A POLICY ANALYSIS OF CLEANER TECHNOLOGY: A CASE STUDY OF MONDI LIMITED

By

KGAUTA SYLVESTER MOKOENA

Bachelor of Science (Environmental Hydrology, Soil Science and Industrial Psychology), Post-Graduate Diploma (Policy and Development Studies)

Submitted in partial fulfilment of the requirements for a
Master of Social Science degree in Policy and Development Studies
in the School of Human and Social Studies
in the Faculty of Human & Management Sciences
University of Natal
Pietermaritzburg

2003

ABSTRACT

The pollution problems resulting from industrial production activities result in the deterioration of our natural environment. That is why something needs to be done in order to preserve our environment. Conservation alone is not enough. Development is needed. Waste minimisation through applying Cleaner Technologies can help the country in the reduction of waste production and improve industry's environmental management processes.

This study was based on an investigation into the adoption of Cleaner Technology. The study argues that elements of Cleaner Technology and the application of tools and strategies to practice Cleaner Technology are very useful for any industry. The costs of Cleaner Technology to companies cannot be compared with the benefits they can get from adopting Cleaner Technology.

Mondi Limited concentrates on the product element of Cleaner Technology. It applies the recycling and re-use strategies in order to achieve product modification and input substitution. The organisation and knowledge elements are very strong and supportive to the technique element that is used at the Mondi Paper Mill. These three elements contribute to the increased efficiency, improved quality of intended products and waste minimisation through re-use and recycling.

The question emerges about what government can or should do in return to companies like Mondi since they contribute towards the sustainability of our natural resources.

PREFACE

My involvement in the course organised by CEAD and SACUDE has helped me a lot in gaining a feeling and a bit of an experience when working with the timber industry. I have also developed an interest in the topic of this document from that course. I therefore would like to thank CENGOPO for making it possible for me to be part of that course, from which I also received a little funding for my project.

ACKNOWLEDGEMENTS

I like to convey my words of appreciation and acknowledgement to the following people: Professor Ralph Lawrence from the Centre for Government Policy Studies (CENGOPO) at the University of Natal (Pietermaritzburg) for introducing me to the field of public policy. My supervisor Ms Anne Stanton from the Centre for Government Policy Studies (CENGOPO) at the University of Natal (Pietermaritzburg) for her excellent guidance and supervision. Professor Rob Fincham from Centre for Environment and Development (CEAD) at the University of Natal.

I also like to thank Ms Gladys Naylor, Mr Phillip Ninela and Rafique, from Mondi Paper Mill and Mr A Pott from Mondi Forests who have been very helpful and co-operative in supplying the information that was requested from Mondi Limited. I like to say thank you to Dr Olufemi Idowu who has helped me in ensuring that the language and grammar of this document is acceptable. A thousand words of thanks are due to my sponsors more especially the Danish for their financial contribution and to all my friends for their support, may I say that you are the stars.

DECLARATION

This thesis was undertaken under the Centre for Government Policy Studies (CENGOPO), at the University of Natal, Pietermaritzburg, with the Supervision of Ms Anne Stanton.

This is an original work by the author. It has never been submitted for any degree or any diploma to any other institution. Work of others that has been used has been duly acknowledged in the text.

Kgauta Sylvester Mokoena

DEDICATION

I would like to dedicate this piece of work to my late father (Mokgethi), to my mom (Sarah), my precious daughter Puleng Andile Lebohang, her mom (Phumla Noncedo Precious), and to the whole of my family.

TABLE OF CONTENTS

List Of Abbreviations And Acronyms

CT – Cleaner Technology

EU – European Union

NEMA – National Environmental Management Act

WSSD – World Summit on Sustainable Development

CEAD – Centre for Environment and Development

CENGOPO – Centre for Government Policy Studies

NGO – Non-governmental organization

EMS – Environmental Management System

EIA – Environmental Impact Assessment

SABM – South African Board Mills

BM – Board Machine

FSC – Forest Stewart Council

SABS – South African Bureau of Standards

DWAF – Department of Water Affairs and Forestry

CCT – Clean Coal Technologies

DTI – Department of Trade and Industry

SMME – Small Medium and Micro-Enterprises

WWW – World Wide Web

EU – European Union

ORG – Organization

CSIR – Centre for Scientific Institute Research

List Of Figures And Tables

PART I: PUBLIC POLICY FRAMEWORK

1. INTRODUCTION

The aim of this section is to introduce a theoretical framework of public policy, which will form part of the fundamentals of this study. This theoretical analysis of public policy will highlight that it is very difficult to divorce policymaking from policy implementation. The separation of the two can result in inefficiency in any of these two processes. It is therefore imperative to take policy as a system comprising of various parts, which complement each other to make public policy successful. Policymaking is a continuous process that includes a range of activities and phases such as agenda setting, alternatives, decision-making, implementation, and policy evaluation. Each of these phases is interrelated to each other.

The success of policy implementation relies heavily on compliance, which in turn depends on a method or a combination of methods to make people or organizations comply with policies. Enforcement is one common example of gaining compliance. Parsons (1995:518) discusses different approaches or policy instruments and modes to the enforcement mix, for example, the use of incentives to encourage compliance to policies. Different policy instrument for implementation will be discussed later in this section.

Policy networks in the form of partnerships such as public-private partnerships are also very helpful in addressing problems related to policy implementation. Kingdon (1995) argues that the presence of a policy problem and the politics of the day might open a policy window. His views, in this respect, will be closely considered.

2. PUBLIC POLICY

In order to achieve any objective in a successful manner, policies are used to provide a guide on the way towards achieving those objectives. That is why most successful organizations have policies which are followed by members of that organization. Policies bring about order and method by which things are being done or have to be done. In most instances policies are in line with the organization's vision, missions and objectives. That is why it is also appropriate for people, companies, institutions, government and any other body or structure to have a clear policy for clients to know how the structure intends to do its business and how it intends to relate to other structures as well as its clients.

Depending on the area where a policy is found, one can have a company policy, organization's policy, institution's policy, government policy (which is public policy), team's policy and so on. The common thing about all these policies is that they guide people on how they should conduct themselves for obtaining certain objectives. This means that there is a strong link between a policy and the organization or body for which the policy is made.

If one does not comply with a given policy, he or she is said to be showing a sign of disobedience to the organization and some disciplinary actions are normally taken against such people. The same happens with public policy, governments will take some steps for people who do not comply with legislation or government policies.

Policies can be regarded as the laws or regulations which the government or group of people can use to control certain situations. Public policies can be regulatory, policies that help in shaping human behaviour; distributive policies, which are polices that ensure that human beings enjoys their rights or freedom to certain things and self-regulatory policies which are policies in which the public is complying through free will. Anderson (1997:16) clearly differentiates between the regulatory policies and distributive policies by arguing that regulatory policies impose restrictions or limitations on the behaviour of individuals and groups. On the other hand distributive policies increase the freedom or discretion of the persons or groups affected.

Parsons (1995:338) argues that distributive policies help the government to decide who gets, what, when and how. There are also redistributive policies which are polices meant to ensure that resources are enjoyed by all the public in the similar way by availing opportunities to the groups which were previously disadvantaged or deprived of those privileges.

For the purpose of this research, regulatory policies will be discussed, largely related to public policy. According to Anderson (1997:10), public policy is a relative stable, purposive course of action followed by government in dealing with some problem or matter of concern. The presence of policy results in people behaving in such a way that there is some uniformity. Government can use public policy to modify human behaviour by refraining them from doing what is bad and making them do what is good or desirable.

Public policies are employed in public administration. The straightforward idea is that public policy emerges from the interrelationships between intentions and actions of political participants. According to John (1998:22), in a democracy, citizens elect politicians to carry out policy platforms. "Politicians", he says, "in turn create programmes for the bureaucrats to implement". Senior bureaucrats instruct lower-level officials to carry out policy decisions. Central governments direct local governments what to do, and so on. Thus, through many chains of cause and effect or commands and responses, policy emerges at different stages (John, 1998:22).

Kingdon (1995) argues that public policymaking can be considered to be a set of processes, including at least; the setting of the agenda, the specification of alternatives from which a choice is to be made, an authoritative choice among specified alternatives, (as in a legislative vote or a presidential decision) and the implementation of the decision (Kingdon, 1995:2-3). According to Kingdon (1995:3), during policymaking the success of one part in the policymaking process does not necessarily mean the success of another.

Anderson (1997), has noted the following on public policy:

> *Problem identification, agenda setting, and policy formulation constitute the pre-decision segment of the policy process in that they do not involve formal*

> *decisions on what will become public policy. They are important, however, because they help determine which issues will be considered, which will be given further examination, and which will be abandoned. Thus they involve political conflict and help set the terms for additional conflict (Anderson, 1997:128).*

Policy formulation or policymaking can be done in different ways. The most common way is where the government or the ruling class takes the decisions and makes policies affecting and on behalf of the people whom they lead. This is called a top-down approach since policy decisions are made by those people 'on the top', namely the government or ruling class. On the other hand when the public is involved, when all the interested and affected parties are participating in decision-making, the process is referred to as the bottom-up approach since policy decisions are taken from grassroots levels.

Bureaucrats seek to impose order on decision-making in order to prevent too much participation, a practice that is often called gatekeeping (John, 1998:25). In gatekeeping, officials create time limits on the consultation process and invoke the need to progress to the next stage of decision-making to limit the extent to which interest groups and organizations participate in decisions, in order to speed up the decision-making process (John, 1998:25).

In democratic countries, policy formulation is open to all interested and affected parties. There is more emphasis on transparency and public participation in decision-making and policymaking. This allows all interested and affected parties to participate in the policy formulation process. There are a lot of other groups or organizations, besides government, that may be involved in decision-making or policymaking. Non-governmental organizations (NGO's), the media, political parties, private organizations can all be involved in policymaking. NGO's represent interested and affected parties of civil society that deal with particular areas of concern.

The NGO's can be in labour, environmental groups, development organizations, youth organizations, professional organizations, etc. They have different interests and

they all contribute in policymaking and in policy implementation. Journalists, bureaucrats and politicians also try to represent policymaking as an orderly process because of the attractiveness of clarity (John, 1998:24).

In conclusion, depending on the nature of a policy, policies can be found anywhere. Public policies are normally administered by government in order to fulfill its obligation as the people' servant. The success of a policy will also depend on how the policy was made. The following section will discuss the policymaking process or policy cycle in more detail.

3. THE POLICYMAKING PROCESS

Public policymaking can be considered to be a set of interrelated phases or processes, often referred to as the policy cycle. Breaking the policymaking process up into different phases is a useful approach for policy analysis. The first phase is the identification of the policy issue or problem. Second, is the setting of the policy agenda. Third, is the specification of alternatives from which a choice is to be made. Fourth, is an authoritative choice amongst the specified alternatives. Fifth, is the implementation of the decision and lastly is the evaluation of the policy (Kingdon, 1995).

The policy agenda is, according to Kingdon (1995:202), the list of issues or problems to which governmental officials, and people outside government closely associated with those officials, are paying some serious attention to. At any given time, there are a lot of problems or issues that need the government's attention. Not all of them can be attended to at once, at one place, by the same people or by one department. The large number of these issues makes it impossible for government officials to attend to all of these issues at the same time. Hence not all those issues or problems are given serious attention (Kingdon, 1995:3).

In other words, out of the set of all conceivable issues or problems to which officials could be paying attention, they do in fact seriously attend to some rather than others (Kingdon, 1995:3). Agenda setting is the process, or stage of policymaking where government narrows this set of conceivable issues to the set that actually becomes the focus of government's attention.

There are more specialized agendas depending or dealing with issues concerning a particular government department such as health, education, defence, etc. Within each of these government departments, there are more specialized agendas for certain fields. For example within the education department, more specialized agendas on higher education, adult education, or primary education. Each of these agendas has its own set of interested and affected parties.

