwilling to talk about their environmental performance and their responses to the authority's standards and regulations. It is not too hard to realize that their environmental performances are not always good to show out or maybe even the management doesn't know. Especially when it comes to the questions how the companies interact with inspection by regulators. The common sentiment among companies is to keep a "negotiative relation" with the authorities, including the environmental regulators.

Kommentar [MS7]: What do you refer to here? Not a full meaning.

- Some respondents were reluctant in commenting the current environmental legislation, determinants of their environmental improvement, and what petitions could be made to the legislators. In addition, most of the companies interviewed were unwilling to provide the information which is perceived as "sensitive" such as profits, investment plans and costs etc.

- Their information on the technological processes and their environmental impacts is primarily subjective. Also are their personal opinion about environmental regulations and their own violations of environmental standards. Then the quality of information relies very much on their willingness to give correct and complete answers.

- The respondents themselves did not clearly understand some concepts in the questions. Some questions were beyond their knowledge, authority and field of expertise and so the answers were much of reference value. And I sometimes did not understand their answers due to my limited knowledge.

Part II Theoretical Background

Porter hypothesis of environmental regulation

The hypothesis about the environmental regulation and economic competitiveness was first forwarded by Michael E. Porter, a leading economist in competitive strategy in 1991. Later on, in 1995 it was further sophisticated in an article by Porter and van de Linde and became the known Porter hypothesis. The hypothesis asserts that stringent environmental regulation make firms apply technological changes and cleaner production, thereby improving their production efficiency and subsequently economic competitiveness (Porter 1991, Porter and van de Linde 1995). More efficient production process means better cost saving and this benefit is able to offset the compliance cost for environmental regulation and the innovative investment. As a cost leadership business strategy, those who move first towards the environmental improvement will enjoy the dominating market position, especially compared to firms in countries where environmental standards are implemented later.

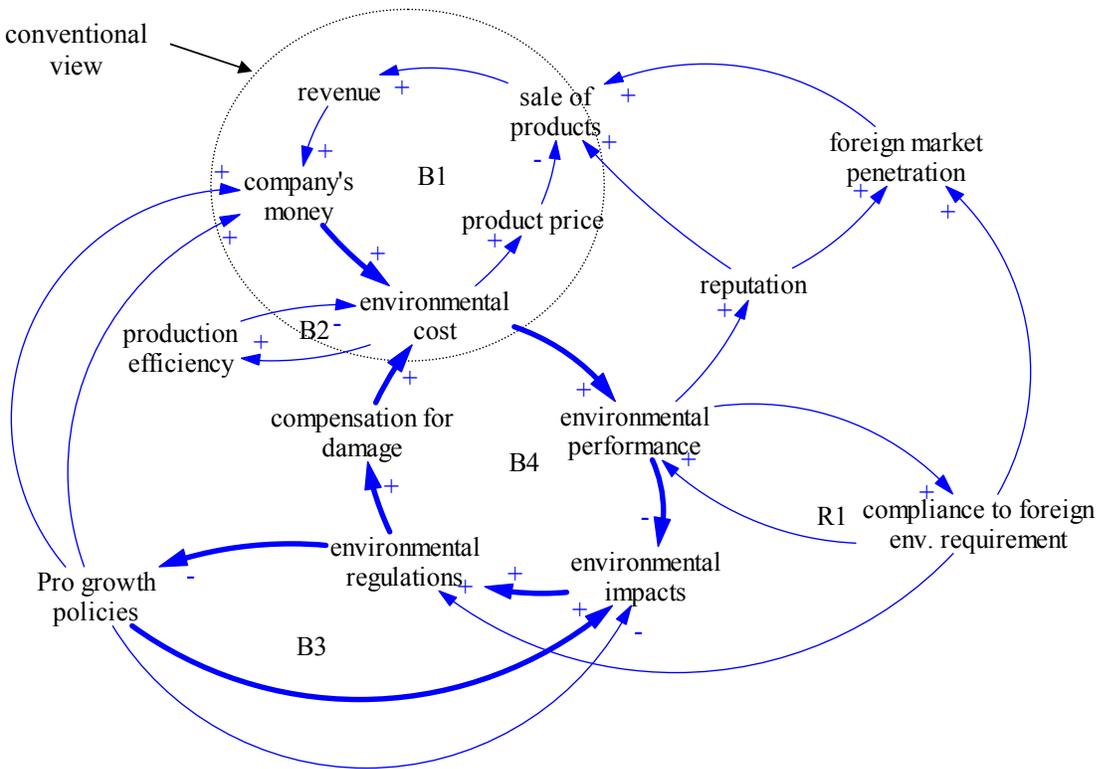


Fig 1. Causal loop diagram (CLD) of relationship between environmental performance and competitiveness and the interaction between environmental policies and economic policies.

The above causal loop diagram (CLD) was constructed by the author to briefly illustrate the cause and effect relations between several variables (Sterman, 2001). As a conventional wisdom, industrial companies, by environmental laws, have to internalize their externalities they generate with their production. That would increase the price of the products and services that in principle reduce the sales, especially in a competitive market (the upper part of the CLD). However, another way of thinking about environmental standards forwarded by Porter and van der Linde (1995) conceives that properly designed environmental standards can trigger innovation that may partially or more than fully offset the costs of complying with them (the lower part of the CLD). Such 'innovation offsets', as one can call them, can not only lower the net costs of meeting environmental regulations, but even lead to absolute advantage (p. 98). Investment in environmental aspects (environmental costs) improves both the environmental performance and production efficiency. Another effect that should be taken into consideration are the fact that by complying with environmental standards, firms are likely to have their reputation hailed by the media and public (the right part of CLD). It would also increase the possibility of penetrating into highly standardized foreign markets e.g. EU and the U.S. After all, with increased productivity and an expansion of consumption markets, firms, in not a short run, will find themselves in a situation of higher sales and higher profits.

As for the policy analysis (lower to the left part), while the pro-growth policies helps increase the overall income, it does not help industrial firms reduce the environmental impacts, let's say overexploitation of raw material, deterioration of living conditions and human health. A set of environmental policies therefore is crucial to improve the firms' environmental performance balancing the destructive impacts of such economic growth. In the long term, such economic policies embedded with environmental ideas would facilitate the desirable sustainable growth by enhancing corporate income and reducing environmental impacts (*broken strokes*).

In Porter hypothesis, other external factors that could be drivers of change are largely ignored. Here in the CLD one can see the penetration into foreign market as one of such drivers. Much research has been conducted to include these factors in explaining the corporate environmental performances (Piritta 1994, Carlos 2003, Susmita Dasgupta et al. 1997). They concluded that demand for environmentally friendly products from foreigners is one of major external forces for firms to adopt appropriate pollution control technology.

Over the past 10 years, the Porter hypothesis is widely and deeply tested both in qualitative and quantitative terms (Young 2003; Silvera 2000; Jaffe et al 1995; Cagno et al 2005; Murty 2003; Wagner et al 2004; Lefebvre 2003). And the results are more mixing than clearly supportive and many are still skeptical about the widespread existence of this hypothesis of such win-win opportunities (Murty 2003). One may find more empirical studies that show that regulation makes firms less efficient and competitive than studies showing the opposite. The results vary from country to country, region to region, sector to sector and even intra-sector. Then one key point can be made here. To understand the effects of environmental standards on firms' competitiveness we need to know the nature of firms and the settings against which they are operating in response to regulatory pressure rather than trying to simply say it does good or bad to the firms.

A broad based approach used in Lefebvre *et al.* (2003) makes a contribution to the understanding of this relationship. It is argued that firms' competitiveness depends on firms' characteristics, product characteristics and drivers of changes, which can be measured by product life cycle management score, environmental management systems and environmental R&D (see Fig. 1 *Conceptual Framework*, p.264). Environmental regulation is defined as one driver of changes, among others like pressure groups and morality.

In regard to the firm's characteristics, the size of firms, the aggressiveness of their technology and their environmental management systems are said to be potential determinants of firm's environmental performance (Lefebvre *et al.* 2003, p. 265). It is a common perception that large corporations in industrial countries have more resources to adapt themselves to such changes and therefore better maintain their competitiveness. The mining industries, for instance, are used to emphasize technology as a main competition tool, with a "virtuous" cycle between efficiency, innovative capacity and pollution control (Chudnovsky *et al.*, 1997 quoted in Carlos 2003). Meanwhile a cross country survey of Canadian and Australian firms by Annandale D. *et al.* (2003) concludes that *company size as less important determinants* (emphasis added) although saying large companies are more responsive to environmental regulation and the reasons given for this phenomenon are that large companies are more exposed to the public eye, and that they are able to respond because they have greater resources than small firms (p.126).

Kommentar [MS8]: Just because they are large?

Kommentar [MS9]: Covering which countries?

This divergence may suggest that there is still room for extensive research in the effects of firm's size on environmental performance. Carlos (2003) provides some insights into these characteristics with his research.

"where the innovative capacity is less developed, the advance of environmental control tends to be more concentrated in end-of-pipe solutions. Because of this, small and medium enterprises may have to face a disadvantage; however, this is not a problem concerning the size of the firm. Even if the company is large, an organisational structure that does not encourage innovation will induce only marginal improvements, such as end-of-pipe treatments that do not affect considerably the production profile. Therefore, these companies will face much more problems to adopt more radical changes than in firms where pre-exists an organised system to adopt innovations" (Young 2003, p.88)

One feature of firms that is under-studied is the ownership. The expenditures on the environment by firms, which reflect either their responsiveness or the law enforcement, differ considerably between state owned and private owned firms. In state owned companies, it is the state who bears the expenditures then environmental regulations that intend to internalize the environmental externalities may not change these firms' competitiveness. Private companies are not endowed with such kind of support and they may tend to evade the rules in order keep their production cost low, at least in the short run.

Apart from firms' characteristics, the products themselves also have potential impact by environmental regulation on the firms' competitiveness. Whether the products are sold domestically or abroad indicate which environmental legislatures the firms are subject to. Products sold in foreign countries with tough environmental regulations, like the US and EU markets, have to meet and anticipate these high standards. But once satisfying these standards, they are more likely to have higher penetration rate and the companies' reputation increases as a reward. This is a reason for greening the companies without perceiving

standards as a burden on the productivity and sales growth. This aspect is not well studied and many developing countries exporting to the EU, for instance Asian seafood, understand the restrictions or ban on their goods as protectionism practiced by the EU to shield competitiveness rather than a driver to make them more environmentally friendly.

External pressures on firms' to change in consideration to the competitiveness are stakeholders' demand (from customers, suppliers, green groups, environmental legislatures etc.). Also are there internal pressures contributing to such changes. One of the main conclusions from Annandale D. et al. (2004) is that internal pressures are more significant determinants of company response to environmental approvals regulation than has otherwise been thought (p.118). Corporate environmental initiatives trigger innovation with the introduction of more environmentally friendly products or processes and often require the adoption of state-of-the-art environmental technologies. Although environmental leadership is considered a technology driver, it also promotes managerial innovations. Furthermore, environmental concerns cannot be properly addressed by pursuing separate isolated activities but must be tackled comprehensively and systemically, requiring inter-functional integration within the firm but also upstream and downstream integration with suppliers/subcontractors and customers. Integrating environmental issues into corporate strategy is a catalyst for radical innovation for firms and for all actors along the supply chain (Lefebvre et al. 2003).

From the above review it can be said that the linkages between environmental regulation and corporate competitiveness are not clear-cut. The CLD is, therefore, created to include variables interacting with the economic competitiveness and environmental regulation. Within a confined scope, it represents a synthesis of dynamics of firms' behavior with respect to environmental issues. The matrix of nature of regulation, characteristics of firms, internal and external pressures lays out such a complex setting on which firms are operating that it is not easy to simply confirm that environmental regulation encourages or discourages the competitiveness of firms. In one hand, the CLD displays driving forces behind the (un)willingness to internalize environmental issues such as (non) compliance with legislation, in the other hand, shows the trends of economic growth and environmental degradation. In long run, if prevention measures are not taken, the environment will hit a level of irreversible damage which destroys the capacity of firms and the economy as a whole to maintain objectives of growth.

The hypothesis made by Porter and van de Linde has been supported in some industries and raised the possibility of win-win situation for the environment but further research is needed. The thesis is inspired by the idea of further research on the linkages that should be made on the industry specific basis rather than on inter-sectoral or country wide basis due to the complex and interlacing connections involving the issue. Also, such research is beneficial to a deep analysis of environmental policies from a sectoral view.

Kommentar [MS10]: How do you use your CLD related to the review. Is the CLD an outcome of the review, or was guiding you in what to look for in the review? Can you relate parts of the CLD to parts of your review? If so, you will get a good synthesis represented by the CLD.

Part III Vietnam industry with focus on textile-garment and Environmental regulation

III.1 The Current Growth and Industrial Environment in Vietnam

Growth in Vietnam

After decades of wars and conflicts, Vietnam's economy has changed significantly since the introduction of market-oriented reform and opening of the economy in 1986, the so-called *Doi Moi* or Renovation (SR of Vietnam, 2000). Vietnam escaped from the crisis in the mid-1980s and its annual GDP growth rate averaged 7.2% during the 1990s. Much of this development is attributed to the growth of the industrial sector and the exploitation of natural resources (crude oil, minerals etc) as well as comparatively cheap labour (VIE, 2000).

Along with the economic growth, social advancement has been achieved. Education, healthcare system and public services have reached the grassroots since the Gini coefficient (the inequality measurement) only showed a tiny increase from 1993-1998. It is widely recognized that the vast majority of Vietnamese people have gained from the reform process (Tran Thi Que, Vo Tri Thanh 2002). Although Vietnam remains one of the poorest countries in the world, poverty has been reduced considerably, from 58% in 1993 to 37% in 1998. Successful economic development also contributed to the significant poverty reduction regardless of measurement methods. Food poverty incidence reduced from 25% in 1993 to 15% in 1998 and about 11% in 2002, while total poverty incidence, which is calculated by adding the minimum non-food expenditures to the amount of the food poverty line, also declined from 58% to 37% and 29%, respectively over these same years (SRV 2003).

Kommentar [MS11]: For what time period?

Industrial share to the country's GDP increased from 19.8% in 1991 to 36.6% in 2000. Internally, positive structural changes in industrial sector have initially created a rather solid domestic industrial structure. The processing industry has become a fast growing sector, representing 80.5% of the overall industrial production value and 18.7% of the country's GDP (UNIDO 2001:6).

In the National Strategy for Socio-Economic Development to 2020, the Vietnamese Government has set an ambitious goal of doubling the GDP of 2000 by 2010 and joining the ranks of industrialized nations of the world by 2020 (SR of Vietnam, 2003). Toward this end, the government has committed to devote a larger share of the national resources to the industrialization which means a sheer shift in the structure of the economy, a higher growth in industrial sectors and higher rate of urbanization.

Industrial Water Pollution

Vietnam's growing environmental problems have been extensively documented in the literature (WB 1995, UNDP 1995). Industry is the major contributor to these problems, accounting for 60-70% of the country's pollution load. Vietnam's industry still largely uses obsolete and outmoded technology that is highly inefficient in the use of energy and produces

significantly more pollution per unit of output than its counterparts in the industrialized countries (VEPA, State of Environment, 2002).

Due to old equipment, lack of adequate controls and inadequate treatment of wastewater and air emissions the overall environmental record of the industry is low (VEPA, 2002). Many industrial pollutants have a high environmental health cost. Without improvement towards environmentally benign technology and cleaner production, the higher the industry grows the more contaminated the environment is.

Kommentar [MS12]: What is this and do you have a reference?

According to a survey of industrial establishments by Vietnam National Environmental Protection Agency (VEPA), 90% of firms do not have wastewater treatment units and their wastewaters are discharged directly into the sewage system and nearby rivers. Air pollution is a growing problem in the industry. The old-aged manufacturing units are emitting a large amount of CO, CO₂, NO₂, SO₂, and HF whose levels are 2-3 times higher than permissible standards.

The main solution adopted by environmental regulators and firms in Vietnam for the waste treatment is “end-of-pipe” approach. A drawback of this approach is that it requires expensive investment and is unable to radically eliminate the waste. Recently, the pollution prevention has been highlighted as an alternative but still new to both firms and environmental management agencies. In the context of Vietnam where highly polluting old facilities and processes are still in operation (impossible to cease at once), a combination of these two approach would be a optimal choice for the industrial pollution control.

III.2 The textile industry in Vietnam

III.2.1 Overview of textile-garment industry

In Vietnam, Textile-Garment industry is of pivotal value in the overall industrialization. Its continual contributions in terms of share in GDP and employment to the national economy have been much appreciated. However, like other manufacturing sectors, the environmental impacts of textile-garment industry have been received as much attention. It is worth looking into the case of textile-garment industry to explore the contradiction between economic benefits and environmental consequences.

The textile-garment as an industry in Vietnam has been set up by the French with the establishment of the first textile factory in Namdinh, North of Vietnam in 1889. Throughout the last century, the textile-garment industry has been growing both in the North and the South of Vietnam. Large textile-garment complexes have been established using machines and technologies from Soviet Union and Eastern Europe (the North) and some Western European countries (the South) (Hill 1998:14). But the industry only emerged as an important sector in the economy with the Doi moi (Renovation) that commenced in the late 1980s.

In term of state control over the industry, the Vietnamese government established the Vietnam National Textile-Garment Corporation (VINATEX) in 1995. It serves as a state-owned parent organization that regulates the planning, investment fund and sets output targets for state owned textile-garment firms. VINATEX is one of 18 state Corporations

directly controlled by the Government and Ministry of Industry. It is said that the purpose of establishing this organization was to lessen unnecessary inter-sectoral competition by uniting the textile and garment industry and enable the structure change towards a more powerful and internationally competitive industry. VINATEX is now having some 60 members.

Table 3 Export values of Vietnam textile-garment industry, 1995-2002

Export value (million USD)	Year							
	1995	1996	1997	1998	1999	2000	2001	2002
Total export	5.448,9	7.255,9	9.185,0	9.360,3	11.541,4	14.482,7	15.027,0	16.530,0
Textile-garment	850,0	1.150,0	1.503,0	1.450,0	1.746,2	1.891,9	1.975,4	2.710,0

Source: Vietnam Economic Review, issue May 19 2003.

Textile firms can also join a non governmental organization - Vietnam Textile Apparel Association (VITAS). It was established in 1999 with the aim of harmonizing business activities within its members regardless of the ownership.

The current average growth rate in the textile-garment industry is about 10.7% per year (VINATEX). Among all manufacturing industries, its export value in 2002 was almost US\$ 3 billions, second largest to that of gas and petroleum industry. This number in 2005 is estimated between US\$ 4 and 5 billions and expected to rise to US\$ 10 billions in the year 2010.

In terms of ownership, the industry is participated by state sector, private sector and foreign owned enterprises. Although the state is still the dominant player, the private sector is playing an increasingly important role. The private sector, including companies with foreign investment, now accounts for 35-40% of the country's total textile production and 70-75% of garment outputs (Vietnam Trade Office in the USA, http://www.vietnamustrade.org/Eng/garments_&_textiles.htm).

In the textile sector, in 2000, 43.75% of the output of the state sector has been produced by central SOEs as many local state firms have been facing financial difficulty contributing only 9.07%. Private sector made up for 22.5% and foreign owned sector 30.41% (IIRS 2001:13)

Table 4 Textile and Garment Output, Employment and No. of firms by ownership, 2001

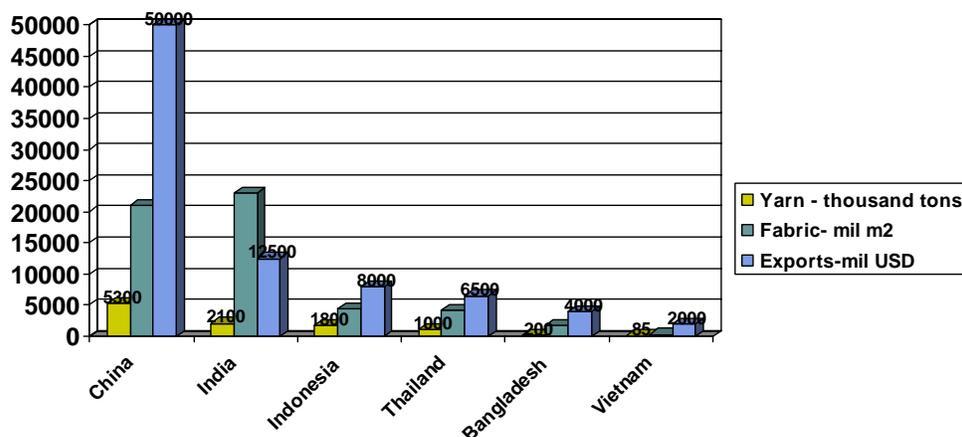
	Textile				Garment			
	State	Non-state	Foreign	Total	State	Non-state	Foreign	Total
Labor (people)	74708	97199	19354	191261	83537	167680	32932	284149
Labor share (%)	39.1	50.8	10.1	100.0	29.4	59.0	11.6	100.0
Establishment (unit)	82	32225	55	32362	97	68332	83	68512
Estab. share (%)	0.3	99.6	0.2	100.0	0.1	99.7	0.1	100.0
Output (mill. VND)	4410023	1730244	1556604	7696871	1589870	2015957	979129	4584956
Output share (%)	57.3	22.5	20.2	100.0	34.7	44.0	21.4	100.0
Output/labor (mill. VND)	59.0	17.8	80.4	40.2	19.0	12.0	29.7	16.1
Labor/Etab. (people)	911.1	3.0	351.9	5.9	861.2	2.4	396.8	4.1

Source: Vietnam Institute of Economics 2001 Textile and Garment Industry in Vietnam: an Overview. IDRC/CIDA project, p. 17.

III.2.2 Sectoral Competitiveness

Although as a whole the textile-garment industry gained great success over the past decades the actual growth in the textile sector is modest compared to that of garment sector. This is explained by the difference in their comparative advantage. The success of garment sector was largely based on an abundant source of hardworking labor while the textile sector's growth relies on capital and machine investments (VIE, 2001). In terms of international competitiveness, according to a report by Ministry of Industry (IIRS, 2001), Vietnam textile-garment industry is confronting some major obstacles when it competes globally. First, the product prices are higher than that of neighboring countries, especially China by 10-20% while labor productivity, level of automation in the textile industry are much lower. The production scale of Vietnam's textile-garment is equal to 1/10 of that of Thailand, 1/15 of Indonesia, 1/30 of India and 1/50 of China. The figure below displays its production capacity compared to those of other textile exporting nations.

Fig 2 Vietnam textile garment production capacity vs. other exporting countries (2000)



Source: compiled from Table 4 in VINATEX (2002), p. 25

Due to the fact that Vietnam is not a WTO member, its textile-garment industry is still subject to limited quota allocation under bilateral agreement and higher import tariffs imposed by the U.S, Canada, EU etc. At the same time, the industry is facing harsher competition by other ASEAN countries in the domestic market when the domestic import tariff barriers have to be lowered in line with the effect of AFTA agreement (ASEAN Free Trade Area) in the beginning of 2006 (VINATEX 2002).

III.2.3 Capital

There are 4 sources of capital to which textile-garment firms can access. The first source is the commercial banking system of which 4 state commercial banks counts for 80% of total deposits and lending. The second is the Development and Investment Support Fund – directed and funded by the Government. The third source of investment capital is soft loans and/or grants from foreign countries – Official Development Assistance (ODA). This type of capital aims at some priority areas and actually very few firms are able to borrow from it. The fourth source is non-banking capital, including firm’s equity and funds mobilized from the informal banking system including the firm’s employees (VIE 2001: 43).

In theory, all firms share a level playing field, meaning that they can access to all types of capital with equal opportunity. In practice, however, only state firms have access the Investment and Development Support Fund, which was set up to support government development programs, With regards to access to investment capital from banks, officially there is no discrimination between SOEs and private firms, but SOEs are normally placed in a better position. The reason lies in the collateral requirements by the banks when firms apply for loans. Private firms are definitely required to have collateral to be able to borrow from banks, while for SOEs, with guarantee by authority (central and local) will suffice to get bank loans (VIE 2001:44).