The third phase of the policymaking process looks at the process of establishing and assessing a set of alternatives also referred to as potential policy solutions or proposals. Apart from the set of subjects or problems that are on the agenda, a set of alternatives for governmental action is seriously considered by government officials and those associated with them (Kingdon, 1995:4). When decision-makers consider all conceivable alternatives, the process is called rational decision-making. On the other hand when only conceivable alternatives are considered, the process is called incremental decision-making. Out of the set of conceivable alternatives, officials actually consider some more seriously than others. This process of specifying and assessing different alternatives is used to narrow the set of conceivable policy decisions to those that are then seriously considered (Kingdon, 1995:4).

The identification of a problem or a need for certain action to be taken, possible solutions and alternatives and the participation of policy groups (such as government, business, non governmental organizations (NGO's), community and political groups) are all key components of the policymaking process. The involvement of the above policy groups might result in the discussion over the issue or problem that needs to be addressed. Often, this results in a discussion document, which stipulates the terms of reference for the decision-making stage. Setting the agenda therefore makes it possible for policies to be formulated, through a series of meetings, discussions and decision-making processes.

It is not easy for the government to know everything in a particular country, hence there is a need for some signal which will alert the government about the presence of a problem in a particular area. This signal will serve as a problem indicator that might also result in the government seeing the need for policymaking on a particular issue or problem.

Some organizations shape, and others are shaped. Some have the capacity and resources to set their own agenda, make their own decisions with a measure of independence; others are constrained by their dependence on their environment, which includes powerful sets of decision-makers (Parsons, 1995:236). Organizations can make decisions when they are faced with choices, they rank the decisions and one emerges as a clear winner (John, 1998:33). The objective of the agenda is to have an

outcome at the end of the day. The idea is to achieve a desirable outcome given limited information and values of the decision-makers. According to John (1998:34), values of the decision-makers and the values of the organization both constrain and guide decision-makers.

Following problem identification, agenda setting and policy formulation is policy adoption. Policy adoption involves deciding which proposed alternative (which could include taking no action), will be used to address a problem (Anderson, 1997:39). When considering the proposed alternatives, possible actions may be anticipated and taken into account in an effort to help ensure that policy will accomplish its intended purposes (Anderson, 1997:128-129). The final policy adopted, acts as a frame of reference for the government and other administrative agencies. It safeguards the public from the wrongdoing of any person. It therefore strengthens the checks and balances, offers a framework for action.

Finally, it is important to understand how and why policymaking differs between policy sectors (John, 1998:12). Depending on which sector in which the policymaking process is taking place, the decision-making process might not be the same as in another sector. The same can be said with public policies, governments usually have more power and hence public policy at least in its positive form, is based on law and is authoritative (Anderson, 1997:12).

4. PUBLIC POLICY INSTRUMENTS

Policy instruments can be defined as the different tools, approaches and methods in which governments seek to secure compliance to public policies. Each policy implies its own type of policy instrument. Some regulatory policies, such as legislation, are enforced primarily through judicial action (Anderson, 1997). Enforcement is a policy instrument for regulatory policies. It is one of the options available for making people comply with the adopted policy. Incentives are also a possible method of ensuring compliance which will be explored later. In this section I will focus on enforcement. A good public policy is all very well, but without an appropriate policy instrument, the delivery of public policy is difficult and uncertain (Parsons, 1995).

Parsons further says that we only have to consider, for example, the difficulties that European Union policies and other international agreements and laws have encountered to realize that a good policy, if it is to be carried out, must have effective means of enforcement. Parsons (1995:509) further talks about the enforcement mix as a way of making people comply with policies. In the enforcement mix, policy methods may range from brute force and fixed bayonets to information broadcasts that seek to change behaviour. Markets, bureaucracy and community, for example, may be viewed in terms of different ways of enforcing policy (Parsons, 1995:509).

According to Parsons (1995:509), there are three different ways by which enforcement can take place. Firstly, the market exercises enforcement through supply and demand, prices, and the interaction of buyers and sellers. Secondly, the bureaucracy relies on citizens' compliance to rules. Thirdly, community enforcement relies on such modes as shared values, reciprocity and trust. Parsons (1995:509) identifies five approaches to the mix of enforcement modes. These approaches are:

(i) The Boulding Approach,
(ii) The Hood Approach,
(iii) The Burch and Wood Approach,
(iv) The Etzioni Approach, and
(v) The Incentive Approach.

(i) The Boulding Approach

The Boulding approach focuses attention on enforcement and power. It is named after Kenneth Boulding, an economist whose ideas about power have great relevance to understanding the enforcement costs of delivery and the boundary possibilities of different mixes of enforcement strategies (Parsons, 1995:509). Enforcement seems to depend on a lot of power. Power can be defined as the capacity that A has to influence the behaviour of B so that B acts in accordance with A's wishes. In fact Robert Dahl (cited in Lukes), defines power as "A has power over B to the extent that A gets B to do something that B would not otherwise do" (Lukes, 1974:11-12).

Boulding distinguishes between three kinds or categories of power. These categories are threat, exchange and love. The threat category is what is called coersive power since it is based on fear. Here, compliance is achieved as a result of the fear of punishment if there is no adherence to the policy. The exchange is what is called reward power or bargaining, since it is based on the ability to distribute desired rewards in such a way that nobody loses. The love category can be called referent power since it is based on a leader's possession of desirable resources and personal traits which followers like. Boulding also considered the threat, exchange and love categories against their consequences (Parsons, 1995:510).

According to Boulding, the consequences of the threat, exchange and love categories are destruction, production and integration, respectively. The effect of destructive power is to destroy people and valued things. The effect of productive power is to be seen in blueprints, ideas, tools and machines, and the activities of construction and manufacturing. Integrative power may be thought of as an aspect of productive power that involves the capacity to build organizations. It also involves the capacity to create families and groups, to inspire loyalty, to bind people together and to develop legitimacy (Parsons, 1995:510).

It should be noted that, Boulding does not see his categories as pure forms. He indicates that the love, the threat, and the exchange categories have the quality of being fuzzy sets, in that they contain elements of other types of power consequences (Parsons, 1995:510). Enforcement through threat can cause productive and integrative consequences, as in the case of the exercise of threats by income tax

authorities or policemen. The threat carries destructive consequences, but if successful may be socially productive and integrative (Parsons, 1995:510).

The use of exchange power to enforce is productive in that for X, A gets Y from B, and B gets Z from A in reciprocal terms. However on contractual terms: A gets B if he does C. It may involve bargaining to establish a satisfactory rate of exchange or terms of trade (Parsons, 1995:510). It can also be noticed that exchange or bargaining also contains elements of destruction to enforce contracts and trust and courtesy, to make exchange possible (Parsons, 1995:510).

The use of love as a mode of enforcement involves an appeal to a moral sense or a sense of community or citizenship (Parsons, 1995:510). The love category is a request for compliance not based on a threat or on, if you do X, you will get Y but on the appeal to a social sense or loyalty to the nation. In the same way as the other categories of power, the love category also contains a capacity to generate its destructive opposite. It also has a capacity to create enemies, to alienate people; it has a destructive as well as a productive aspect. The integrative consequences of love as a mode of enforcement may prove highly productive. This implies that compliance takes place because of concern, care or a sense of duty, rather than for money or avoiding the long arm of the law (Parsons, 1995:511).

The Boulding approach means that, depending on the nature of a policy, some polices may contain more threat than exchange, others more love than threat and vice versa. In other cases, more than one category may be found. In all these cases though, the intention will be to enforce the policy.

(ii) The Hood Approach

The Hood approach examines the forms of administrative enforcement and their effectiveness (Parsons, 1995:511). In this approach, Hood identifies four options or modes for enforcement. Firstly, set aside or modify rules. Secondly, spread the word. Thirdly, pursue and punish rule-violators. Fourthly, make it physically difficult, impossible, or inconvenient to break the rules (Hood, 1986 cited in Parsons, 1995:511).

❖ **Mode 1 enforcement – set aside / modify rules**

In cases of non-compliance, government may choose either to set the rules aside or to modify the rules in order to bring about compliance (Parsons, 1995:511). In the case where incompetence is the type of non-compliance, the application of mode 1 enforcement has no effect on non-compliance. Setting the rules aside is an option here, however it is the government's responsibility to do that. The removal and the modification of the rules is at the government's discretion. Also the modification of the terms or conditions of the rule is at the discretion of the granting authority (Anderson, 1997:248).

Mode 1 enforcement is also likely to increase the opportunities for non-compliance in the case of an opportunist non-compliance. Also in the realm of principled objection to a rule or a specific application, mode 1 enforcement may influence dissent, without doing much damage to basic rules (Parsons, 1995:511).

❖ **Mode 2 enforcement – spread the word**

The government may choose to use publicity and persuasion in enforcing compliance to policies. According to Anderson (1997:155), persuasion involves marshaling of facts, data, and information, the skillful condition of arguments, and the use of reason and logic to convince another person. This amounts to the kind of "please keep off the grass" notices, in an attempt to gain compliance by giving information or advice which aims at modifying behaviour (Parsons, 1995:511).

The application of mode 2 enforcement may change behaviour in the case where incompetence is a type of non-compliance. In the case of the opportunist non-compliance, mode 2 enforcement is unlikely to have much effect on an opportunist (Parsons, 1995:511). Mode 2 enforcement is unlikely to change behaviour in conditions of an objection in principle.

❖ **Mode 3 enforcement – pursue and punish rule violators**

This is the use of legal and police action to punish non-compliance. Most governments have adopted this method to ensure compliance to their policies. Governments seek to impose criminal penalties, fines or jail sentences which requires action through the courts (Anderson, 1997:253). This mode is unlikely to diminish an

incompetent form of non-compliance. It may also depend on whether the prevention of non-compliance is feasible and affordable (Parsons, 1995:512).

- **Mode 4 enforcement – make it physically difficult, impossible, inconvenient to break the rules.**

According to Parsons (1995:512), this enforcement method discourages the use of notices to inform people (such as putting up a notice not to walk on the grass), but it encourages making it physically difficult or inconvenient to disobey (thus fencing off the grass to prevent people from walking on the grass). Parsons (1995:512) argues that like mode 3 enforcement, in the case where the incompetence is a type of non-compliance, the application of mode 4 enforcement may depend on whether the prevention of non-compliance is feasible and affordable.

In the case of an opportunist non-compliance, mode 3 and 4 are more likely to have an effect on the opportunist, through fear of getting caught and inability to do it respectively. Mode 4 enforcement might make matters worse and it depends on feasibility and affordability of the preventative measures (Parsons, 1995:512). Mode 1 and 2 enforcement are soft enforcement responses while mode 3 and 4 enforcement are hard enforcement responses (Parsons, 1995:512).

(iii) The Burch and Wood Approach

The Burch and Wood approach provides a framework for analyzing the relationship between enforcement to policy type and regime. It corresponds with the hard sanctions in the Hood approach and the use of threat in the Boulding approach. Burch and Wood provide a framework on which to map the choices of enforcement methods in terms of negative sanctions that prevent people from doing things (Parsons, 1995:514).

Anderson (1997:253) argues that sanctions put some sting into administrative action. The other extreme is the use of positive sanctions, which are more indirect. These sanctions are aimed at inducing a change in behaviour. According to Parsons (1995:514), positive sanctions include soft-sanctions of the Hood approach, and the use of the love and the exchange categories in the Boulding approach. Against these,

Burch and Wood set modes of controls in terms of formal-controls and informal-controls (Parsons, 1995:514).

According to Parsons (1995:515), the modes of control that can be employed in policies can be set in the context of the political regime. The domain of positive sanctions and informal-control permits of a political regime which is pluralistic and in which enforcement takes place through bargaining. The domain of formal controls and positive sanctions may be characterized as being highly legalistic, but manipulated to induce compliance. This domain resembles the Hood's mode 1 enforcement since it involves setting aside and manipulation. A problem also in this is that people might not like to destroy their reputation. As a result those who deal with government often seek to maintain their good will and hence may be reluctant to challenge government actions (Anderson, 1997:253).