III.2.4 Employment in the industry

In 1992/93 total employment in textile and garment industry (both formal and informal sectors) was 1.04 million people and the figure for 1997/98 was 1.17 million (VIE 2000:22). State-owned firms employ 59% of the total textile-garment workers. However, this figure from a report by VINATEX is 1.6 million in 2000. Although there is a disagreement between data sources, one may get a rough idea of how labour- intensive the industry is. It is expected that there will be a labor shift from state sector to private and foreign sectors due to the higher wage in the latter (IIRS, 2001:24).

In 2000, the technically trained labors are around 500,000 for the whole industry, including those doing office jobs. The suppliers of this type of labor are textile-garment faculties in Vietnamese technology universities and colleges. However, they can only provide 50-70 engineers, 100-150 technicians and around 2000 mechanics for the textile industry each year. Some training institutions reported that there is no student applying for the textile technology recently due to the low paid wage and toxic working environment compared to some other manufacturing industries (IIRS, 2001:22). The lack of trained workers for the future needs is obvious.

III.2.5 Textile and Garment technology

The state of machines in textile and garment industry has been improved recently but overall half of the machine is antiquated. Some firms are still using Russian and Eastern European equipment which is no longer manufactured, and the lack of spare parts is a constant problem. As a result, many firms are operating at less than 50% capacity. The problem is just as

serious in the predominantly state-owned spinning sector, which in the main produces low quality threads; 50% of the country's spindles were estimated to have been purchased before 1979 ((Hill 1998:24).

Much of the technological upgradation has been made by the Government in the textile sector through providing long-term loans on preferential terms to textile SOEs. As of 2000, a budget of around USD 2 billion has been spent in 237 projects for state owned companies. It is observed that these investments have low rate of return or even considered absolute loss due to administrative and financial mismanagement (IIRS 2001: 23). Another reason is that most of state firms made such investments in foreign currencies which are subject to foreign exchange rate risk. Losses incurred when textile SOEs borrow in foreign currencies, but mainly target the domestic market (VIE 2001:8).

The domestic private firms and textile households who are unable to make large investments bought back old discarded equipment from SOEs (VINATEX 2003:20).

II.2.6 Sectoral Environmental Pollution

In the textile and garment industry, the most polluting source is found in wastewater. As informed in the official statistics, the industry wastewater discharge volume is between 24-30 million m³ per year, in which only 10% is treated. The untreated volume contains high concentration of hazardous chemicals.

The industry uses more than 1,000 tons of dyestuff and 20,000 tons of other chemicals each year. 70% of them are retained in the products and the other 30% released into the environment. As a consequence, the level of pollutants in wastewater from textile firms is usually 10-20 times higher than TCVN Standard B for industrial wastewater (VINATEX 2003:40). The water pollution is intensified with a large amount of oil to supply used in all most of textile factories to supply heat for the dyeing process. When the used oil is mixed into wastewater it is very difficult for the treatment.

The dominant approach to the wastewater problem is the end-of-pipe solution. The preventive approach such as Cleaner Production or the recycling of wastewater is utilized in a very small scale, mainly in some big state-owned or foreign invested companies.

The below table show that the volume of wastewater in 2010 will at least triple compared to that of 2000 and more remarkably pollutant concentration indicated by the BOD, COD, SS content in the wastewater also increases by three times. This means that the overall impact on the environment is much likely 6 times higher than the current level.

Table 6 Projected quantity of wastes in the textile-garment industry to 2010

Business as Usual Scenario				
Pollutants	Unit	2000	2005	2010
Wastewater	m ³ /day	65-83,000	131,000	274,000
SS	ton/day	37.5	65.8	137
BOD	ton/day	22	38.1	79.5
COD	ton/day	45	79	164.4

Emissions				
- Dust	ton/day	5.2	9.2	19.2
- SO ₂	ton/day	1.4	2.43	5.1
- NO ₂	ton/day			
Solid waste	ton/day	274	480	1000

Source: VINATEX 2002, p.43

III.3 The Environmental Institutional Framework in Vietnam ¹

Kommentar [MS13]: This section needs to be shortened considerably.

The policy-making procedures in Vietnam are characterized by a mixture of uni-partisan political style and the socialist market led direction of development. The governmental agencies, thoroughly embedded with Party units, are predominant in the management of socio-economic development. Non-governmental institutions exist but few in numbers and generally serve as supporting branches of the Government. Like other types of management in Viet Nam, the existing institutional framework for environmental management is almost entirely a governmental institutional framework (UNDP 1995).

By the 1992 Constitution, the Politburo of the Communist Party of Viet Nam is the highest policy-making body. The President, the Prime Minister, and the Secretary-General of the Communist Party are of the highest power and the two formers are definitely Party members. Every five years Party Congresses are summoned to discuss national policy and planning directives. These are later discussed and agreed upon by the National Assembly. One of the seven commissions of the National Assembly, whose functions are researching and providing advice on specific areas, is the Commission for Science, Technology and Environment. It is accountable for environmental affairs (UNDP 1995).

Kommentar [MS14]: Is this necessary? Maybe you should only refer to the UNDP 1995 reference.

The main ministry responsible for environment in Vietnam was used to be the Ministry of Science Technology and Environment (MoSTE). However the Ministry of Natural resources and Environment (MoNRE) was formed in 2002 to specially shoulder the environmental responsibility. In addition, at least 10 other ministries and 15 state committees/general departments have responsibility for environmental and natural resource management functions.

- Ministry of Natural Resources and Environment (MoNRE)

Until 2002, the Ministry of Science, Technology and Environment (MOSTE) has been the national agency for environmental protection. Within line ministries are Departments of Science, Technology and Environment (DOSTE) or a similar designation, Departments of Science and Technology (DST), which are responsible for environmental affairs. The

¹ This descriptive summary is largely based on a 1995 UNDP report *Incorporating environmental considerations into investment decision making in Vietnam* at <http://www.undp.org.vn/undp/docs/1995/cap21/>

Departments of Science, Technology and Environment (DOSTE) are accountable to the Provincial and Central-level City People's Committees in terms of local environment protection.

In 2002, the Ministry of Natural Resources and Environment (MONRE) was established upon the environmental function of MoSTE (renamed to Ministry of Science and Technology) in order to strengthen the state management of the environment and natural resources. Its primary environmental responsibilities are united creation and management of the system, the prevention and control of pollution, enhancing environmental welfare and advancing sustainable development (MoNRE website www.monre.gov.vn).

Kommentar [MS15]: Also this – is it necessary for your study here, or is because you want to be politically correct at home? :-)

- Vietnam National Environmental Protection Agency (VEPA)

Vietnam Environment Protection Agency (VEPA) is built upon the National Environmental Agency (old NEA), which was a department of old MOSTE. VEPA is now under the administration of MoNRE. It assists MoNRE to undertake functions of the state environmental management which are (1) environmental inspectorate and supervision, (2) pollution prevention, (3) environmental quality improvement, (4) natural conservation, (5) environmental technology promotion and (6) public awareness enhancement (VEPA website www.nea.gov.vn). It is considered that the VEPA will have the almost same duties as the old NEA except the EIA-related tasks which will be managed separately by another department.

Another main change is that the inspection function previously assumed by VEPA is now transferred to a Department in MoNRE. This change is reportedly leading to the shrink of inspection force, by cutting down the technical staff in the Inspectorate, formerly belonging to VEPA. The inspector's responsibilities concerning industrial pollution control are (1) conducting investigations into cases of pollution, (2) monitoring compliance with environmental standards by firms, (3) issuing warnings, administrative fines or command to temporarily shut down polluting enterprises, in the worst cases.

- Environmental Institutions at Local level ²

The governance structure of environmental management from central to local represents 3 tiers – Center, Province and District. At provincial level, each province has a Department of Science, Technology and Environment (DoSTE), which is responsible for environmental management. The restructuring of the natural resources and environment sector will lead to the corresponding change in the local administration at provincial level. A new natural resources and environmental administrative structure will be formed based on a merging of Department for land administration and environment. This process is underway and at least in the next 3 years, DoNREs instead of DoSTEs will be established in all 61 provinces.

² This descriptive summary is largely based on *Environmental Sector Study for Japanese ODA for the Socialist Republic of Vietnam*, a JICA report at http://www.isgmard.org.vn/Information%20Service/Report/General/JICA/TOC_en.pdf

The DoSTEs are under the direct management of Provincial People’s Committees and receive only technical and administrative guidance from MoNRE. Nominally, there are units/departments at district level monitoring environmental issues but none in reality because of insufficient staffs. There is currently discussion among regulators on setting up a separate environmental department further down to communal level. This is unlikely to be realized in a near future as it involves a broader administrative reform.

The top-down framework of environmental management in Vietnam is shown in the table below.

Table 1 Agencies in the National Framework for Environmental Management

Policy makers	Communist Party of Viet Nam Prime Minister National Assembly Provincial People's Councils
Law makers	National Assembly Prime Minister Provincial People's Councils
Planners	Ministries and National Committees (planning depts.) Provincial People's Committees (planning depts.)
Advisors	Office of the Government Ministries, universities and institutions Non-government organizations Steering committees, cross-sectoral working groups
Executive organizations	Ministries MoNRE Vietnam National Environmental Protection Agency (VEPA) Provincial People's Committees Provincial Departments of Natural Resources and Environment (DoNRE) National committees
Implementing organizations	Environment Department of the National Committees DoNRE VEPA, NGOs, DOSTE, institutes, mass organizations universities, research institutions

Kommentar [MS16]: This is the most interesting piece of information here. Rest of it can be shortened or omitted.

Source: adapted from the Report: Incorporating Environmental Considerations into Investment Decision –Making in Vietnam. UNDP 1995.

III.4 Environmental Legislative Framework

The primary sources of environmental law are the Constitution, the Law on Environmental Protection, the related laws, international environmental conventions ratified by the National Assembly, Governmental regulations and local laws. This section addresses these documents with the focus on industrial pollution control.

- Constitution

The present Constitution of Viet Nam dates from 1992 (revised version). As in other countries, it is the supreme law of the country with which all other Vietnamese law must be consistent. The Constitution was enacted by the National Assembly after broad consultation, and a similar process of consultation would apply if the Constitution were to be amended (UNDP 1995).

A range of environmental duties and obligations is placed on the organs of the state, private bodies and the general public by the Constitution. For instance, it prohibits the appropriation or damage of natural wealth by any organization or individual and an obligation on all individuals as well as State organs, units of the armed forces and economic and social bodies to abide by regulations on environmental protection (Article 29). The importance is attached to the overall environmental protection and conservation of natural resources. The pollution control and prevention are not explicitly addressed in the Constitution.

Kommentar [MS17]: I don't know if this is necessary either. DO you use it later or not? If not, then omit.

- Law on Environmental Protection

The Law on Environmental Protection (LEP) was promulgated by the National Assembly in 1994. Appearing short after the Doi moi in late 1980s, this Law has such a significant meaning that special attention was paid to environmental protection in an early period of economic development. Its 55 articles provide basic principles and methods to protect the ecological environment and control the pollution. The LEP stipulates rights and obligations of the State and people as individuals and organizations with regard to environmental protection. Article 38 imposes the Ministry of Science, Technology and Environment a responsibility to the Government to manage environmental protection. Provincial and municipal People's Committees take the same responsibility in the areas under their jurisdiction.

Article 6 provides that environmental protection is the general duty of all citizens and citizens "have the right and obligation to detect and denounce any act in breach of the environmental protection legislation". According to Article 43 such act is denounced to State management agency for environmental protection or other competent State agencies.