The domain of formal controls and negative sanctions is an area of authoritarian legalism. In this domain, rules are rules, and enforcement takes place in the use of law, policing and threat. On the same note, the domain of negative sanctions and informal controls takes us into the areas of tyranny and autocracy (Parsons, 1995:515). It can also be argued that in some instances, sanctions are built into control techniques (Anderson, 1997:253).

(iv) The Etzioni Approach

The Etzioni approach is the fourth approach to enforcement. It is derived from Etzioni's scheme for analysing kinds of power as providing a link between the enforcement of public policy, and the problem of compliance within the organizations responsible for implementing it (Parsons, 1995:509). This approach mixes the love category, fear and money. Etzioni argues that there are three basic reasons why people in organizations comply with rules, disciplines, orders or policies.

Firstly, they may do so out of a sense of agreement, love or morality. According to this, Etzioni believed that people do not need to be forced into doing something. They do it because they want to do it. In a situation involving authority, 'B complies because he recognizes that A's command is reasonable in terms of his own values' (Lukes, 1974:18).

Secondly, people may comply because of fear. If they do not do what they are commanded to do, they fear that they might have to face the consequences of their non-compliance, which might not be good at all (Parsons, 1995:517). As a result of the fear of punishment, the government can also get compliance to legislation from citizens who would not comply in the absence of punishment.

Thirdly, people may comply because it is in their monetary or remunerative interest. Although they may disagree on moral grounds, or hate what they have to do, they do so because of the monetary reward which compliance will bring. Enforcement may therefore be the result of normative, coersive or remunerative power (Parsons, 1995:516). The use of one form, or a combination of two or three of these forms of power will result in the success in getting compliance during policy implementation. Any of the combinations can work depending on the place and the situation where it is applied. However one form might be more effective than the other form. Etzioni argues that effective organizations are those which attain a balanced mix between low levels of fear (coersion and alienation) and high levels of money (remuneration and calculation) and love (normative and moral) involvement (Parsons, 1995:517).

(v) The Incentive Approach

A more positive alternative to enforcement of public policy is to introduce or offer incentives. Incentives can be offered in many different ways, one might be the reduction of taxes, or service charges. The idea behind awarding incentives is trying to achieve compliance willingly instead of a situation where compliance is achieved through punishment, fear or retribution.

If incentives are introduced, they could encourage compliance since they motivate and reward people who abide by the rules to maintain that good practice. The absence of incentives is one factor that leads to nonconformity to certain policies (Hadebe, 2001:48). The presence of incentives makes people comply with policy so that they can receive those incentives. Incentives act like a remunerative power in Etzioni's approach. This is because people benefit from doing what they are commanded to do, while at the same time power is exercised over them.

According to Anderson (1997:249), loans, subsidies, and benefits are means by which public purposes can be advanced through aid, in the form of money or other resources, to companies, farmers, students, home buyers, and others. It is argued that if material incentives such as money, trophies and certificates are involved, people will comply more easily. People would work harder to comply with the policy in order to get incentives, hence incentives can also ease the transition from welfare to work (Robins, Michalopoulos and Pan, 2001:147).

> *The incentive system, it is said, "let individuals make their own decisions, thus enhancing freedom and voluntarism and yet (under the right circumstances) achieves desired goals at the lowest possible cost to society" (Anderson, 1997:257).*

Incentives also promote efficiency in cases where a policy is related to environmental pollution as a result of gases emitted by certain companies. The presence of the incentives can motivate more companies to participate in waste reduction campaigns and hence address environmental problems such as air pollution, sawdust and others.

Without incentives, there are little or no opportunities for increased achievement and efficiency (Deere and Welch, 2002:108). The use of the incentives enables the government to influence the behaviour of people to do what they would not otherwise do in the absence of power from the government. This is a form of power where reward is used to change behaviour as Dahl (1974) suggests. Incentives are also a way of illustrating Etzioni's approach in which love, fear and money are mixed, to promote compliance to policies (Parsons, 1995:517-519).

"The changing incentives and opportunities ... have led individuals to change their behaviour" (Deere and Welch, 2002:97). Incentives can also enable people to use their discretion in complying with policies. Public policymaking in a democratic society does not only involve deciding on a programme structure but it also includes the ends and means to achieve that structure. These ends and means encourage the public to participate in the realisation of the proposed policy.

The presence of incentives can make people act more voluntarily and reduce the bureaucratic pressure on government to enforce rules and punishment. The incentive part makes it admirable for citizens to act the way the legislation say they should act since compliance will mean that there will be some benefits to them.

Incentives can work hand-in-hand with more traditional regulatory policies. For example, according to Anderson (1997:251), taxes are important policy instruments because they provide revenue and also serve to sanction or encourage certain types of behaviour. As a result the use of tax rebates as an incentive can also encourage the public to change their behaviour as it is intended by public policy. The power to tax has occasionally been wielded for regulatory purposes (Anderson, 1997:251).

Like any other policy instrument, an incentive system has some weaknesses or shortcomings. For example, granting incentives within the environmental management framework can leave decisions on how much to pollute to the judgement of the companies guilty of polluting, dictated by their interests and failing to stigmatize pollution as morally wrong (Anderson, 1997:257). Incentives allow people to use their discretion in complying with policy. Some companies may then favour to increase their production process and profits as opposed to pollution reduction. If the increased production and profits causes the emission of pollutants, most companies will choose to continue, since the incentive offered or available does not outweigh the financial benefits of pollution production.

A second shortcoming evolves around equity (Anderson, 1997:257). Due to their strong economic position, some companies will be better able to pay the emission taxes and avoid restriction on their pollutant production. This is because they have the money to pay for polluting while other companies may not have. This will make the law bear down more heavily on those companies who cannot afford it.

To conclude, incentives might not be the only solution and this makes it necessary for one to consider the fact that the mixing of policy instruments is also possible and can work very well. The cumulative effect of all the policy instruments can make policy implementation very successful. Mixing policy instruments seems to be the key to successful policy implementation.

5. POLICY IMPLEMENTATION

When the adoption or decision-making phase of the policy process has been completed, the next phase is implementing the actual policy decision. For example, a bill that has been enacted into law by the legislature, can now be referred to as a public policy (Anderson, 1997:214). Policy implementation is a stage following the policymaking process. Anderson (1997) also refers to it as policy administration. During policy implementation, the newly adopted policy gets to be tried and tested in a real situation. The policy has certain objectives to meet. Hence the next step is to put it into practice. According to Anderson (1997:214), policy implementation is what happens after a bill becomes an Act or a law.

In a democracy, normally once the legislature or parliament has made a policy, the executive and bureaucracy take over the implementation thereof. Wildavsky refers to street-level bureaucrats as government officials and employees that are responsible for policy implementation. There are a number of procedures to be followed during policy implementation. There are also techniques that different players are supposed to use in the policy implementation process. The public is also expected to comply with the policy. Anderson (1997:214) argues that policy implementation is neither a routine nor a highly predictable process, partly because there are different groups of people playing different roles during the implementation process.

Policy implementation is not necessarily separate from policymaking, in fact it should not be. This is because when policymaking is made without due attention to policy implementation, it is highly unlikely that policy implementers can succeed in policy implementation. The result of the separation of policy implementation from policymaking can be that policy implementers are faced with practical difficulties that the policymakers have failed to include or address during the policymaking stage. This in turn will increase the chances of policy to fail to serve the purpose it is meant to serve.

As mentioned earlier, the street-level bureaucrats are public servants within the government bureaucracy. This responsibility makes street-level bureaucrats the main providers of public services and therewith realizing the aims of public policy.

In modern political systems, policy implementation is formally the province of a complex array of administrative agencies, now often referred to as bureaucracies (Anderson, 1997:216). According to Anderson (1997:214), administrative organizations are often assigned much discretion or latitude to issue rules and directives that will fill in the details of policy and make it more specific.

It is also important to establish the intentions of the policy so that policy implementation will lead to the intended result. This is important because without achieving its aims and objectives, a policy is useless and its formulation process will be a waste of tax payers' money. When a policy achieve its' aims and objectives, it is likely that it will succeed. The reverse is also true. Through distinguishing between policy goals and outputs or outcomes, policy analysts are able to find out if policy intentions turn into reality, and when policies are successes or failures (John, 1998:22).

In conclusion, Lindblom (1980) mentions the absence or inadequacy of incentives, as the ostensible policy requires as part of the problem of policy implementation. In addition to this, policy implementation is deemed more successful if interested and affected parties, policymakers and policy implementers communicate and participate in all the stages of both policymaking and policy implementation processes. This brings us to the significance of policy networks.

6. POLICY NETWORKS

It is important to discuss policy networks because they contribute positively towards the formulation and the implementation of policies. The policy network approach became popular in the 1980's and 1990's and the theme still continues today (John, 1998:17).

Policy networks can be defined *as the regular contacts between individuals in interest groups, bureaucratic agencies and government, which provides the basis for sub-government (Rhodes, 1997:37).* Rhodes (1997:37) also defines a policy network *as a cluster or complex of organizations connected to one another by resource dependencies.* According to the European Union definition, *a policy network is a set of resource dependent organizations (Rhodes, 1997:36).*

The above definitions show that there are actors or individuals who work together because of a set of common interests or common behaviour. The advantages of policy networks can include the fact that members benefit from the shared resources available in the network. Public policy has shown to work well in situations where policy networks exist. Policy networks result from the voluntary working together of different parties or groups of organizations. In a policy network most participants feel that they are benefiting and that their continued participation is worthwhile.

Policy networks play a very imperative role in the implementation of a policy. This is because, government, public institutions, large companies and other institutions can exchange information, knowledge and ideas through policy networks. Policy networks operate in different policy areas and fields (John, 1998:87). Policy networks can exist in policy communities, professional networks, intergovernmental networks, producer networks and issue networks. In a network situation these groups can choose to interact a lot with individual members or with the whole group. The company network system is shown in figure 6.1 and it always changes, depending on the company behaviour and the nature of dependence.

The diagram below shows how different institutions can be inter-connected and hence increase their chances of working together.

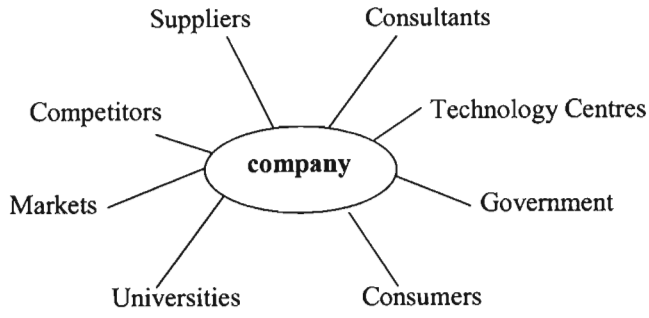

Figure 6.1: An Example of Policy Networks (adapted from Smink, 1991).

Institutions work together, and bring information with them into the specific policy network. In doing so, all members benefit from the centralised information or from direct communication with each other. According to Rhodes (1997:12), the policy network approach focuses on institutions and the links between them. Universities, government departments, consulting firms, customers, suppliers, technology centres are some of the members or actors in policy networks. Different participants bring different resources and strengths with them into the policy network. For example, universities can contribute knowledge on recent research findings. Firms or companies might have financial resources and capacity to bring to the network. This could lead to industries funding university research programmes, and so on.

Although policy networks exist, the formation of networks should be encouraged by companies or governments. For example, in a situation where policy is made to promote waste reduction, companies involved in waste production need to be part of the network and they will benefit from the network by learning new ways of dealing with waste or minimizing waste production. This can be more successful if the network also includes technical and academic experts on waste minimization. The waste reduction process also concerns the waste removing group such as NGO's or a specific government department and they too should be included. In addition, there are a number of private organizations that deal with waste. Their input can also help brainstorm the reduction of waste production in different ways, and assist in the policy implementation process.