Table 2 Legal documents issued by Party and State organs

<i>Communist Party</i>	<i>State</i>	<i>Legal documents</i>
Resolutions (Policy objectives, not law)	National Assembly promulgates:	- Constitution (Hiến Pháp) - Law (Luật) - in whole - Ordinances (Pháp Lệnh) - by the Standing Committee of the National Assembly - Resolutions (Nghị Quyết) - in whole or by the standing committee
	The President of the State, representing the Assembly, issues:	- Orders (Lệnh) - Decisions (Quyết Định)
	The Government	- Decrees (Nghị Định)

	(appointed by the President and Assembly) issues:	- Resolutions (Nghị Quyết)
	The Prime Minister and the Ministries can each issue:	- Rulings, Decisions (Quyết Định) - Directives (Chi Thị)
		[The Prime Minister also issues overall "policies" and "National strategies."]
	The Ministries can also issue:	- Circulars (Thông Tư) - Regulations, Dispatches (Công Văn)
+	Local Governments issue:	People's Council - decisions (Nghị Quyết Hội đồng Nhân Dân) People's Committee - resolutions, decisions (Quyết định của Ủy ban Nhân Dân), and directives (Chi Thị của Ủy ban Nhân Dân)

- Vietnamese Standard System

Vietnam Standards (TCVNs) are national standards of Vietnam. There are 3 types of TCVNs designed to control pollution: (1) Environmental Quality Standards (or Ambient Environment Standard), (2) Effluent Standards; and (3) Supporting Standards (testing, sampling standards etc). Most of supporting standards are adapted from those of International Organization for Standardization (ISO). They are prepared by STAMEQ (National Directorate for Standards and Quality) in consultation with technical committees and interested parties. Basically these standards are applied voluntarily by industrial firms; some are set mandatory by MoNRE. So far, of 360 environmental standards, one third is made mandatory including parameters of solid waste and wastewater. Standards of dust, chemicals and emissions are to be added to this list.

Part IV Results

I conducted 5 in-depth interviews with textile companies locating Hanoi, Haiduong and Namdinh, in the North of Vietnam. Reports by governments and the industry show that they have different economic and environmental profiles. Of these five companies, 3 are state owned and 2 private owned. Of two private firms, one is a family run silk-making business in Vanphuc Silk Village in the vicinity of Hanoi.

Questions that I asked these companies are to find the answer about: (1) their current situation in terms of economic and environmental state; (2) perceptions and barriers to their improvement of their environmental performance; and (3) their responses to the current environmental standards and policies and the impacts on their economic competitiveness.

With the reference from a technical expert in VINATEX, my access to state-owned companies was much easier than expected. They showed a large extent of cooperation and even allowed me to take pictures inside the factory.

Non-corporate interviews were conducted in Hanoi with 04 senior officials in governmental ministries responsible for environmental issues, 02 technical experts in the textile industry, 02 researchers and, 02 NGO representatives and 01 textile worker. These interviews have been conducted for the following reasons: (1) to investigate the effectiveness of the current environmental regulations; (2) to explore the relationship between firms and environmental regulators; and (3) to learn about the working conditions and environmental impacts of the textile firms (See *List of respondents* in Annex 2).

IV.1 The current situation of the companies

IV.1.1 Economic performance

Before examining any further on the environmental impacts and performance by the interviewed companies, it is crucial to go into their current financial situation. Theoretically, the first and foremost objective of any firms is the profit and their ability to maintain the profitability in the long term.

The industrial output varies from company to company and the highest output belongs to the Namdinh Textile Co. that owns the largest production capacity and highest number of employees. Main products are yarn, fabric, kitchen towels and garments, of which 80% is sold in the internal market. In Namdinh Silk Co., only 15% of total production is exported last year.

In the interviews most of the respondents clearly showed their reluctance to talk about the current financial issues. In the first place most of the interviewees confirmed they were enjoying a good financial health by citing the annual increased sales and production outputs. But later on, 3 state owned companies revealed that they are deep in bad debts to the State Bank and some commercial banks. As said a vice director of Namdinh Silk Co.:

“Actually I do not want to say anything about it. This year business performance improved much from last year but we can only maintain the capital. The profit? Oh, no more than 100 millions VND (equiv. US\$ 6,000 – note by author) at best. We are struggling to pay back the debt to State Bank and maintaining the payroll and meeting the planned output.”

The same situation is experienced by the Namdinh Textile Co., another state-owned firm. This firm is considered the first textile establishment in Vietnam when the French created it as an industrial complex of textile in 1889. It used to be the leading textile company for decades before the collapse due to ailing business performance and serious corruption in 1994. Now it is under the restructuring phase aimed at optimizing the production process and downsizing the workforce. Still the company is employing 4,078 workers, a nearly 50% decrease from last year. A senior manager in Namdinh Textile Co. said:

“Our performance this year is better than last year. The main reason is we cut half of the number of workers and we paid half the salary, correspondingly. We are winning

money of course but considering the amount of debt that the we are in, the profit is so tiny”.

Table 7 State owned company profiles in 1999

No	Name	No. of employees	Turnovers (million VND)	Outstanding debt (million VND)
1	Namdinh Textile Co.	7,500*	410,000	48,000
2	Namdinh Silk Co.	1,700*	113,204	40,000
3	Win View Tex	950	11,445	1,600

*These figures in 2005 are 4,780 and 599 respectively

Source: compiled by author from the interviews and VINATEX reports.

Although the figures of debt is not updated it is reasonable to infer that these companies still remain in great debts with the current rate of profit making as admitted by their managers³.

In contrast to the situation faced by state-owned companies private ones show a profitable business. With 14 labours, the silk-making household in Vanphuc Village retained a profit of more than VND100 million, as much as in the 599 employee state owned Namdinh Silk Co. This success probably lies in their unique silk products, a streamlined management and a minimum cost structure. No investment in environment is ever made.

Yenmy Dyeing Co., another private company, is enjoying good financial state. Their 2004 turnover was VND45 billion and the after-tax profit is VND2.5 billion. 45 workers are employed and their wage on average is VND1.5 million per person per month (approx. USD100) (Interview 31 Aug 2005). The company chose to operate in the industrial park for some reasons. First, they are offered preferential land lease by the Park as an incentive to attract investors. Second, the physical infrastructure in the Park is complete. Third, the park is a new centre for textile industry in Haiduong Province and the company is able to create business links with other textile companies easily. They also do not have to install their own wastewater treatment plant as they can share a concentrated treatment plant with other companies in the Park.

IV.1.2 Environmental Impacts

The environmental impacts from these textile companies under investigation take various forms from wastewater, emissions, solid water, noise, heat among others. Of course the most obvious and serious environmental impact by the textile companies is wastewater. Almost all of stages in the textile manufacturing process generate wastewater because a large volume of water is used as input together with chemicals, heated oil, softeners etc. (See Appendix 4 for more details). According to Mr. Hieu, a textile expert in VINATEX, the dyeing-finishing stage is mainly responsible for the high volume of waste water and the high content of toxic

Kommentar [MS19]: Is this figure relevant for your study? Do you use it later in the analysis. IF not so, please remove. It is standard linear organisation chart.

³ At the time of writing, the Government decided to write off the outstanding debts of 4 textile state-owned companies, including the debt of VND222.7 billion of Namdinh Textile Co.

Source: <http://www1.dantri.com.vn/kinhdoanh/doanhnghiep/2005/11/87209.vip>

chemicals that are polluting the inner working environment and the surroundings also, if not carefully treated.

“I want to stress an important technical aspect in the dyeing-finishing process. It is the liquid ratio in dyeing. The quantity of chemicals in the machine is determined by the concentration of the dyeing batch and most of these chemicals are discharged as wastewater (....) This ratio in Vietnam textile industry is high because it is using obsolete technology from China. For example, In Namdinh Textile Co. the ratio is around 1/10-1/12, that is, it needs 10 kg of dyestuff for 100 kg of fabric. It also requires a high quantity of water to be used” (interview transcription with Mr. Hieu, 29 Aug 05)

However, the dyeing processes in these textile companies use different types of dyestuff and chemicals for different types of fabric. The volume of water use is also different among them; the daily volume of water used in Namdinh Textile Co. is 7,000 m³, 1,600 m³ in Namdinh Silk Co. and while this figure in Yenmy Textile Co. is almost 1,000.

The daily volume of wastewater discharged from bigger companies is very high, the highest being 4,800 m³ (up to more than 6,000 m³ with dyeing) in Namdinh Textile Co. (VINATEX 2002) and the lowest being 100 m³ in the Vanphuc Village craft household (interview dated 29 September 2005). Normally the wastewater contains COD, BOD, pH, SS, oil etc. However the chemical content in wastewater of the silk craft household is unknown for the reason that the chemicals used in the dyeing process are hidden as a secret to protect the traditional products from competition. Anyway it is not treated before discharged into the local canals (See Picture 1).

The effluent discharged by these companies contains very high levels of *Chemical Oxygen Demand* (COD) and *Biochemical Oxygen Demand* (BOD), suspended solids (SS) and other organic and inorganic chemicals. BOD refers to the amount of oxygen that a chemical solution or effluent consumes through biological degradation. COD refers to the amount of chemicals that the effluent consumes through breakdown. High concentrations of BOD and COD can severely disturb natural ecology. For instance, it can kill certain types of plants, lead to the growth of different plants on land and thereby lead to starvation for the indigenous populations of living species (Miller 2004).



Wastewater in Namdinh Textile Co.



Wastewater in Namdinh Silk Co.



Wastewater in the local canal at Vanphuc Village

Picture 1. Images of wastewater from some textile facilities in the interview. Note: They are on the way either to the municipal sewage or the local canal without any treatment.

Most of the interviewed companies acknowledged that their production process created various pollutants to the environment from wastewater, smoke, noise and dust. The

wastewater outweighs other types of pollution in terms of volume and chemical content and impacts on human health. How did they actually deal with these environmental matters?

Kommentar [MS20]: Good section!

IV.1.3 Corporate Environmental Management

Although showing concern with their environmental problems, none of these establishments owns an Environmental Management System (EMS) (*See Fig 2 for an example*). They even do not have a separate department responsible for environmental management. Of 5 companies interviewed, 3 state-owned companies have a technician who works in the technical department and deal with the environmental problems at the same time. The extra responsibility added no money to his/her regular salary. When asked about the environmental management, the “manager” of the silk craft household in Vanphuc Village smiled saying: *“I am working as manager, technician, warehouse keeper, and accountant at the same time. If you want, from now on call me environmental manager”*. (Interview 29 September 2005). It is understandable that for small and medium size companies one way to reduce the overhead cost is to keep a minimum apparatus. Meanwhile the big state-owned companies said the reason that they do not have particular staff for the environmental issues is they are not forced to do so. In the interview with Mr. Dzung (VINATEX), he said there is no administrative regulation or order by governmental ministries or the Corporation management requiring this position.

In these companies, only one in Haiduong, Yenmy Textile Co, has the wastewater treatment system which is shared among companies locating in the industrial park. In accordance with the TCVN no.5945-1995 (Vietnam Standard) on industrial wastewater, wastewater discharge standards are divided into 3 levels – A, B, and C. Level A standards require the most extensive and sophisticated wastewater treatment, whereas Level C standards require minimal treatment. At present, industrial waste treatment facilities are expected treat wastewater to at least Level B standards. Wastewater contains higher pollutant level than C Level is not permitted to discharge.

The results from interviews show that the state-owned companies undertook some kind of treatment for wastewater- chemical and mechanical treatment with sedimentation tanks. Textile experts in VINATEX, Mr. Dzung and Mr. Hieu, expressed that this type has low effectiveness and is in fact useless when the large flow of wastewater comes through however. This opinion is consistent with what is shown in Picture 1 (*above*); no wastewater is properly treated. That is also not surprising when one revisits Section II.4.1 saying that only 10% of all wastewater from the textile industry is treated.