Policy networks can create a platform where various policy principles can be discussed and the companies involved or affected can have an idea and the opportunity to discuss their concerns of policies affecting them before they are approved. According to John (1998:84), policy networks have the potential to shape how decision-makers exercise policy choices.

The roles of academic institutions in a policy network are numerous. They can help by providing expertise or training if required by the members in the network. Their contributions can help in strengthening the links and the relationship between organizations involved.

In conclusion, policy networks can also be instruments for successful public policy management, since they encourage the participation of interested and affected parties. A policy network also contributes to a change in behaviour because it groups together people of the same behaviour. According to Rhodes (1997:12), policy network approach is a modern variant of the institutional approach that focuses on behaviour within institutional context.

This makes policy implementation a consultative process since all the role players are part of the network. Information sharing and collective decision-making is possible, since all relevant role-players are encouraged to be involved.

7. CONCLUSION

The chances of people complying as a result of the introduction of incentives are higher than in enforcement, since compliance from incentives is as a result of will as opposed to compliance due to force. However, it cannot be disputed that the combination of the two approaches can have a great effect on increasing compliance because of the increased or doubled effort.

In conclusion, numerous considerations in the policy process, government is the key decision-maker. Getting your policy issue recognized by government is a challenge in itself. Once this has been achieved, a second challenge of finding a workable solution, one that is implementable, becomes difficult. Implementation depends on a number of issues, such as using the right policy instruments, or having the necessary cooperation between those who make policy, those who implement policy, and those who will be affected by the implementation of that policy.

It has emerged that policy networks can make some contribution in all of these considerations. Policy networks can be useful throughout the policymaking process: from problem definition, agenda setting, policy adoption, policy implementation and policy evaluation.

PART IIA: ENVIRONMENTAL ISSUES AND TECHNIQUES

1. INTRODUCTION

The challenge of environmental management is to get the various environmental problems or issues onto the policymaking agenda of government. The usual case is that the policymaking agenda of government concentrates on social, economic and political issues, rather than environmental issues.

However, pollution is a very serious problem since pollution does not only affect the natural environment, but also human beings as part of that environment. Pollution can result in deaths when people are exposed to situations containing high health hazards, such as in chemical production plants or where communities residing close to areas where there are a lot of environmental problems. Pollution must thus be seen as more than an environmental problem, and as a social, economic as well as political problem worthy of government attention and action.

With growing urbanization and industrialization, waste treatment and finding ways to treat environmental pollution as a result of emissions, effluents and solid waste also require serious consideration. It is difficult to come up with one clear solution on how environmental pollution and its related problems can be mitigated, or managed since it will probably never be completely eradicated. The term Cleaner Technology will be considered as a policy solution.

This part of the research project will conceptualize the term Cleaner Technology. But first, a background on environmental policy and management will be established. Cleaner Technology is an approach to environmental management and is regarded as a solution or part of a solution to address environmental problems such as pollution. In this report, the history of environmental management, the origin of the concept of Cleaner Technology and the strategies to achieve it shall be discussed.

2. ENVIRONMENTAL MANAGEMENT

The state of the environment is one of the most important contemporary issues facing society. Sayre (1996:14) defines the environment as the surroundings in which an organization operates including air, water, land, natural resources, flora, fauna, humans and their interrelation. Hence, the concept of the environment is very broad since it entails natural resources, people, ecology, and any other physical or biological creatures. Prior to the 1960's, "the environment" was not often mentioned by politicians, the general public or the media. This has slowly changed and in the last 15 years, there has been a growing worldwide interest among industries and the government to sustain the environment (Hamner, 1996:1).

One of the first key events that made the environment an enduring social issue was the 1962 publication of Rachel Carson's book, *Silent Spring* (De Steiguer, 1997:1). The book, *Silent Spring*, exposed the risks posed by pesticides. The impact of this book on public opinion was truly immense. It argued that from the dawn of human existence, individual families and tribes of hunter-gatherers almost certainly faced periodic resource shortages that threatened their existence. These resources were wild animals for people who depended on hunting, and natural vegetation for people who depended on vegetables. Due to human consumption and the use of our environment for development, the reduction in these resources is evident (De Steiguer, 1997:2).

By the late 18th century, the Western world was beginning to experience rapid population growth and sweeping social change (De Steiguer, 1997:2). An increase in population meant a larger dependency on natural resources which initiated the need for governments to think of ways to deal with the problem of resource shortage. The government saw a need for environmental policy to modify human behaviour with regards to the environment. This was due to the pressures of urbanization, industrialization and environmental degradation.

Human beings have always been concerned about their environment, but to different degrees. In the twelfth and thirteenth century, people were worried about nature and the environment they were living in. St. Francis, the medieval monk of Assisi who lived in 1182 to 1226, believed in the austere existence of a religious ascetic, serves as

an example of early environmental concern because he is reputed to have held a deep appreciation for animals, plants and all the things of the creation (De Steiguer, 1997:4).

However, the consequences of the Industrial Revolution were probably the first real scholarly concerns about the sustainability of natural resources. By 1760, English industrialization had begun a rapid economic expansion that would continue until about 1830. The production of coal and iron, the two key materials of early English industry, was soaring. Steam engines were developed to provide mechanical energy, first to pump water from coal mines and then later to drive machines in the rapidly expanding cotton textile industry (De Steiguer, 1997:4). Gas derived from the combustion of coal, in turn, provided fuel for lightning and as a result, factories were able to continue producing at night as well as during the day.

With this development, urbanization increased as more and more people came to the cities in search for jobs.

> *The development of urban areas also resulted in an increase in population as the conditions were becoming favourable for reproduction to take place. The living conditions improved enough to lower infant mortality rates and lengthened lifespans. Indeed, the conditions of the Industrial Revolution brought about the origins of a world population explosion which continue even today (De Steiguer, 1997:4).*

Along with the benefits of technology, many would argue that there have been huge social costs as well. Events, such as the Exxon Valdez oil spill in Alaska's Prince William Sound and the Chernobyl nuclear disaster in the former Soviet Union are unhappy reminders of some of the prices paid for technological progress. It was this concern about rapid environmental degradation and the unintended side effects of technological development which inspired Rachel Carson to write her book, *Silent Spring* (De Steiguer, 1997:2).

With *Silent Spring*, a newer problem, environmental degradation, was identified besides the older concerns of population growth and resource scarcity. These central

issues of modern environmentalism became those of human population growth, natural resource scarcity and environmental degradation.

According to De Steiguer (1997) the period from 1962 to the mid 1970s was an era known as The Age of Environmentalism. The post-Rachel Carson environmental writers had one common goal, that is, to change human attitudes and behaviour regarding the environment. This initiated the first real environmental policy intervention. It was agreed that the world's environmental resources needed to be managed, so that they can continue to exist. It stated that government was to make public policies that would require and expect people to behave or act in a certain way.

George Perkins Marsh (1801-1882), an American diplomat, scholar and conservationist wrote a book in 1864, called *Man and Nature* and observed that through history, there had been repeated patterns of human abuse of the natural environment, particularly through deforestation. He showed how the deforestation process resulted in a decrease of natural resources, and how environmental management policies (such as those of afforestation programmes) had to be written to monitor and manage the situation. It was argued that, industry, particularly in the developed and developing world, must increasingly take into account the costs of the effects of its operations on the environment, rather than regarding the planet as a free renewable resource (Welford, 2002:2).

It has to be noted that from Rachel Carson's warnings about the pesticides to more recent events such as the 1992 Earth Summit in Rio de Janeiro and the 2002 World Summit on Sustainable Development in Johannesburg, there is a change in behaviour. People are now concerned and some even obsessed with environmental quality and its impact on present and future generations. Hence in 1987, a World Convention agreed on the definition of Sustainable Development as "the development that meets the needs of present generations without compromising the ability of the future generations to meet their own needs" (Bruntland Commission, 1987). This intended to minimize the exploitation of the natural resources and at the same time encourage good environmental management.

De Steiguer (1997:1) argues that the world's inhabitants likewise share a wide range of environmental concerns, from the toxic effects of agricultural chemicals to the quality of the water they drink. Most governments must now treat environmental and natural resource concerns with the same seriousness which is usually afforded more traditional governmental interests such as the economy or national defense. So, he argued that there should be a change in the policy agenda (De Steiguer, 1997:1).

There are a number of environmental management tools that can be used in order to monitor the environment, pollution, production processes, so as to manage the results or the impacts. Most of the terms used in environmental management support proactive behaviour, based on the Precautionary Principle, also known by the old saying, "an ounce of prevention is worth a pound of cure" (Hamner, 1996:2). This is meant to avoid the problems from happening since in the past, the absence of precautionary measures resulted in a lot of disasters. Most environmental policies have tended to be reactive, reacting to a particular crisis while the Precautionary Principle demands managers to be proactive, to prevent disasters from happening.

Since the richer areas have more industrial production, one would expect them to have more pollution. However, this is not the case. A number of studies conducted by the World Bank in Chinese cities clearly show that pollution density clearly rises as wages fall (The World Bank, 2000:97). The World Bank found that the rich communities can afford to relocate to other places which are pollution free while this is not the case with poor people. The World Bank also found that even if the rich lived in high levels of industrial production, that production in those areas is much cleaner because citizen feedback is stronger (The World Bank, 2000:97). The study found a higher prevalence of skilled personnel than in the developing areas. This makes it easier for government to enforce Cleaner Production due to high levels of efficiency and residential pressure.

The next section will discuss environmental management tools in more detail. These tools are there to assist or guide environmental management. Managing the environment means ensuring the use of the natural resources in such a way that pollution is reduced and that the processes involved do not cause any harm to the environment or human beings.

3. ENVIRONMENTAL MANAGEMENT TOOLS FOR SUSTAINABLE DEVELOPMENT

According to Welford (2002:10), in environmental terms, at the core of the systems approach is the role of environmental management systems which companies enact through procedures which ensure that environmental performance is improved over time. This shows that in the same way as sustainable development, environmental management is a process which trough the use of appropriate strategies can be achieved. For the purpose of this study, environmental management tools such as environmental management systems (EMS) and the Forest Stewardship Council Certification (FSC) and Cleaner Technology (CT) will be discussed in more detail since the case study focuses on Mondi Limited, a timber industry.

(i) Environmental Management Systems

According to Hamner (1996:10), an Environmental Management System (EMS) is:

> *That part of the overall management system which includes organizational structure, planning activities, responsibilities, practices, processes, procedures and resources for development, implementing, achieving, reviewing and maintaining the environmental policy.*

An EMS provides order and consistency for organizations to address environmental concerns. This can be through the allocation of resources, assignment of responsibilities, and ongoing evaluation of practices, procedures and processes.

Welford (2002:11) argues that within the framework of the EMS, there will be a need to develop an environmental policy, in order to regularly audit environmental performance and to report on that performance in the same way. These tools helps to monitor the use of the environment in a sustainable manner and at the same time making decisions in manner that is not compromising the rights of the future generations to make their own decisions.

Certification by the International Standards Organisation (ISO) offers one vehicles for pursuing assistance for companies who adopt Cleaner Technology and related

environmental management systems. The ISO certifies international auditing firms, which in turn scrutinize the quality of factories' processes according to ISO guidelines (The World Bank, 2000:86). The ISO certified companies especially those seeking growth in international markets, enjoys competitive advantage because they can assure potential customers that they maintain high quality standards.

The ISO 14001 is the Environmental Management Systems specification and guideline, named after the International Standards Organization (ISO). This is only one of the standards in the ISO 14000 series. It is very important to give this distinction since the ISO 14000 standards are becoming more attractive in the eyes of different industries. EMS remain largely voluntary, so it is up to a company to use it to its advantage through increased management commitment on environmental issues. Licencing is a form of advance check in which a person or company who wishes to engage in a particular activity must demonstrate certain qualifications or meet specific standards or requirements (Anderson, 1997:248-249). Inspection is the examination of some matter (such as permits, products, or records) to determine whether it conforms to officially prescribed standards (Anderson, 1997:248).