To these companies, having a treatment facility is very costly. It is estimated that Namdinh Textile Co. and Namdinh Silk Co. need at least US\$4 million and US\$2 million respectively to install such facility (JICA, MoI 2000). It is impossible considering their financial situation. In order to achieve economies of scale, it makes sense for companies to share a common wastewater treatment facility (Malaviya N. 2002). Yenmy Textile Co., private-owned, is sharing wastewater treatment in Pho Noi Industrial Zone, Haiduong Province. But the problem is that there is not enough wastewater from facilities in the Zone for the treatment plant to run efficiently. While the zone management keeps calling for more investors in the area, the treatment is still in the ready-to-work state and those firms who already operated are discharging directly into the sewage. Mr.Dzung, Director of Yenmy Co., complained that

many state-owned companies who received state funds to invest their own wastewater treatment units are deliberately running it on and off to lower treatment costs. In this case, it is the state who bears the costs, not the company. This information was confirmed by Mr. Thong and Mr. Hieu stating that running treatment facilities is costly as well and some firms were actually caught not treating wastewater. Another reason that some of the interviewed delayed the installation of such plant is they are identified as severe polluters and planned to move out of residential area where they are operating.

About the investment in the treatment facilities, neither state firms nor private firms have enough funds. The state-owned firms stated that they are to move into the new industrial park in a few years and such investment is a waste of money even though they are able to do so by borrowing from the Government's Development and Investment Fund via VINATEX. The private firm can not do that. It does not have the same status as state companies and if it wants to invest it can only borrow from commercial banks at high interest rate. Treatment facility is an investment of no return and the company could not afford the borrowing interest.

There was one thing repeatedly mentioned by most respondents except the silk household during the interview is that they participated in the Cleaner Production (CP) program. The earliest participant in this CP program is the Namdinh Silk Co. from the year 2000. The CP program is organized by Vietnam Center for Cleaner Production and financially sponsored by SIDA (Swedish International Development Agency) and DANIDA (Danish International Development Agency). They listed many practical benefits gained from the program such as better housekeeping, better saving of energy and raw materials, less use of toxic chemicals, better modification of machines among others. But after the demonstration phase (having technical and financial support), the initial results from the program have not been maintained by the companies due to budget constraint. In a short talk with a Programme Officer in UNEP, however, he said after the CP has been implemented and things have been put in place, little money but greater management efforts are required to maintain the output of CP (*Interview with N. Svenningsen in 31 Aug 2005*). This fact, on one hand, is an indication of improved sense of environmental protection of the management and, in the other hand, a lack of determination and commitment of long term environmental strategy.

IV.1.4 Pressures on companies

Severely polluting firms often find themselves under hard pressures to go green from my directions: environmental regulators, affected adjacent communities, green NGOs, media, business partners, workers etc. At the same time they are under market pressures to be profitable. In the survey, some questions have been asked about the inspections and complaints to which polluting firms are usually exposed. Interestingly enough, none of these interviewed companies are as such. There is seemingly a compromise between environmental inspectors and companies. The table below summarizes responses by interviewed firms to environmental inspections.

Table 8 Corporate responses to inspections

Kommentar [MS21]: Excellent. Use it for further analyses

Interviewed companies	Responses
WIN VIEW TEX (state owned) Duong Tam Tam, Director	2-4 times per year. They ask for Certificate of Env. Quality but we have not ever applied for it. They ask us to pay the administrative fine for wastewater only, which is 60 mil VND (15 mil per quarter). They are polite and understanding. No crack down on us.
YEN MY DYEING Co. (private owned) Nguyen Duy Dzung, Director	Because we are a model of environmental protection, we usually received 10-12 inspection visits from the Province, Ministries, and Departments. It took us a lot of time. We paid the wastewater treatment fee which is 4.500 VND per m3.
NAM DINH TEXTILE Co. (state owned) Ha Van Vinh, Head of Environment Dept.	2-4 times per year. We had to pay 240 mil VND of fines (60 mil per quarter) which are based on the volume we consume not on how much we discharge. They're facilitating our business, not finding faults with our work.
NAM DINH SILK Co. (state owned) Tran Thi Ngoan, Technical Director	2-4 times per year. The fine is 9 mil VND per quarter (water here is treated as it is domestic use not industrial use). 2 mil VND for other wastes. Of course we pay the inspectors some grease money, just as other companies do.
VAN PHUC Silk Village (small sized family firm) Duong Thi Nu	Very rarely there is an inspection for the whole village. But we knew it in advance because our cousin works as environmental and land administration officer in the Commune Office. There is no fine. All we have to pay is an envelope (with some money in it-note by author) to the inspection team. They usually skip inspecting our village.

Note: US\$1 = VND15700
VND1 million = US\$64

Indeed most of these companies are paying wastewater charges for domestic use based on amount of the water they consume though they all are industrial establishments. According to the **inter-ministerial Circular** (signed between Ministry of Finance and MoNRE) no.125/2003/TTLT-BTC-BTNMT on providing guidelines for the implementation of the Decree No. 67 /2003/ND-CP of June 13, 2003 on environmental protection charges for wastewater, all these textile firms, including the silk household are subject to the industrial wastewater charge. The charge aims at reducing the amount of hazardous pollutants in wastewater for both industrial use and domestic use. If this charge is fully imposed on firms, the amount of money they have to pay is enormous.⁴ Both firms and local environmental regulators understand that it is impossible to collect this charge and the latter chose an easier

Kommentar [MS22]: ??
Interministerial – a general decree?

⁴ The Circular provides a formula to calculate the industrial wastewater based on the discharge amount, the amount of pollutant existent in wastewater as follows:

$$\begin{array}{l} \text{Environmental} \\ \text{protection charges} \\ \text{for industrial} \\ \text{wastewater to be} \\ \text{paid (VND)} \end{array} = \begin{array}{l} \text{Volume of} \\ \text{discharged} \\ \text{wastewater} \\ \text{(m}^3\text{)} \end{array} \times \begin{array}{l} \text{Amount of} \\ \text{pollutants in} \\ \text{wastewater} \\ \text{(mg/l)} \end{array} \times 10^3 \times \begin{array}{l} \text{Charge rates of environmental} \\ \text{protection for industrial wastewater} \\ \text{discharged into respective receiving} \\ \text{environment} \\ \text{(VND/kg)} \end{array}$$

When applying this formula to Namdinh Textile Co. which discharges 7,000 m³ of wastewater per day I arrived at a daily charge is VND21 million or **an annual charge of VND700 million**, 3 times higher than what they are paying now as domestic wastewater charge. Technical data retrieved from JICA, MoI (2000) *Draft Final Report: Case study on the Master Plan Study for Industrial pollution Prevention in Vietnam.*

solution by imposing a lower charge to facilitate their own work. Yenmy Textile Co. agreed to pay the water treatment fee of VND 4,500/m³ charged by the treatment plan but refused to pay the pollution charges for wastewater that they claim as double charge. They, though, have not paid a penny for their wastewater either to the treatment plan or the inspectors because no company in the industrial park did it (*Interview* 31 Aug 2005).

Complaints from neighboring communities are few because the main environmental impacts by these firms are not very visible. They discharge wastewater into the underground sewage system shared with residential areas. Wastewater then flows to the nearby rivers where it can be noticed. WIN TEX VIEW Co. in Thuongdinh Industrial Zone which is located in Hanoi inner city is a good example. Many other companies in the Zone like rubber and detergent companies also discharge into these rivers and no one is to be blamed because that is regarded as non-point source of pollution.

The silk household received direct complaints from their neighbors since its wastewater is noticeable as discharged into open canals. In the Vanphuc Silk Village, 70% of household runs silk-making business that generates jobs and income for villagers. Those who complained are not running this type of business and “marginalized”. Their voices hence are weak and normally ignored. The environmental situation in the village, though, is critical demanding urgent responses from polluter-villagers and responsible authorities. The village currently discharged 4000 m³ of wastewater containing high strength content of COD and BOD (IEST 2000:132).

Neither state nor private companies received ecological requirements from foreign partners. It can be explained with the fact that their products are largely sold in the domestic market where ecological products are not popular at all. In recent years, some textile products were exported but the share of these products was insignificant. In 1998, for example, total value of textile exports (including yarn and fabrics) was about USD 62 million or 4.8% of total textile-garment exports (VIE 2001:32). However, the interviewed companies realized that their products need to be environmentally friendly as soon as they are trying to expand the international market share. Mr. Tam, vice director of WIN TEX VIEW co., had a quite radical comment:

“Green textile garment products are a must for us in order to export directly to international market. Now we are still the subcontractor for foreign brokers then the value added for our production is very low. Chinese textile and garment exports to big markets are facing the quota barrier by the US and Europe and it could be a good chance for Vietnamese products if they meet ecological requirements. Maybe going green is our own way to be competitive”.

(Interview 30 Aug 2005)

With regard to the internal working environment in the companies, I attempted to interview workers who directly operated the machines. They could be a more precise source of information about workers’ sickness and environmental performance. Unfortunately, this was not simple. Some workers with whom I contacted had insistently refused the interview for fear of losing job, even when I made sure to conduct the interview in a close and private space which brings no harm to them. Finally, I had a chance to have an “interview” with one of them, just outside the Phanoi Industrial Park, Haiduong Province. The young man has been working the textile field for 3 years as a fiber spinner and just quitting the same job in another firm due to low wage. The information from him was poor because of his low level

of education and his unwillingness to cooperate. He feels good with the new working environment which is clean and neat but the most important factor for him to decide working there is the higher wage. The interview ended after less than 10 minutes when he stopped answering and left.

Anyway I was able to have an opinion about the working place in these firms I had interviewed when I walked around taking pictures. Generally speaking, it is far from desirable. The smell of chemicals and dyestuffs were spreading all around when the dyeing machines ran and some workers protected themselves with soft mufflers and rubber gloves. In the silk-making household in Vanphuc Village, the same simple protection for workers was seen. (See Appendix 4 for illustrations of several workplaces).

Kommentar [MS23]: Too toxic? Could you judge from your short visit? Really? I think you should rephrase.

It seems that external forces like regulations, foreign partners, and affected communities have little effect on the environmental performance of these surveyed companies. So what are the driving forces, if any? All companies stated that the environmental target is placed in the bottom of the priority list. The internal factors, such as technological modification and enhancement, will improve their environmental performance. In the interview with Mr. Thong, Director of Institute of Textile and Garment, he said:

“Improved quality, lower price, higher productivity, enhanced competitiveness and expanded markets are determinants for the technological change in the company. Along with this, highly efficient, energy saving technologies will be utilized and the environment will be improved as a by-product of such process. The policy factor is important and can be ignored but the more importance should be attached to internal factors”

This would be true to companies active in a real market economy. The transitional economy in Vietnam is characterized as a hybrid of market principles and socialist directions and the state sector is still dominant. The state-owned companies in the interview emphasized that beside the profit objective, they have to make sure that the social and political targets are to be fulfilled. These targets are not clear-cut but it generally means they have to follow the sectoral plans, the ministerial strategies and administrative directions from governmental authorities. They can hardly lay off labors due to pressures from labour unions and local authorities. As long as the environmental targets are not integrated into these socio-economic-political plans, the companies are not forced to move towards a cleaner environment. For them, environmental improvement is not a proactive process.

IV.1.5 Remarks

Kommentar [MS24]: What about what you did not see... and did not interview the managers about...?

Results from the corporate interviews show that most of these companies show little concern with environmental improvement. They are not under much pressure to change: the products are still sold quite well in domestic market; environmental costs not fully internalized into the business by lax environmental measures; no internal demands to improve working conditions. Meanwhile the barriers to change are more obvious: current financial difficulty and lack of funds for investment.

Although state-owned companies were favored with State financial support they have not actively participated in environmental improvement due to lack of motivation and pressures. The lack of funds is used as a good excuse for to avoid environmental responsibilities.

Interviews with firms indicated that textile companies are working in a closed environment, that is, they do not face very fierce competition from foreign counterparts. Textile products consumed in foreign market with tough environmental regulation may have to satisfy highly demanding customers and produce special products for narrow segment of market. However, the garment sector in Vietnam does not rely on the production of the textile sector as 70% of the raw material for the garment sector is exported. When the garment firms face ecological requirements from foreign buyers they import ecologically qualified raw material from more advanced textile countries rather than choose from domestic textile producers. However, with the removal of textile tariff barriers within the WTO members at the end of 2004, industrial countries are potentially using non-tariff barriers to limit the textile imports from low-cost producers in developing countries. Countries will respond by using non-tariff policies (e.g. environmental standards) to offset the losses to preferred industries resulting from the reductions in tariff rates (Ederington J. *et al* 2003). In a foreseen future, the textile industry of Vietnam is most likely to be challenged by ecological requirements e.g. eco-labelling, improved working conditions for which they are ill prepared so far. Interviews also indicated the textile firms did not face pressures from green domestic customers. On one hand, it may results from the fact that the level of concern about environmental issues or harmful effect of products is low, in the other hand it shows unclear opportunities for the development of green products.