(ii) Forest Stewardship Council (FSC) Certification

The FSC certification is one of the environmental management tools that can be used to determine whether or not a company is utilizing timber and its raw materials in a manner that comply with international standards (such as ISO). This is an international accreditation that a company acquires through complying with the principles of FSC. For a company to be FSC accredited, it has to have a very good environmental management system. The oldest and "gold standard" of certification system is the Forest Stewardship Council. It was founded by environmentalists in 1993 and backed by the World Wide Fund (WWF) for nature, FSC has emerged as a dominant and demanding performance-based certification system for the timber industry.

The principles of FSC will briefly be summarized. This summary is based on Mondi's FSC policy document (2001).

Even though the FSC principles are internationally recognized, they still demand compliance with other local and international laws. The FSC principles requires the forest industry 's environmental management plans to respect all applicable laws of the country in which they occur, and international treaties and agreements to which the country is a signatory.

The legality of the land or the site at which the plantation of the forest is located is also important. Hence, the FSC principles require that the tenure and land-use rights and responsibility should be clearly known. Long-term tenure and land-use rights to the land and forest resources have to be clearly defined, documented and legally established. The rights of indigenous people are also protected. The FSC principles require that the legal and customary rights of indigenous people to own, use and manage their lands, territories, and resources shall be recognized and respected.

In order to ensure fairness and avoid exploitation in the forest or timber industry, the FSC principles also promote community relations and workers' rights. FSC principles require Forest Management operations to maintain or enhance the long-term social and economic well-being of forest workers and local communities (Mondi Forests Publication on FSC, 2001).

The FSC principles also require Forest Management operations to encourage the efficient use of the forests' multiple products and services to ensure economic viability and a wide range of environmental and social benefits. In addition to this biological diversity should be conserved together with its associated values, water resources, soils, and unique and fragile ecosystems and landscapes.

FSC requires an environmental management plan that is appropriate to the scale and intensity of operations. This plan is required to be written-up, implemented, and kept up to date. The EMS should also make accommodation for monitoring the condition of the forest, the yields of forest products, the chain of custody, the management activities and their social and environmental impacts (Mondi Forests Publication on FSC, 2001).

The FSC principles require that management activities in high conservation value forests be maintained. Decisions regarding high conservation value forests should always be considered in the context of a precautionary approach. This means that while plantations can provide an array of social and economic benefits, and can contribute to satisfying the world's needs for forest products, they should complement the management of, reduce pressures on, and promote the restoration and conservation of natural forests (Mondi Forests Publication on FSC, 2001).

The above principles and criteria encompass the key principles of environmental management for sustainable development, which companies in the forestry industry have to comply with, if they seek to attain FSC accreditation. The above principles help the company to attain sustainable forestry management and hence sustainable environmental management.

Welford is of the opinion that government will increasingly seek to implement its Polluter-Pays-Principle and one consequence of this is that some companies and products may simply disappear, because they can not cope with punishment and fines imposed on them (Welford, 2002:12). Hence the success of environmental improvement will be determined largely by the responsiveness of business by getting voluntary accreditation with either local or international bodies like FSC.

FSC can also be used in Cleaner Technology, since one of the strategies to achieve Cleaner Technology is input substitution. This will be discussed in more detail later. Most companies who like to sell their timber products overseas would have to ensure that their raw material is FSC certified timber in order to comply with international requirements. This makes forestry to be directly linked to the use of FSC. However other timber related products are also linked to FSC since customers recommend that the products they are buying should made from FSC certified timber.

Some companies have recently been honoured by the WWF who bestowed on them the coveted "Gift of the Earth" award. This is an international award and was in recognition of their leadership role in promoting sustainable forestry management through certifying its holdings under the principles and criteria of the Forest Stewardship Council (FSC).

The FSC accreditation acts as an incentive to the timber industry to voluntarily adopt and implement sustainable environmental management plans and policies. It indirectly assists government in enforcing its national environmental policies.

In conclusion, the FSC has a leading position in forest certification, having gained significant recognition in those markets where certified products are demanded. As the interest in certification has increased, so too have the number of systems, greatly confusing the consumer. FSC certification is strongly independent, actively supported by environmentalists and sets increasingly demanding standards. The consumer is assured that products from FSC-certified forests are sustainable.

4. THE ORIGINS OF CLEANER TECHNOLOGY

Since the 1960's, there has been a growing interest in the environment, or more specifically in the damage being done to the environment, in Europe and North America (Welford, 2002:1). Different issues ranging from wildlife conservation, deforestation, degradation of natural resources, resource scarcity, increased population, ozone layer depletion, sustainable development, urbanization, are some of the current environmental issues. The interconnectedness of these issues is becoming more evident. The hole in the ozone layer and global warming is the result of not one country's or one company's actions but that of many.

According to Hillary (1997), Cleaner Technology is a comparatively new approach to dealing with environmental concerns and grasping the opportunities arising from those challenges. Hillary (1997:53) defines Cleaner Technology as:

> *The persistent use of industrial processes and products designed from their inception to prevent the pollution of air, water and land, to reduce waste, to minimize risks to the environment and human health and to make efficient use of raw materials, such as energy and water.*

Welford (2002:6) argues that the preservation and improvement of the environment, the protection of human health and the prudent and rational use of natural resources must be met by applying four principles: One, the prevention of harm to the environment. Two, is the control of pollution at source, as Cleaner Technology aims to do. Three, is the implementation of the Polluter-Pays-Principle and four, is the integration of environmental considerations into other community policies (Welford, 2002:6).

Thrane (in an Unpublished Publication, 1997) defines Cleaner Technology as:

> *The minimization of waste and reduction of emissions from production, as close as possible to the point of production.*

In Australia, the Centre of Excellence in Cleaner Production at Curtin University of Technology states that:

> *Cleaner Technology is about making more efficient use of the materials and energy we employ when we conduct business. It leads to the conservation of energy, raw materials and water as well as the reduction of the generation of wastes and emissions (www.curtinuniversity.com).*

According to Hamner (1996:6-7),

> *Cleaner Technology means the continuous application of an integrated preventative environmental strategy to processes and products to reduce risks to humans and the environment. For production processes, Cleaner Technology includes conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity of all and toxicity of all emissions and wastes before they leave a process.*

In their definitions of Cleaner Technology, most authors have the minimization of risks to the environment and humans and the reduction of waste materials and emissions as common points. The discussions about Cleaner Technology also include the efficient use of raw materials. This, they argue, contributes positively to sustainable development. Hamner (1996:6-7) also mentions that Cleaner Technology is a continuous process, it is not a 'once of thing'. It might take time before the results can be seen, however the presence of an environmental management system (EMS) is a crucial element of Cleaner Technology.

The idea behind Cleaner Technology is mainly to achieve sustainable development and address environmental problems such as pollution and the emission of gases and effluents that are harmful to the environment. Governments and business leaders alike recognize that industrial development needs to become environmentally sustainable in order to avert ecological crises at all levels from the local to the global (Christie, Rolfe and Legard, 1995). Cleaner Technology marries industrial needs for production with environmental considerations of sustainable development.

Cleaner Technology was pioneered by large processing industries, but it has become evident that it is likewise applicable to small to medium sized enterprises in manufacturing, construction and service industries (Van Berkel, 1999:1).

In the USA, the concept was pioneered by a company called 3M and a few other large USA based processing industries. These large industries realized in the mid 1970's that it makes far more sense and even saves money to prevent waste and emissions in the first place, as opposed to treating and controlling waste and emissions, after these have been generated (Van Berkel, 1999:1). Although it took until the mid 1980's before attempts were made to transfer the experience to small and medium sized enterprises, Cleaner Technology practices and technologies for small to medium sized enterprises developed and disseminated rapidly since then (Van Berkel, 1999:1).

The countries where Cleaner Technology has been introduced successfully are Europe and North America. More recently, areas like Australia, New Zealand, South and East Asia and Africa, are slowly starting to adopt the principles of Cleaner Technology. The phrase Cleaner Technology is often interchanged with Cleaner Production. There is neither a standard definition for Cleaner Production, nor even a standard term. Other phrases in widespread use include clean technology, cleaner technology, clean production (Christie *et. al.,* 1995:39). The phrase or term used in this work is Cleaner Technology, or CT.

The World Bank reported that the industrialization process caused numerous environmental injustices. The concept of environmental justice has strong intuitive appeal for developing countries (The World Bank, 2000:98). The World Bank argued that development came with the exploitation of natural resources instead of sustaining the natural resources. The large multinational corporations operating in developed countries often transferred their outdated production plants to developing countries where the environmental legislation was not as strict as those in their home countries (The World Bank, 2000:98).

In the United States, the belief that polluting industries in poor, uneducated communities face laxer regulation and can operate at higher levels of pollution has catalyzed a political movement for environmental justice. Its goal is equal

environmental quality for all citizens, regardless of their income, education, or ethnicity (The World Bank, 2000: 98).

Due to environmental injustices of this sort, a lot of damage has been done already, but something can still be done in order to improve the situation. First, the government could assume responsibility for maintaining a minimum decent standard of environmental quality for all citizens (The World Bank, 2000:99). This can be combined with many Cleaner Technology approaches to ensure sustainable development without risking the chances of the future generations to make their own decisions.

Everything which consumers, companies and other institutions do will have some impact on the environment (Welford, 2002:2). Hence it is very important to consider human behaviour in relation to environmental management, sustainable development and Cleaner Technology. The next section will describe the different elements of Cleaner Technology and how all of them are integrated and linked as a system.

5. ELEMENTS OF CLEANER TECHNOLOGY

For analytical purposes, it can be argued that Cleaner Technology consists of four elements. These elements however, must function jointly for Cleaner Technology to be a holistic system. According to Thrane (1997), the four elements of Cleaner Technology are: (i) organization, (ii) knowledge, (iii) technique, and (iv) product. Thrane (1997), these elements can be illustrated in a diagram format as shown below.

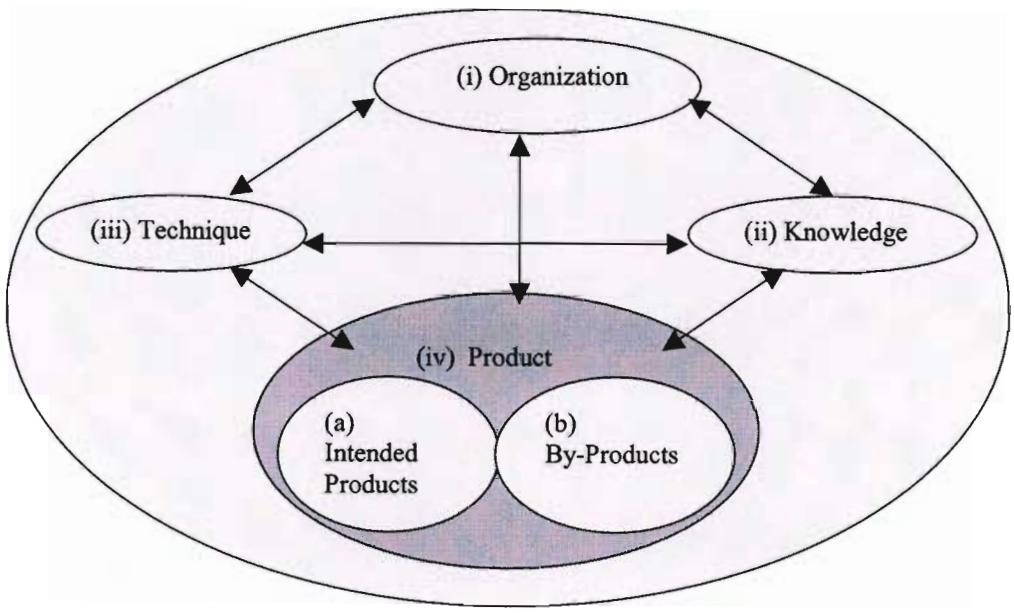

Figure 5.1: The four elements of Cleaner Technology (Adapted from Thrane 1997).