The state owned enterprises, seen as dominant players in the business, received State's financial support and protection. This current financial mechanism and the top-down appointment of corporate management (from VINATEX and Ministry of Industry) exercise little pressure on the top management of state-owned companies. Moreover, their managerial ability is not very performance based since their effort is focused on keeping the business on a narrow margin of profits, enough to pay the wage, not more. They do not have incentives to draw up a long-term, proactive plan for the development of the company, let alone the environmental strategy.

Meanwhile the private companies, with the limited resources and and small size, choose to meet the short-term market demands by cutting indirect costs. In theory, small firm, which are usually more flexible and less formalized, may adapt more quickly to green requirements. Also firms with more proactive technology policy are expected to be better positioned in responses to environmental challenges (Lefebvre 2003). However, the R&D investments in small textile firms are small due to the lack of funds and technical knowledge and they often aimed at small modification of products and processes. They are not able to implement R&D programs themselves and have to rely on the research institutions but the relationship between R&D organizations and firms is weak. In Vietnam, the research institutions are usually financed with the State budget and again, the state-owned companies received a better position than other firms in the linkage between research and application (Interview with Mr. Thong, Institute of Textile-Garment).

In regard with the environmental consequences of growing textile production, the data of the potential limits where the environment is able to sustain is unavailable due to lack of research. It can be argued that when the environmental impacts increase by six folds in the next five years (see *Table 6*), the environmental pressures faced by firms are to increase correspondingly. As the international competition will rise high, this will place textile firms in such a situation that make them unable to maintain economic and ecological sustainability.

IV.2 Analysis of Vietnam current environmental Regulation

IV.2.1 Shortcomings in the Law on Environmental Protection

The scope of environmental legislation aimed at industry has grown rapidly since the 1960s. Environmental law aims to reduce industrial pollution, curb the use of hazardous substances and minimize waste (Fineman 2000:62). Some legislation is directed at ‘point-source’ emissions, preventing pollution from particular discharge points – such as chimneys and waste pipes. Other prescriptions and prohibitions tackle pollution from the start, rather than the end, of an industrial process (*id*). Having been implemented since 1994, Vietnam Law on Environmental Protection (LEP) set the first milestone in environmental legislature. During the interviews, it was appraised by all respondents, no matter who they are: legislators, economic policy makers, researchers, NGO workers and corporate managers. It is understandable that the environmental legislators attached a crucial meaning to this Law which is written and implemented by them.

“... (LEP) was a big step forward in environmental protection. Before that, no one had an idea about the environment; no care has been taken to environmental protection. This Law also demonstrated the determination by the Party and State because just 1 month after it was passed, it was made into effect. You must think of this because no other law ever came into effect that quick. This had an immediate impact in stopping the flow of industrial waste pouring into Vietnam at that time when many companies were importing wastes from Europe and Japan to feed the production process due to the shortage of raw material. A lot of imported wastes are very toxic”.

Interview with Mr. Kinh, 29 September 2005

They also realized that this framework law is showing considerable shortcomings that are partly responsible for the growing pollution and ecological degradation. These shortcomings stem from the fact that the law was made at a time of poor understanding of environmental principles, the fast industrialization and urbanization and the institutional change in environmental management. And, indeed they admitted that the Law in particular and the environmental regulations in Vietnam are not effective in curbing the industrial pollution. All they said, however, is the noticeable phenomena, not the root causes for the current situation that lie in the Law itself and in the interaction between this Law and other laws in Vietnam’s legal system.

The Law set up the structures of what one can and cannot do with regard to environmental protection aiming at changing undesirable behaviors. But it does not, in itself, do anything to control or change behaviors, identify whose specific behavior is the target of change, specifically define the standards of performance, and tie specific activities to specific people to carry out those standards. Article 5 provides the identification of "the State" or an agency as "responsible" without identifying the particular person or individuals who take ultimate responsibility. Perhaps the key feature of State socialism that embeds itself in Vietnamese law is the idea that everything is a collective effort: the Communist Party, the community, the society, the State. There is no article in the LEP stipulates the rights and obligations of particular enterprises or institutions with regard to environmental protection.

One important feature that is lack in the LEP is the specific environmental liability and dispute resolution. In the interviews, a common observation is that the polluters received complaints from surrounding residents but normally ignored them as a way of dealing with environmental disputes. Here are some interviews from textile companies

"...There are some complaints about noise and smoke from the dyeing unit, but no big things"

"...There are some complaints last years for the waste water but we ignored them. That is not a problem"

"...I do not know but maybe people complained about our wastewater but there is no written complaint so far"

"...Yes, those people who do not run textile business in the village kept complaining all the time but we do not care. They need our money for compensation".

Article 6 in LEP provides that it is a duty for all organizations and individuals to protect the environment but no rights are given to citizens to report or file charges against the polluters. It means that no civil liability can be imposed. This explains why LEP only identifies the administrative liability for those who pollute. Polluters solely have the responsibility to the administrators for complying with standards and regulations, not to those who suffered direct losses from such pollution as complaining people shown above.

Lack of the role of court is obvious. Vietnamese legal system is primarily based on a contract between the State and citizens rather than a social contract between citizens is that it creates a very different role of the court. In the Civil Law, in force in 1995, Article 628 only provides that polluting individuals, organizations and other entities have a *duty to compensate* in accordance with the present environmental protection law while the LEP provides that they have a duty *both to compensate and to eliminate the damage of pollution*. With these ambiguous references, it is much likely that the process of dispute resolution for environmental damages is facing unsolvable difficulties.

Kommentar [MS25]: You mean unclear role? Is it corrective power you mean, or is legislative control?

Kommentar [MS26R25]:

Although the criminal liability is mentioned in Chapter VI of the Law providing that the most serious cases of environment pollution and damage are treated as criminal issues, one hardly finds specific provisions that penalize environmentally damaging conduct. The Criminal Code, in force in 2000, includes a chapter about environmental criminals but not identifying who they are. It is also unable to differentiate between administrative violations with criminal conduct; this fact means that no court can be brought in to deal with the serious cases of environmental pollution.

When researching Vietnamese legal system, one can notice other characteristics of Environmental Regulation that make it likely ineffective are: (1) The laws and standards are written and enforced by the very Ministry of Natural Resources and Environment (MoNRE) and its subordinate agencies that would need to be held accountable. This built-in conflict of interest gives the incentive to those who might be compelled to write the law so as to do as little as possible; (2) Tasks and functions of State agents are defined in LEP but no measurable quality or effectiveness. Therefore the criteria for measuring performance of State actors are not performance based. These are not unique either to LEP or other legal documents.

In the interview with Mr. Tien, head of Department of Environment, MoNRE, he noted that LEP, as a principal legal framework, is intended to providing basic principles and methods to

protect the environment with the “polluter pay” principle. This principle is translated into the administrative punishment measures imposed on polluters in order to make them rehabilitate the environmental damage. That is not enough, however. As shown in the above analysis, LEP failed to impose a wider range of environmental liabilities or sanctions – from administrative, criminal, and economic to civil. In Vietnam, environmental resentment is widely recorded and growing into disputes between economic and social and welfare interests (MoNRE, 2005: 27). When the dispute over the environment between various actors occurs the only pattern of dispute resolution which they can resort to is through administrative measures.

IV.2.2 Ineffective Implementation of Environmental Laws – Problems of Institutional Framework

Kommentar [MS27]: Good!

As described earlier, the existing institutional framework for environmental management in Viet Nam almost relies on the governmental institutional framework. Three questions are usually asked when one comes to the institutional framework: (1) Are the institutions appropriately placed? (2) Are they utilized for integrated policy making? and (3) Do they function efficiently? (ESCAP)

Compared with the frameworks used in the Asia Pacific region, the quantity and range of institutions for environmental management in Vietnam are considerably adequate.⁵

Vietnamese institutional framework for the environment appears to be well structured but its actual functioning is far from effective. Many other factors, lack of funds and human resources, political will, line coordination etc, are deterring the current implementation of environmental laws, as acknowledged by Mr. Kinh who had been Head of Inspectorate Dept. in VEPA:

We are confronting many difficulties in enforcing regulations. First, there is lack of environmental inspection staff. For example, in such a big city as Hochiminh City there are only 30-40 staffs, only 8 in Hanoi, 8 in Haiphong. Other provinces have 1 to 3 persons on average. Can you imagine that? We usually received complaints from the

⁵ A model of framework for Asia Pacific is shown in ESCAP website, including:

- An environment department (or unit) in a multi-functional ministry (Australia, Pacific Islands)
- A more independent environment ministry/department
- An environmental unit (cell) in each relevant ministry/department coordinated by Ministry of Environment or another ministry. (Sri Lanka, Philippines)
- A national level commission/committee specialized in environment (often parallel to the planning commission/committee)
- A national level planning commission or committee with emphasis also on sustainable development (Philippines, China)
- An Environmental ministry/department at national level and decentralized decision making authority (e.g. local government, regional environment office) at local level; (China, Malaysia, Pakistan, India, New Zealand)
- Parliamentary system (head: a prime minister, government agencies head: ministers, staff: professional civil servants) Malaysia

(http://www.unescap.org/dpad/vc/orientation/M2_intro_national.htm)

communities about polluting factories but actually we are only able to inspect companies that are big and easy to access to.

(.....) Before we have 2 forces of inspection: ministerial inspectors and VEPA inspectors. Now there are only ministerial inspectors who are both few in numbers and under trained. 40 inspectors are working in 6 major fields which require complex technical knowledge. (Interview transcription, September 29 2005)

According to a report by MoNRE (2005), the number of environmental officers in Vietnam is as few as 3 per 1 million people, compared to the average of 70 in Southeast Asian countries. They perform their functions in a top-down hierarchical lineup of Central, Provincial and District levels and in a horizontal system in 61 provinces and municipalities. Lack of financial support is another serious problem. At present, the government investment budget for environmental protection is around 0.1% of total GDP while this figure in the Southeast Asia is 1% on average (MoNRE 2005: 31). The Politburo, in Resolution no.41-NQ/TW dated 15 November 2004, has commanded that at least 1% of the national budget be allocated to environmental management from the year 2006 onward. Can it be realized? A senior economic official in the Ministry of Planning and Investment revealed:

*...it seems impossible, I must say. The Minister of Finance says that there **will not be** separate item for the environmental management in the next year budget. He also says the current budget for environmental management has already been over 1% of the total budget and they can not balance the new item.*

(emphasis added)

There is in fact no lack of political will or at least demonstration of will for environmental management. The ruling Party has already issued two statements on strengthening the environmental management.⁶ Although they are not officially classified as legal documents their importance can not be disregarded in the context of Vietnam. They should be read as firm orders like laws and will be later on legalized into National Assembly's Resolutions, Prime Minister's Decree and other regulatory documents by ministries. In the interviews with governmental officials and researchers, Party documents have always been mentioned in the beginning. Unfortunately from the legal point of view, these Party statements are more like political slogans than documents describing means of solving problems. They read like a list of commands with no priorities and solutions. Yet, a law must be a solution to a problem that provides incentives and institutional mechanisms for changing behaviors and relationships. Simply stating the desire for an improvement or change is not even the first step towards legislation (*informal talks with some respondents*).

The above transcribed interview also unveils the conflict of interests between line ministries, where economic interests are of higher priority. The Ministry of Finance was not persuaded to sacrifice economic targets even there is a Party command to do so. This together with other opinions during interviews gave an impression that economic growth is too overwhelming to have the implementation of environmental standards gone smoothly. Economic actors in corporations and ministries have every incentive not to comply with the environmental standards in order to protect their own targets. For example, in the interview with Mr. Hieu, an expert in VINATEX, he said that VINATEX and the Ministry of Industry

⁶ Politburo Directive no.36-CT/TW dated 25 June 1998 on strengthening the environmental protection in the industrialization and modernization; and Politburo Resolution no.41-NQ/TW dated 15 November 2004 on the environmental protection in the advancing phase of industrialization and modernization.