As it can be seen from figure 5.1, Thrane (1997), argues that Cleaner Technology can be disaggregated into four parts as explained above. These parts are part of one system represented by the outer circle. Each one of these elements will now be looked in more detail so as to see why they are separate from each other and how and where they link with each other.

(i) Organization

The 'organization' element relates to the task of making and planning Cleaner Technology within a company. This is the 'central' element that links the Cleaner Technology 'technique' and Cleaner Technology 'knowledge' because the structure of an organization will tell where the decisions on Cleaner Technology or technology innovation will be taken. The size and nature of the organization will influence the

type of Cleaner Technology that can be and will be implemented. In order to address certain undesirable production processes, a company may need to organize itself accordingly. An organization needs to focus and align its people, systems, strategies, resources, and structure (Sayre, 1996:106).

An agency's organizational mission, culture and structure, the legal milieu in which it operates, and the political and private actors with whom it interacts may influence separately or together how and why that agency behaves and to what effect (Firestone, 2002:1). The need for a change in behaviour is what the company needs to establish and make necessary organizational changes. In this way a company might incorporate environmental concerns into designing and delivering services for government, community and the whole environment (Van Berkel, 1999:2).

Companies need an organizational approach for environmental management in order to organize the smooth identification, evaluation and implementation of Cleaner Technology opportunities. Cleaner Technology assessments are undertaken with a view to seeking ways to avoid or at least reduce the generation of waste and emissions. Moreover, it is expected that these contribute to changes in the management and information systems that can support and facilitate Cleaner Technology activities (Van Berkel, 1999:4).

A commitment by management in organizing Cleaner Technology activities is also very imperative. Plant management has to set the stage for a Cleaner Technology activity, in order to ensure collaboration and participation from the different departments in the Cleaner Technology exercise. Management commitment may be reflected in environmental policy statements such as the company's environmental management system as discussed earlier on. In small to medium sized operations, the actual behaviour of the management is at the very least equally important as written statements (Van Berkel, 1999:3).

(ii) Knowledge

The Cleaner Technology 'knowledge' element is essentially the 'software' element of Cleaner Technology. It includes theoretical and innovative knowledge, skills and experiences. Knowledge or information is very important for companies,

governments and the communities since it helps in the development of good environmental practices. Knowledge takes on many forms. It includes knowledge about cleaner techniques, technologies, production and products that enables companies to change their production techniques in such a way that waste and pollution is minimized. If the community knows about the impact of waste and emissions from companies in the area, they can lodge complaints to the government about their dissatisfaction with the company and actions can be taken against that company. Hence, many environmental management systems include an element of access to information, ensuring transparency and openness.

Cleaner Technology depends on employees and managers having the necessary knowledge about existing production techniques and processes. The experience of employees, in particular those involved in the daily operations and maintenance on the shop-floor where often wastes and emissions are generated, is indispensable (Van Berkel, 1999:3). Their experiences, acquired skills and knowledge of the production process often enable the employees to present solutions and innovative thinking to managers.

Knowledge about the production costs is important in the sense that proper cost information can inform management of unnecessary costs incurred and can convince management as well as employees that cleaner producing techniques can be more efficient in the long run (Van Berkel, 1999:3). Knowledge assessment helps to see if the environmental needs and training within a company have been identified. Among other things, it also helps to establish what are the training needs for specific job functions. Is there a training program in place? Is it reviewed regularly? Does the training process include documentation and evaluation? These are some of the questions that should be answered. As a way of acquiring and growing knowledge, training needs of each person in the organization involved in environmental management should be identified (Sayre, 1996:108).

Management should set the stage, but whether or not Cleaner Technology opportunities are established is largely dependent on the participation and willingness of employees (Van Berkel, 1999:3).

(iii) Technique

In Cleaner Technology, the technique element can be thought of as the 'hardware' element of Cleaner Technology. The Cleaner Technology technique consists of workers, raw materials, and machines that are brought together in the working process. According to Van Berkel (1999), this element entails good housekeeping, raw material substitution, machinery changing and product redesigning. The whole production process includes energy, water and raw material saving, as well as re-use and recycling.

Technological innovation is required if the current techniques do not function very well, either by polluting or using a lot of raw materials. The need for the change in behaviour can also be established in the technique component. With good housekeeping, employees will know what to do and what best techniques can be used to address a problem if it arises. Raw material substitution can be another option if the process does not seem to proceed well with the current raw material. A change of machinery can be done although this is an expensive option. However, it is better than paying the costs for rehabilitation, or environmental damage repair.

(iv) Product

The 'product' element is divided into (a) intended product and (b) by-product. The two products are a result of the normal production process. The Cleaner Technology product element relates to the output of the three other elements. Environmental management tools are developing rapidly. They include eco-audits for processes and plants, environmental reports, assessment of suppliers, environmental performances, and life-cycle analysis of the total environmental impacts of products from design to disposal (Christie *et. al.,* 1995:54).

Usually, efficient performance will be where the production process uses all raw materials to produce the intended products. However, the situation is different as not all of the raw materials can be converted to intended products. The result is that waste materials are generated with negative environmental consequences.

(a) Intended product

The intended product is the ultimate objective of each and every production process. Cleaner Technology aims to reduce the waste per quantity of intended products produced. The value of Cleaner Technology to achieve this will not only mean more sales, income and profit for the company, but it will also mean the reduction of waste material, pollution minimization and other related incentives.

Unfortunately, according to Van Berkel (1999:3), many companies, in particular small to medium sized enterprises, do not know how much money they are wasting. Typically, only costs charged by external waste contractors are taken into consideration, but actual waste costs are often a multitude thereof (Van Berkel, 1999:3). The finished product must not be an environmental hazard. Therefore, Cleaner Technology takes into consideration the whole life-cycle of the product and its impact on the environment. Life-cycle assessment is a very important part of Cleaner Technology.

(b) By-product

A by-product is an unintended (or unwanted) product that emanates from the production process. It is regarded as waste material if it does not serve the same purpose as the intended product is meant to serve. Some by-products can be used as raw material to make other products. However, this is not always the case. Some by-products are unsuitable, and can be more toxic than the initial raw material. In addition to being toxic, they often pollute the environment.

Cleaner Technology attempts to alter or adapt the whole production process in such a way that it conserves raw materials and energy, eliminates toxic raw materials, and reduces the quantity and toxicity of all emissions and wastes before they leave the production process. Van Berkel (1999:2) argues that this will in turn reduce the production of unwanted by-products and reduce the environmental impact along the life-cycle of a product from raw materials extraction to its ultimate disposal. Cleaner Technology promotes the development of products with less emissions and content of environmental and health hazardous substances, renewable energy consumption, and less use of non-renewable resources (Remmen, 2002:58). The next section will explain how and give some strategies to achieve Cleaner Technology.

6. STRATEGIES TO ACHIEVE CLEANER TECHNOLOGY

In order to attain efficiency, minimized waste production and emissions, Cleaner Technology requires changing attitudes, responsible environmental management and evaluating technologies (Van Berkel, 1999:2). There are various ways of making more efficient use of natural resources (such as raw materials, energy and water) and or reducing the generation of wastes and emissions at the source. Van Berkel (1999:3), suggests five common strategies or approaches towards Cleaner Technology, namely:

(i) product modification;
(ii) input substitution;
(iii) technology modification;
(iv) on-site recycling and re-use;
(v) and good housekeeping

The diagram below shows that these strategies can be used separately or together in any combination.

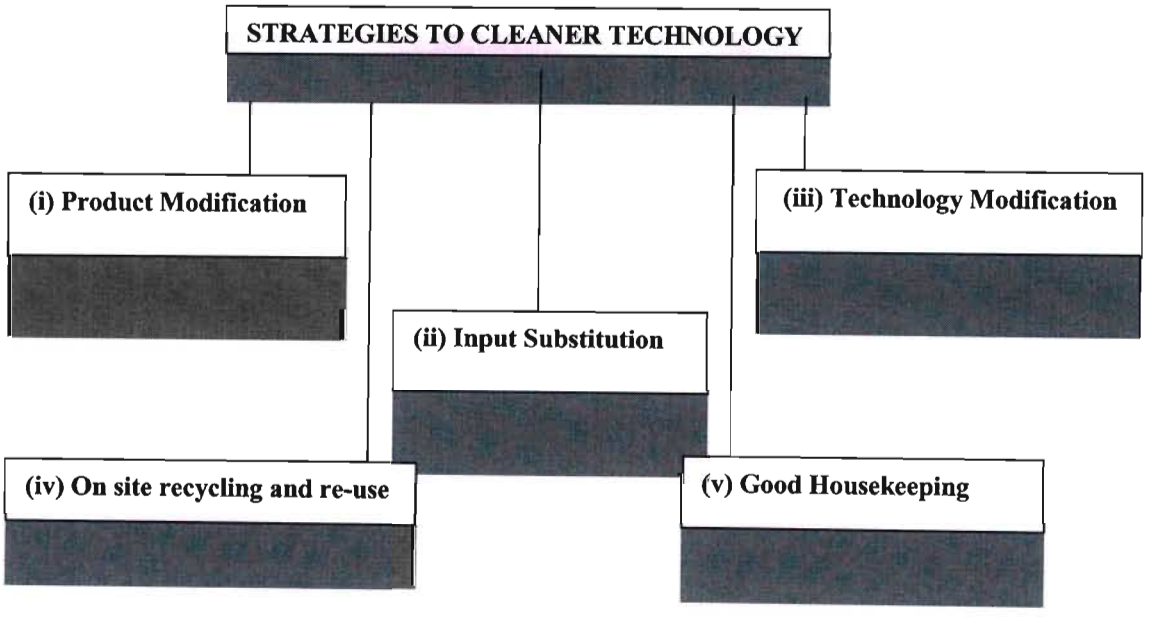

Figure: 6.1 Strategies to achieve Cleaner Technology
(Centre for Excellence in Cleaner Production, Curtin University of Technology)

The above diagram shows that different strategies can be used either independently or together as a combination of strategies. The line from Cleaner Technology shows that each strategy can be directly linked with Cleaner Technology and at the same time be linked to the other strategy or strategies. The above strategies can be further explained as follows:

(i) Product Modification

Product modification happens by changing the inputs, processes or redesigning the product in such a way that the negative environmental impacts resulting from its production are minimized. This strategy can also be adopted to improve the quality of the product while at the same time minimizing the negative environmental impacts. The improved quality of the product can lead to more customers buying that product and hence, the strategy can add competitive advantage to the company.

There can be different financial implications in product modification. The following two examples are considered. An example of a low or typically no cost product modification can be; making the product easy to clean by choosing smooth and robust surfaces, and by avoiding small crevices, dead corners and inaccessible inner spaces. The product modification of Cleaner Technology include incremental changes in materials to replace packaging or components that produce waste problems (Christie *et. al.,* 1995:48).

(ii) Input Substitution

Input substitution means changing from raw materials that might result in high emissions and / or effluents to raw materials that result in less emissions or effluents. Although emissions and effluents are difficult to avoid, they should be used in such a way that the environmental impact is reduced and minimized.

Input substitution can benefit the company if the raw material will be substituted with a low cost one. The example of a typical low or no cost input substitution can be replacing cyanide based electroplating process by cyanide free processes (e.g. alkaline and acid zinc plating) and replacing solvent-based paints by high solids or water-based paints. The example of a typical medium or high cost input substitution can be replacing solvent-based coatings by powder coatings. The inputs can be substituted

with the less toxic ones, less bulky ones or with the more environmental and user friendly one (Christie *et. al.*, 1995:48).