(to which VINATEX belongs) have made official request to MoNRE in order to lower the wastewater pollution charges, as provided in the Decree 67CP and Circular 125, for the state-owned textile firms. If this succeeds, they will enjoy a special charge 30% lower than the regular one applied to other industries. This means that the administration still has very significant power and uses it to influence environmental authority to suit its benefits. Other industries and ministries may follow this manner to gain their own which would negate the intended effect of the legal orders.

The inspection is an **example** of how economic interests intrude the effective implementation of regulations. None of the interviewed companies worried about the impact of inspection on their production though they were all polluting and subject to warning, fines or potential shutdown. These firms made use of a similar way to lower the fines and escape legal sanctions – grease money or the ‘envelope’.⁷ The inspectors received the money and turned a blind eye to the pollution as they are making a profit from the polluting operation. They are then much concerned with maintaining the illegal profits and do not want to crack down on these firms. If these polluting firms are made bankrupt due to stringent environmental regulations the inspector would lose a source of income. This kind of negotiative/collaborative relationship is very dangerous since it will encourage pollution.

Kommentar [MS28]: Of what?

The administrative fine imposed on violated firms is very low. According to the Decree No.121/2004/ND-CP dated 12 May 2004 on the regulations on Administrative Penalties in the environmental protection, an administrative penalty of up to 70 million VND (USD 4,000) may be imposed. Actually, as the interviews with environmental regulators revealed, the actual average fine between VND 5-10 million (USD300-600) has been imposed. By comparing with the cost of treating wastewater, one can see the costs for not complying with the law are much lower than that for complying. That is why all most of firms were willing to pay the fines, a very cheap price paid to keep them operating.

The implementation of environmental regulations now has the increased involvement of non-governmental organizations such as academic institutions and NGOs. The mass organizations in Vietnam created by the Party as supporting branches also involve in. So far they mainly provide assistance to the implementation with dissemination of environmental information and awareness raising campaigns. Academic institutions are required to provide necessary information for the policy-making process. However, in the interview with Mr. Thanh, an environmental specialist in Institute of Trade, he commented that the environmental policy research in Vietnam is facing many difficulties among them is financial support, skilled staff, information access and the most serious is that policy-making is much relied on subjective desires of administrative authorities than on research. The policies made by them are sometimes not scientifically justified. From the view of a green NGO, Center for Business Entities and Community Development, their main role is defined as helping firms and communities to protect the environment while increasing profits and employment. They are implementing projects in the national scale with the vision of sustainable development, “*proving that poverty alleviation and sustainable economic development are not just dreams*”. The outputs of these projects are promising with the participation of poor households who live in the rural and remote areas. They also stated that the State should not

⁷ It is known that in Vietnam people put money in an envelope as a gift to someone who can help/helped them out. It gradually became an ominous social issue and is seen as bribery. Of 5 firms, 3 admitted they gave money directly to inspectors.

be omnipotent and omnipresent which means intervening in every aspect of life. The State should focus on several crucial sectors and leave room for other non-governmental actors. It would be more effective than it is now.

IV.2.3 Remarks regarding the legislation and corrective functions

Although the environmental regulations in Vietnam has started very late compared to other jurisdictions, there are indications that legal efforts were being made to improve the environmental quality. The LEP, together with other legal documents, marked the Vietnamese leadership's decision to pursue the environmental protection. However, the implementation of environmental policies encounters many obstacles. Less obvious are flaws embedded in the Law itself. It is essentially administrative rather than legal in nature; courts are playing an insignificant role. Another obstacle is the intervention of political and economic interests in the functioning of environmental regulatory system. This leads to fewer funds to be allocated in the environmental protection, poor coordination between institutional organizations, persistent compromise between inspectors and violators and less desire by public entities to participate in the law-policy making. The environmental regulatory system bears imprints of the existing political paradigm, which are not easily set aside. Revised LEP is being reviewed but little change is more likely to be made than drastic modification.

Part V Conclusion

The case studies in the research provided a number of evidence to answer the question about the ineffectiveness of environmental regulation. Although some achievements have been made, major political and institutional constraints still remains. The findings demonstrate that the implementation of environmental laws in Vietnam has been impeded by the many factors among which the flaws in the Laws itself are very significant. This aspect has never been addressed in any analysis of Vietnam environmental law making this research is of exploratory value in some way.

Kommentar [MS29]: I am not convinced... I would say on the contrary... if you mean the Porter hypothesis...

However, the results from the research did not reveal a correlation between Vietnam environmental regulation and the competitiveness of textile firms as shown in some other studies. They show that although the regulations have imposed some costs on textile firms, they were too insignificant to compromise their competitiveness, regardless of ownership.

Kommentar [MS30]: Isn't this also the Porter hypothesis applied?

Nevertheless, the suggestion that Porter hypothesis should be tested on case basis is supported by the results and further research could be conducted in the same vein. Of course the future research, which at best is conducted in a broader scope of location, should include profitable firms. This would facilitate a comparative study to unveil the difference between their concerns and responses to environmental pressures that may be dictated by external demands in oversea markets for instance. Also there are environmental standards, experiences and ideas abroad that Vietnamese law-makers and regulators can draw on. From the above analysis, the question of corporate sustainability, that is, how to encompass strategies and practices that aim to meet the needs of stakeholders while seeking to protect, support and enhance the human and natural resources for the future still remains. One

Kommentar [MS31]: You mean too low to affect the competitiveness?

possible way is, via the Porter hypothesis, to show opportunities which may not realized by firms themselves if there are not necessary pressures to improve the environment, working conditions while maintaining the productivity and competitiveness.

The pattern of environmental regulatory regulation in Vietnam, showing similarities with those in developed countries, appears to be evolving from command-and-control style to one using market-based instruments. Firms will benefit from this trend because using market tools to improve the environment allows firms to tailor their responses to their own needs and to seek innovative solutions to meeting their responsibilities (Russo and Fouts 1995). Information instruments as non-regulatory measures should also be promoted such as the introduction of ISO 14001, Cleaner Production, Total Quality Management Program (TQM), Production Life-Cycle Management (PLM). The integration into the world economy, is exposing Vietnamese firms in general and textile firms in particular to growing environmental challenges. This also suggests that trade considerations of international trade may play a role in the formulation of environmental policy. These suggestions are primarily indicative and need to apply with adjustments to the existing socio-economic-political circumstance of Vietnam.

References

- Annandale D. et al. (2004) The Determinants of Company Response to Environmental Regulation. *Journal of Environmental Policy & Planning*, Vol. 6, No. 2, June 2004, pp.107-130.
- Cagno E. et al (2005) Cleaner production and profitability: analysis of 134 industrial pollution prevention (P2) project reports, *Journal of Cleaner Production*, Vol.13 (2005) 593-605.
- Ederington Josh and Minier Jenny (2003) Is environmental policy a secondary trade barrier? An empirical analysis, *Canadian Journal of Economics*, Vol.36, No.1, pp.137-154.
- Fineman Stephen (2000) Enforcing the environment: Regulatory realities. *Business Strategy and the Environment*, vol. 9, pp. 62-72.
- G. Haq et al (2001) Determining the costs to industry of environmental regulation. *European Environment*, Vol. 11, pp. 125-129.
- Hill H. (1998) *Vietnam Textile and Garment Industry: Notable Achievements, Future Challenges*. Appendix II of the Industrial Competitiveness Review. Ministry of Planning and Investment and UNIDO.
- IEST (2000) Survey on the present environmental pollution in some craft villages in Hatay Province, Bacninh Province and Hungyen Province: Mitigating solutions. Institute of Environmental Science and Technology, Hanoi Technology University (*in Vietnamese*).
- IIRS (2001) Masterplan of development of textile and garment industry by geographical regions. Institute of Industrial Research and Strategy. Ministry of Industry (*in Vietnamese*).
- Jaffe B. et al (1995) Environmental Regulation and the Competitiveness of U.S manufacturing: What does the evidence tell us? *Journal of Economic Literature*, Vol XXXIII (March 1995), pp.132-63.
- JICA (2003) Environmental Sector Study for Japanese ODA in the Socialist Republic of Vietnam.
http://www.isgmard.org.vn/Information%20Service/Report/General/JICA/TOC_en.pdf
Accessed Aug 23 2005
- JICA, MoI (2000) Draft Final Report: Case study on the Master Plan Study for Industrial pollution Prevention in Vietnam (Wastewater).
- Lefebvre Elizabeth et al. (2003) Determinants and Impacts of environmental performance in SMEs. *R&D Management*, vol.33, no.3, 2003, pp. 263-83.

- Lipsey, R. G., (1991) *Economic Growth: Science and Technology and Institutional Change in a Global Economy*, Toronto: Canadian Institute for Advanced Research.
- Murty M.N. Kumar S. (2003) Win-win opportunities and environmental regulation: testing of porter hypothesis for Indian manufacturing industries. *Journal of Environmental Management* vol. 67 (2003) pp.139–144.
- Malaviya N.(2002) *On the Road to a More Ecological Industrial System: The Role of Waste Exchanges in Ho Chi Minh City*. Research Report. University of Toronto.
<http://www.utoronto.ca/waste-econ/res-pub.html>
 Accessed August 23 2005
- Miller G. Tyler (2003) *Living in the environment: Principles, Connections and Solutions*. Belmont, CA: Wadsworth, current edition.
- MoNRE (2002) *State of Environment - Vietnam 2002*. Ministry of Natural Resources and Environment (*in Vietnamese*).
- MoNRE (2005) *Summary Report: Review of 10 year implementation of Law on Environmental Protection*. Ministry of Natural Resources and Environment (*in Vietnamese*).
- NCSSH (2001) *National Human Development Report 2001: Doi moi and Human Development in Vietnam*. National Center for Social Sciences and Humanities.
- Palmer K. et al (1995), Tightening environmental standards: the benefit-cost or the no-cost paradigm?, *Journal of Economic Perspective*. Vol. 9, no. 4, pp. 119-132.
- Piritta Sorsa (1994) *Competitiveness and Environmental Standards: Some exploratory results*. Policy research Working Paper 1249. World Bank Group 1994.
- Porter, M.E., 1991. America's green strategy. *Scientific America* 264 (4).
- Porter, M. & van der Linde, C. (1995) Toward a new conception of the environment-competitiveness relationship, *Journal of Economic Perspectives*, 9(4), pp. 97-118.
- Que Tran Thi and Thanh Vo Tri (2002) *Vietnam: Achievements and Challenges*. *Social Watch*.
<http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN002366.pdf>
- Rogério Silveira (2000) *Environmental Regulation, Innovation and the Competitiveness of Portuguese Firms*, CISEP – Centro de Investigação Sobre Economia Portuguesa (Research Centre on the Portuguese Economy).
- Russo V. Michael and Fouts A. Paul (1997) A resource-based perspective on Corporate Environmental Performance and Profitability, *The Academy of Management Journal*, Vol. 40, No.3 (June 1997), pp.534-559.