(iii) Technology Modification

Technology modification involves making adjustments on the machines or production equipment so that the production process can run more efficiently and be more environmental friendly than before. It should not have any negative effects such as causing human health problems. Instead, it tries to run the production process with the least amount of raw materials and hence increases the output since the system will be more efficient than before. According to Christie *et. al.* (1995:46), finding ways to increase the efficiency with which energy is used , and to reduce the amount consumed at all stages of production is a key element in Cleaner Technology.

A typical low or no cost example of technology modification is the application of photo-sensors to shut off equipment or rinses in case no objects are being handled. A typical medium or high cost example of technology modification can be applying expanded pattern casting technology such as lost foam process in foundry operations to eliminate waste casting sand (Christie *et. al.,* 1995:46).

(iv) On Site Recycling and Re-use

Cleaner Technology aims to avoid the transporting of waste and hence minimizes the cost of recycling and increases the amount of raw materials available. Re-use also reduces the money spent on buying raw materials or processing the initially unwanted products. An example of a typical low or no cost approach is the current use of rinse water in multiple rinse processes (Van Berkel, 1999). An example of a typical medium or high cost recycling and re-use, is recovery and reuse of metal working fluids ('coolanta') through application of ultra-filtration, and electrolytic recovery of metals from process wastewater from electroplating operations.

(v) Good Housekeeping

Good housekeeping means adopting sound operation and maintenance procedures, to avoid leaks, the production related problems and also to removing any spills. Good housekeeping ensures that there are no losses due to accidents in the production plant. There is a lot of money that companies save through practising good housekeeping,

by simply ensuring that no raw materials are left lying around the production plant unattended. Good housekeeping will bring about better productivity, if you recover a chemical, you minimize waste as well as pollution (Christie *et. al.,* 1995:116).

In conclusion, through good housekeeping a company can save a lot of material that would otherwise be thrown away when good housekeeping was not practised. Through good housekeeping, the most of the raw materials and ingredients are properly used, as opposed to the situation where through negligence or accidents, materials and ingredients are spilled over and lost because they are not fully recovered. With good housekeeping you firstly prevent negligence and accidents from happening and if they do happen, there will be immediate and efficient measures taken to recover the material or ingredients in such a way that they are not lost but they can still be used.

7. CONCLUSION

In conclusion, there are a lot of incentives or benefits for companies, government, communities and the environment available due to Cleaner Technology. The regulation of emissions, effluents and wastes can best be done through the adoption of Cleaner Technology. The adoption of the Cleaner Technology principle will benefit many people in many different ways.

The government can address problems related to pollution, emissions, effluents, and the production of solid waste. Through the adoption of Cleaner Technology sustainable development can be achieved. This is because, as it has been discussed, Cleaner Technology promotes the use of natural resources and re-use of by-products to produce other products as compared to continual use of raw materials from natural resources. Cleaner Technology is about minimising negative environmental impacts, while continuing development priorities.

The theoretical perspective of Cleaner Technology leaves us with little reason why companies cannot adopt this technique. The government can also look into the possibility of drafting Cleaner Technology regulations. Policy formulation is sometimes different but directly connected to policy implementation, as a result, after good Cleaner Technology policies have been drafted, it is important to carefully monitor their implementation so that the use of Cleaner Technology can contribute to the reduction of wastes, emissions and effluents. It is important too to have access to the relevant policy instruments in order to ensure that Cleaner Technology is implemented.

The successful implementation of these Cleaner Technology strategies depends on companies being adequately informed and skilled in pursuing these goals in relation to their environmental management systems. The next part of this research portfolio will look at one company in particular, and determine what, if any, environmental management system it has adopted and why.

Mondi Paper Mill will be discussed in the next section, in relation to its environmental practices and Cleaner Technology. The elements of Cleaner

Technology and the strategies for the adoption of Cleaner Technology will be examined and analyzed.

PART IIB: MONDI CASE STUDY

1. INTRODUCTION

This study seeks to establish if a company knows about Cleaner Technology, does it implement Cleaner Technology and if so are there any incentives for that and to put forward a recommendation to government to put Cleaner Technology into legislation, and encourage compliance through issuing incentives to companies who implement it.

Part of this research project was a case study on the timber industry with Mondi Limited being the company of study. The research tries to establish if there are any Environmental Management Systems (EMSs) within Mondi and whether they include Cleaner Technology. The research aims to find out what the various environmental management systems are and why they have adopted those particular environmental policies.

If there is some implementation of these policies and the adoption of Cleaner Technology government might find it necessary to legislate Cleaner Technology and encourage its adoption and implementation by introducing some incentives for companies adopting Cleaner Technology.

Mondi Limited was chosen because it is a company that is involved in both the production and manufacturing of the complete life cycle of timber products. Mondi Forests plants its own forests, and harvests its trees which they then process into timber products by the other divisions of Mondi Limited, such as Mondi Paper. The unwanted products or by-products of the timber production processes are recycled at a Mondi Recycling Plant. This complete cycle, dictated the choice of Mondi Limited.

In this document, the word Mondi refers to Mondi Limited while each division will be referred to by its public name such as Mondi Forest, Mondi Paper and Mondi Recycling. In this section, research methodology is discussed first, then followed by the presentation of research findings, the discussion of the research findings and some conclusions drawn from those research findings.

2. RESEARCH METHODOLOGY

(i) Research objectives

The research objectives are;

(a) To investigate into the adoption of Cleaner Technology as a policy in the timber industry.

(b) To investigate into the availability of incentives for companies implementing Cleaner Technology.

(c) To see the possibility of Cleaner Technology being put into legislation for companies to implement as legislation or policy.

(d) To draw the government's attention towards availing some incentives for companies adopting Cleaner Technology.

(ii) Research techniques used

Qualitative data analysis method ~~was~~ will be used in order to establish the presence of Cleaner Technology at Mondi, the establishment of whether are there any incentives for the adoption of Cleaner Technology and in conducting a policy analysis of Cleaner Technology with Mondi case study.

Qualitative data analysis method ~~was~~ will be chosen because it is the analysis of all forms of data that was collected using qualitative techniques, regardless of the paradigm used to govern the research (Mouton and Babbie, 2001:490). This is a qualitative research because it seeks to establish the presence of Cleaner Technology at Mondi Limited which was done through observations, reading related documentations / publications, conducting interviews, holding informal discussions and communicating through e-mail and telephone.

According to Mouton and Babbie (2001), in qualitative data analysis, data is interpreted using various styles. This is rarely done in an orderly manner. However, the general procedures are:

(a) Familiarization and immersion

This includes data gathering. During the time of data collection I developed some preliminary understanding of the meaning of data. This stage involved immersing or

actively interacting with data. According to Babbie (2002:298), argues that as you repeat the basic process of gathering information, analyzing it, winnowing it, and testing it, you come closer to a clear and convincing model of the phenomenon you are studying. This was done through taking field notes. This step allowed me to know the data and to know what can be found in the data and hence know how to interpret the data.

(b) Inducing a main theme and sub-themes

Induce general rules for specific instances and any other related categories. Decide on what organizing principle to follow. The language of the respondents is used in this case. Categories should be about: processes, functions, tensions, events, strategies, contracts or policies. Two or three themes are sufficient for the study to be interesting. At the same time the researcher should not lose focus of what is being studied.

(c) Coding

Coding is identifying themes / categories and coding together (i.e. making different sections of data relevant to different themes). Lines, phrases, sentences and paragraphs were coded. Some researchers would like to use coloured markers to mark different themes while others will make photocopies of the text and cut up sections of text to match different themes (Mouton and Babbie, 2001).

(d) Elaboration

Reorganizing the data into themes allowed me to compare sections of the text, see how some extracts of text under one theme differ, or identify sub-themes. This process is called elaboration or exploring themes more closely.

(e) Interpretation and checking

Interpretation is the written account of the phenomena under investigation. Thematic categories from sub-headings were used. Examples of contradictions to interpretations were also investigated. I have also reflected on my own bias in the interpretation of the findings.

The qualitative research method was used because it is more appropriate to the case study and the case study is about Cleaner Technology in one company which will not need statistical analysis. The questionnaire was drawn up and sent to Mondi for answering and returning. On receiving the questionnaire the interviews were arranged with staff members at Mondi. Questionnaires or questions kept on changing since the research is a qualitative. According to Babbie (2002) this requires confirming the data's validity, reliability, credibility, transferability, dependability and trustworthiness.

Babbie (2002:298) argues that the continuous nature of qualitative interviewing means that the questioning is redesigned throughout the project. The sample of the questionnaire used originally in this study is attached in the appendix. The questionnaire was used as a guide, however a lot of questions and answers came subsequent to the questions in the questionnaire which I wrote as notes to use when making the analysis.

The willingness and availability of Mondi to participate in this research has also contributed in the decision making process during sampling.

Staff members responsible for Mondi Limited's environmental management were consulted. All in all about four people were interviewed face-to-face and two of them have electronically filled a questionnaire. People interviewed include, Mr Adrew Pott an Environmental Manager, KwaZulu-Natal Mondi Forests, Mr Phillip Ninela and Environmental Co-ordinator Mondi Paper Mill, Mr Rafiq Gafoor a Senior Environmental Co-ordinator at Mondi Paper Mill, Ms Gladys Naylor an Environmental Manager at Mondi Paper Mill.

Telephonic interviews were conducted to introduce the topic and make appointments for face-to-face interviews. E-mails, brochures, Mondi websites and informal discussions were also used to collect information for the study. Other companies, such as a private recyclers for example Van Recyclers who work with Mondi Paper were also consulted. Van Recyclers collects waste paper and cardboard from different areas and take those to Mondi Paper or Mondi Recycling for recycling.

All of the above enabled access to a wide range of information and also to get clarity where some of the questions in the questionnaire were not satisfactorily answered.
Site visits were conducted to Mondi Forests and Mondi Paper for observation and for further interviews with staff members. These included the Mondi Forest Environmental Co-ordinator and the Mondi Paper's environmental management team. Face-to-face interviews enabled the researcher to verify the statements made in the various Mondi's pamphlets.

The research did not involve communities since the implementation of Cleaner Technology is largely in-house. Cleaner Technology is not government regulated yet, hence there is no need to measure compliance and instead the research seeks to establish the adherence to Cleaner Technology principles and compliance to environment related legislation, international treaties and conventions. Therefore, it is difficult to evaluate Mondi's compliance at this stage.

The results were then summarized and analyzed to determine whether they compare to the formal stipulated requirements of an EMS and Cleaner Technology. The company background, the company's vision, mission, environmental policies, environmental management systems, elements of Cleaner Technology, strategies for Cleaner Technology, environmental auditing, partnerships and policy networks are among the main issues which were looked at in this study.

Cleaner Technology is voluntary, hence only interviewing Mondi staff is sort of acceptable because Cleaner Technology is something that they voluntarily have adopted and that is why they have been chosen for this study. Internal opinions of staff will not be biased since they do not have to do Cleaner Technology, but they do it because they want. This is different from complying because there are regulations put in place to force companies to adopt Cleaner Technology. Hence there is no need for Mondi to be evaluated or monitored by government or communities.

(iii) Limitations

The research was successful, however there were also some limitations which are as follows:

(a) The time to conduct the research restricted me to investigating only one company, this made the results to be only enough to satisfy the objectives of this study. However, I fill that with funding available, the study can still be conducted in the future with the objective of comparing the results, if Cleaner Technology can be a government policy and all companies compelled to comply that policy.

(b) The respondents had a lot of work, hence they were always busy as the interviews and the communication was conducted mostly during work hours where they are also committed.

(c) Funding was only limited to achieving the objectives of this study, otherwise with more funding this subject can be further investigated as more and more areas of interest started to evolve in the process and towards the end of process of conducting the study.

(d) Protocol and the sensitivity of the topic makes it difficult to get staff members commenting or participating in the study without reservations, as a result some people would not want to comment and in most cases they would refer me to the management or the documentation / publications which I managed to get.