- Susmita Dasgupta et al. (1997) Capital market responses to environmental performance in developing countries. The World Bank Development Research Group
www.worldbank.org/nipr/work_paper/market/ (accessed April 25 2005)
- Tran Thi Thanh Phuong 1996, Environmental Management and the Policy-Making in Vietnam, Seminar on Environment and Sustainable Development in Vietnam, Canberra. http://coombs.anu.edu.au/~vern/env_dev/papers/PAP03.DOC
Accessed Aug 23 2005
- VEPA (2004) Selected legal documents on environmental protection, Vol.6. Vietnam National Environmental Protection Agency (*in Vietnamese*).
- VINATRADEUSA. Garments and Textiles Section. Vietnam Trade Office in the USA
http://www.vietnam-ustrade.org/Eng/garments_&_textiles.htm (Accessed 20 Aug 2005)
- VINATEX (2002) Report: Integrating environmental protection into Master Plan of Development of Textile-Garment Industry to the year 2010. Ministry of Industry (*in Vietnamese*).
- Wagner M, Schaltegger S. (2004) The Effect of Corporate Environmental Strategy Choice and Environmental Performance on Competitiveness and Economic Performance: An Empirical Study of EU Manufacturing, *European Management Journal* Vol. 22, No. 5, pp. 557–572.
- Young, Carlos Eduardo Frickmann (2003) Environmental regulation and competitiveness in Brazilian industry, with special reference to the energy sector. BP Visiting Research Fellow in Economics, Centre for Brazilian Studies: University of Oxford.
www.brazil.ox.ac.uk/BP%20Research%20Paper%20Number%202%20%20Youg.pdf
. Accessed April 19 2005
- Internal material collected in the interviewed companies (*in Vietnamese*).

Appendix 1 Research Map – the North of Vietnam



Note: Red spots, Hanoi, Hai Duong, Nam Dinh, indicate where the field research has been conducted.

Source: from <http://www.redrat.net/vietnam/vietmap.htm>. Modified by author

Appendix 2 Terminology

Kommentar [MS32]: I suggest to place this in an appendix in the end.

- **Environmental regulation:**

According to the Encyclopedia Britannica, environmental regulation is considered part of environmental law which includes principles, policies, directives enacted and enforced by local, national, or international entities to regulate human treatment of the nonhuman world.

According to the definition by ESCAP⁸, environmental regulation is part of government policy instruments designed to induce producers and consumers to behave in a certain manner for the sake of environmental and natural protection.

Such government policy instruments may be classified into three broad categories: command and control instruments (CACs); market based-instruments (MBIs) and other policies like environmental education, liability legislation etc. The first two categories are most applied in reality. Voluntary initiatives have also been used for the same purpose, but have often been criticized for being too lenient on industry (G. Haq et al 2001, p. 127).

Command and control instruments (CACs) are the most common forms of environmental policies in both the advanced and developing countries. As the name implies, the CAC approach consists of a 'command', which sets a standard - the maximum level of permissible pollution, and a 'control', which monitors and enforces the standard.

Market based-instruments (MBIs) use price or other economic variables to provide incentives for polluters to reduce harmful emissions. MBIs include charges, subsidies, marketable (or tradable) permits and other MBIs including deposit/refund systems, eco-labelling, licenses, and property rights.

- **Economic competitiveness**

For the whole country competitiveness is defined as "the ability to sell goods and services under free and fair market conditions while maintaining and increasing living standards over the long run" (Lipse, 1991).

In this thesis, it simply means the corporate ability to maintain a sustained profitability by cost efficiency and labor productivity maximization.

⁸ From the webpage of United Nations Economic and Social Commission for Asia and the Pacific www.unescap.org

Appendix 3 List of key informants and Companies

VINATEX (Vietnam National Textile and Garment Corporation):

1. Cao Huu Hieu, Technical and Environmental Expert, Department of Technology and Investment.

Email: hieuch@vinatex.com.vn

Tel: 84-4-8257700

2. Nguyen Duy Dzung, Dyeing – Finishing Manager and Environment Coordinator

Email: dungnd@vinatex.com.vn

Tel: 84-4-8257700 ext 247

MINISTRIES

3. Nguyen Van Thanh, Deputy Head, Department of Technology, Ministry of Industry (Mol)

4. Nguyen Khac Kinh, Director General, Department of Environmental Impact Assessment and Appraisal. Ministry of Natural Resources and Environment (MoNRE)

Email: nkkinh@monre.gov.vn

Tel: 84-4-7734246

5. Truong Manh Tien, Director General, Department of Environment, Ministry of Natural Resources and Environment (MoNRE)

6. Tran Van Loc, Deputy Head, Department of Technology, Natural Resources and Environment, Ministry of Planning and Investment (MPI)

Email: vkq48@yahoo.com

ACADEMIC

7. Nguyen Van Thong, Director, Institute of Garment and Textile, Ministry of Industry

8. Ho Thanh, Director, Department of Environmental Studies, Ministry of Trade

NON-GOVERNMENTAL ORGANIZATION

9. Nguyen Son, Director, The Center for Business entity and Community Development

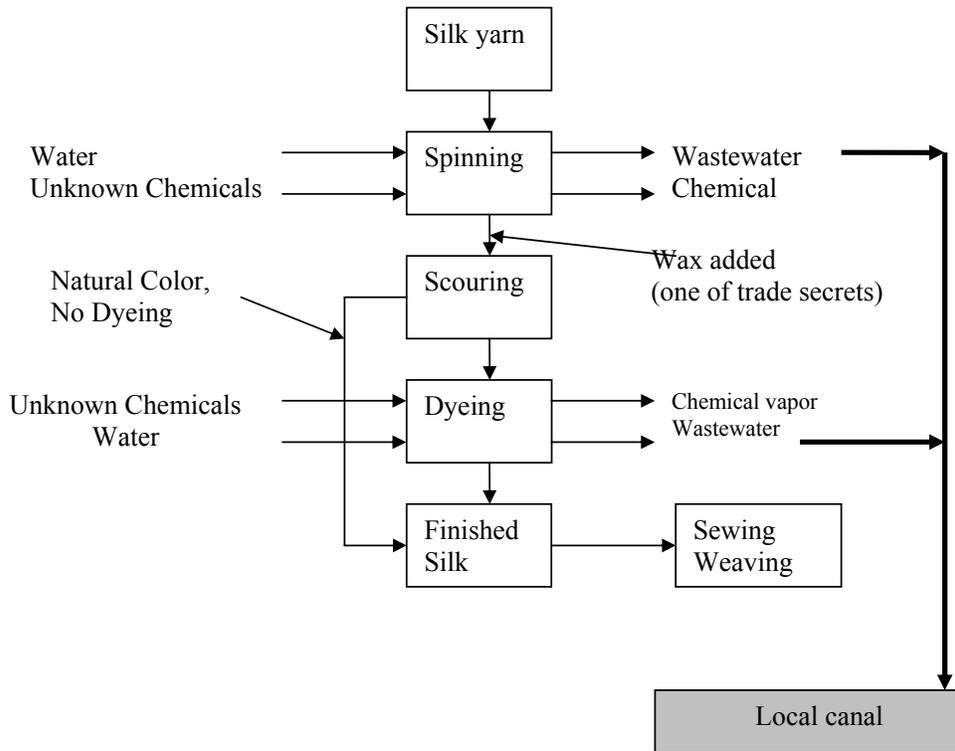
10. Niclas Svenningsen, Programme Officer, Division of Technology, Industry and Economics, United Nations Environment Programme (UNEP)

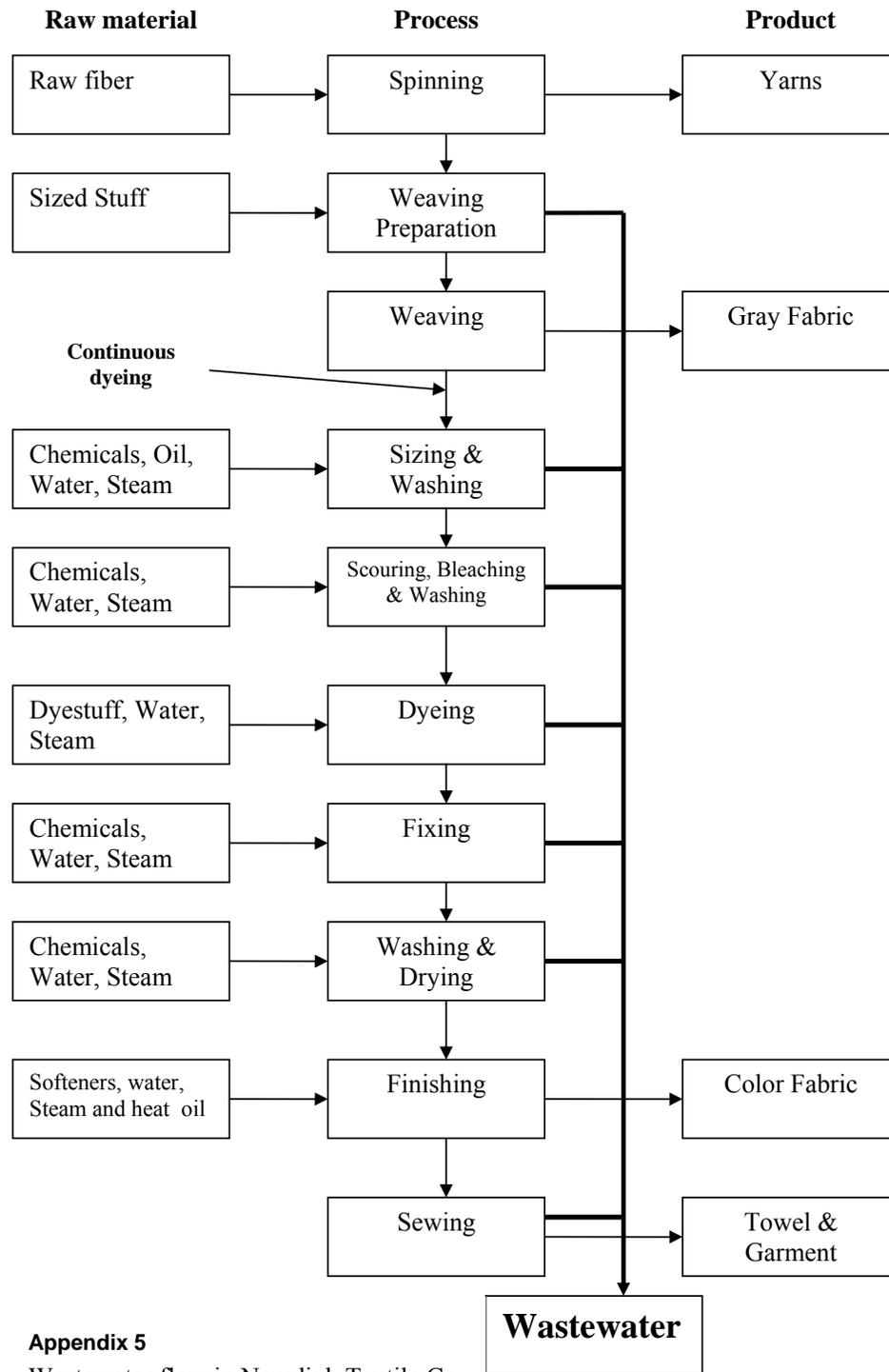
Email: nsvenningsen@unep.fr

List of interviewed companies

No	Name	Location	Telephone	Ownership	Interviewee	Time of Interview
1	WIN VIEW TEX	Hanoi	84-4-5585260	State owned	Duong Tam Tam, Director	9-10 am, 30 Aug 2005
2	YENMY-PHONOI DYEING Co.	Hai Duong		Joint stock	Nguyen Duy Dzung, Director	14-15 pm, 31 Aug 2005
3	NAM DINH TEXTILE Co.	Nam Dinh	84-0350-849422	State owned	Ha Van Vinh, Head of Environment Dept.	8 – 9 am, 15 Sept 2005
4	NAM DINH SILK Co.	Nam Dinh	84-0350-849622	State owned	Tran Thi Ngoan, Technical Director	10:30 – 11 am 15 Sept 2005
5	VAN PHUC Silk Village	Ha Tay		Family enterprise	Duong Thi Nu	3 - 4:30 pm 29 Sept 2005

Appendix 4 Typical traditional silk making and waste flow in Van Phuc Silk Village (Simplified)





Appendix 6 Images of working conditions in some textile firms

Namdinh Textile Co.



Wasting water



Old factory without improvement



Working behind dirty guard-net

Namdinh Silk Co.



Outside the dyeing unit



In the oil heating room



Oil spilt on the floor

WIN TEX VIEW co.



Oil heater



In the dyeing room



Spinning room

Yenmy Dyeing Co. and Phanoi Industrial Park



Clean and neat workplace



The water treatment plant for the industrial park



Treatment plant waiting for wastewater