3. RESEARCH FINDINGS

3.1 MONDI LIMITED: BACKGROUND

Mondi Limited is a subsidiary company of Anglo American plc which makes it to be a global company. However, in South Africa Mondi Limited has a number of divisions which are: pulp and paper mills, forests division, recycling mill, and Mondi Craft. These divisions are found in most parts of the country. As a division of Anglo American PLC, based in London, Mondi Limited has operations in many parts of the world.

Mondi Limited was founded in 1967 and began production in Durban at its Merebank Mill in 1971. By the end of 1981, it had five paper machines in operation with an annual capacity of more than 450 000 tons of newsprint, business, printing and education papers. In addition to the ongoing expansions at Merebank, Mondi added cartonboard to its product range with the acquisition in 1976 of the South African Board Mills (SABM) with its three mills at Bellville, Springs and Umgeni. According to Van Zyl (2001:2), forestry and sawmilling operations were brought into the group when Mondi acquired South African Forestry Investments (SAFI) in 1979, which included the Swaziland forestry and sawmilling operation called Peak Timbers Limited.

The integration of these operations into Mondi led to the formation of three operating divisions called Mondi Paper, Mondi Board Mills and Mondi Forests (Van Zyl, 2001:2). Each of these divisions focuses on a major product line. To extend the range of products offered to the packaging industry, Mondi acquired Huletts Paper Limited in 1982 and absorbed the Felixton (fluting and linerboard) mills operated by Huletts into the board's mills' division (Van Zyl, 2001:2).

All these developments were in line with Mondi's objective of ultimately becoming a world-class, fully integrated timber products enterprise. A major building block in achieving this objective was the investment of R1 billion in 1982 to develop an internationally competitive 450 000 tons a year pulp mill at Richards Bay (Van Zyl, 2001:2). Completed in just two years, and at the time, it was one of the largest single-

line green-field pulp projects in the world. The mill produces pulp for Mondi Mills and for export, as well as kraftliner for local and overseas packaging markets.

Van Zyl also explained that an extra dimension was added to the business in 1984 with the acquisition of the Bruynzeel Holdings Group. This included an equity interest in PG Bison, which operates chipboard plants and distribution outlets, and a controlling interest in Finewrites, a manufacturer and distributor of decorative veneers. Bruynzeel also operated forest holdings and sawmills in the Northern Province, Mpumalanga and Western Cape.

According to Van Zyl (2001:2), the acquisition of Bruynzeel Holdings Group led to the formation of the fourth Mondi division, called Mondi Timber. Mondi Timber supplies a wide range of timber products for building and construction, packaging, furniture and joinery, including moulding and pallets (Van Zyl, 2001:2).

3.1.1 Mondi Paper Vision And Mission

According to the Mondi Paper Sustainability Report 2002, Mondi Paper has a clear vision, that is, *to grow into a major supplier of paper products to South Africa and the world.* This has been their vision since the first reel of newsprint rolled out of their Merebank mill in 1971. The growth of the company has not simply been due to Mondi's continual programme of updating and expanding their plant and machinery, but through forging working partnerships with their customers as well (Gafoor and Ninela, 2002).

The report further states that today Mondi is proud that its customers around the world often say they prefer their products to those of Mondi's competitors. They claim that this is because customers know that a Mondi product is made with concern for quality, care for the environment and, most importantly, with constant attention to each customer's needs (Mondi Paper Sustainability Report, 2002).

The Mondi Sustainability Report 2002, also suggest that through customer satisfaction and service, Mondi is committed to becoming the recognised market leader in Office, Publication, Converting and carbonless Papers in South Africa and selected export markets. At the same time Mondi is commited to conducting their

business in a responsible manner that will protect the environment and the Health and Safety of their Employees, Customers and the Public (Mondi Paper Sustainability Report, 2002).

Thompson (General Manager at Mondi Limited), states (on a Mondi pamphlet, 2001) that Mondi regards itself as a good corporate citizen since it seeks to contribute to the well-being of the communities in which it operates and is committed to the principles of sustainable development. Mondi, the pamphlet claims, promises to comply with all applicable laws and will not engage in any form of corrupt or anti-competitive practices.

Mondi also recognizes its role in the world of commerce. It seeks mutual benefits with its business partners. It actively seeks relationships with customers, partners, contractors and suppliers. Mondi also aims at being the supplier and partner of choice. Mondi sets to attract, develop and retain good people who will form part of the Mondi's good team (Mondi Pamphlet, 2001).

Thompson further claims that, all Mondi employees and contractors are expected to perform their duties to the highest of standards of integrity and ethics. Mondi does not tolerate unfair discrimination and will promote workplace equality. Mondi has no tolerance for injuries to its employees and contractors and it is to this standard that it strives to operate (Mondi Pamphlet, 2001).

3.1.2 Mondi Activities

When interviewing an environmental management team at Mondi Paper, comprising of Ms Naylor, Mr Gafoor and Mr Ninela (2003), all mentioned that Mondi Paper gets most of its raw material from Mondi Forests. Pott (2002) explained that Mondi Forests produces trees and supply these as raw material to Mondi's own mills such as the Mondi Paper Mill in Durban. Mondi Paper at Merebank in Durban, produces various grades of paper using ground wood, thermo-mechanical pulp, recycled fibre pulp, and chemical pulp. According to Gafoor and Ninela (2002), Mondi Paper employs about 12050 permanent employees and 500 permanent contractors.

Mondi does not only have customers in South Africa, but in other places such as in Japan. Mondi Paper thus has local and international customers. Mr Gafoor and Mr Ninela explained that Mondi Paper's customers include printing companies, paper merchants, converters, government institutions, parastatals, higher educational institutions and commercial institutions such as banks. They also have international customers and their international market include Australia, Europe, Middle East, Far East, South America and Africa.

When asked about environmental issues at Mondi, Mr Ricky Pott (a provincial Manager at Mondi Forests) said in an interview that, as a forest division, Mondi Forests produces clean products. What he means by that is that there is little waste or effluent generated by the trees. The quality of water that comes out of the forest is very high, generating no pollution. Mondi employs external consultants specializing on water quality. They keep checking the water quality and the findings mostly show that the water quality is very high. Therefore, the water within Mondi forests is good and suitable for a lot of aquatic species to live in. The availability of insects shows that there is life in that water (Pott, 2002).

Before 1972 and earlier on, most of the land owned by Mondi was planted with trees. The National Water Act of 1998 requires that 30 m be left as a buffer zone along the stream and 50 m be left as a buffer zone along a wetland, before trees can be planted, in order to promote nature conservation. Pott cited this as one of the examples of Mondi's compliance to environmental legislation (Pott, 2002).

There are also investments in the upgrading and expansion of the Mondi Paper plant, to improve capacity and quality, as well as adding value to the products range. Of significance were the rebuilding of the board machine 6 (BM 6) at Springs and paper machine (PM 1) at Merebank which cost over R500 million, as well as the construction of South Africa's first environmentally-friendly recycled fibre plant for the recycling of old newspaper and magazines into newspaper (Van Zyl, 2001:2).

3.2 ENVIRONMENTAL POLICY AND PRACTICES AT MONDI

Mondi has its own environmental policies and those form an integral part of its environmental management tools and systems. Both the Mondi Forests and Mondi

Paper environmental policies have almost the same goals that include the reviewing, updating and monitoring of environmental management systems.

According to their Sustainability Report 2002, Mondi conducts its operations in such a manner that it creates wealth for all its stakeholders without jeopardizing basic resources and processes. Mondi also practices wise and sustainable utilisation of resources, products and opportunities within the forestry estates for the benefit of employees, the general public and adjacent communities (Mondi Paper Sustainability Report, 2002).

Mondi periodically reviews its environmental management systems (EMS), objectives and targets to facilitate continual improvement of its environmental performance and monitor the achievement of its goals. Mondi Forests adheres to the FSC principles and criteria as described in Part IIA of this thesis. Mondi markets itself as environmentally conscious by claiming that,

> *If you buy timber or forest products with the FSC mark – you will not leave your mark on the environment.*

Mondi conducts environmental impact assessment in order to minimize the impact of its operations on biological diversity, water resources, soils, fragile ecosystems, areas of great scenic beauty, and on neighbouring communities (Pott, 2002).

As shown in Table 1, by applying minimum impact management in accordance with the listed principles, Mondi Forests claims to comply with all applicable laws of the countries in which it operates, and all international treaties and agreements to which these countries are signatories. It also practices sustainable plantation forestry on land that it owns, leases, or manages on behalf of others while honouring and respecting the customary tenure or rights of use of local communities (Mondi Forests Unpublished Publication).

Table 1: Comparison between Mondi Forests and Mondi Paper environmental policies adapted from Mondi Forests Unpublished Publication and Mondi Paper Sustainability Report 2002.

Mondi Forests environmental policy	**Mondi Paper environmental policy**	**Comments**
Compliance to legislation and treaties.	Compliance to legislation and regulations. Principle of continual improvement.	Voluntarily willing to comply with legislation, regulations and treaties.
Sustainable forest production.	Re-use and Recycling where possible.	Sustaining the environment e.g through re-use and recycling.
Wealth creation without resource exploitation.	Staff training and produce in an environmentally responsible manner	No resource exploitation but production which is environmentally friendly
Benefit employees, public and adjacent communities.	Excellence in operation with consideration for stakeholders, community and the environment	Mondi voluntarily invites public participation as it is required by NEMA
Conduct environmental impact assessments.	Apply sound environmental practices and techniques to minimize impacts.	EMS and changing practices and techniques to minimize waste and environmental impacts.
Pollution prevention.	Utilise raw material and energy efficiently.	Use of raw material and energy in a process that is not polluting.
Nature conservation.	Support research in science and technology of pulp and paper industry.	Research in science and technology for nature preservation.
Impact monitoring and continual improvement.	Minimising waste to final disposal.	Continual improvement through impact monitoring and waste minimization.
Annual review and update of environmental policy.	Periodically review EMS to facilitate improvement.	More than one audits both internally and externally.

Mondi Limited also focuses on the prevention of pollution. Mondi manages areas worthy of conservation, including natural forestry, refuges for rare or endangered species, sites of scenic beauty, wetlands, and sites of archaeological, cultural or historical interest. The impacts of Mondi's own and contracted operations on the natural and social environments are monitored and the results are integrated into a programme of continual improvement (Thompson, 1999).

Based on the reports of the Environmental Auditing done by both internal and external auditors, and other environmental impact assessments, Mondi reviews and updates its operations on an annual basis. By producing FSC certified products, Mondi Forests supports the principles and criteria of the Forest Stewardship Council (FSC) and subscribes to the Forest Owners Association's Guidelines for Environmental Conservation Management in Commercial Forests in South Africa (Thompson and Hosuel, 1999).

Mondi also complies with environmental legislation and regulations and other requirements relevant to its operations and endeavours to go beyond the legal requirements to minimize adverse environmental impact by pursuing the principle of continual improvement. It supports recycling by utilizing paper based waste products and other materials in its process wherever viable.

Pott explained in a personal interview (2002) that Mondi provides training to its employees and promote environmental awareness to conduct all activities in an environmentally responsible manner. Mondi is committed to excellence in conducting its operations, with consideration of partners, communities and the environment (Naylor, Gafoor and Ninela, 2003).

According to Barton and Lynch (2001), Mondi applies sound environmental practices and management techniques in order to minimize adverse impacts such as pollution on the environment as a result of its existing and new operations. It also utilises raw materials and energy as efficiently as possible. This applies particularly to the exploitation of non-renewable raw materials and energy sources. Mondi also supports research in the science and technology of the pulp and paper making industry,

including environmental issues. Mondi works to minimize waste to final disposal in such a way as to minimize the impact on the environment (Barton and Lynch, 2001).

The results of this study show that most of the Mondi products are FSC certified; that there is third party environmental assessment; and that there is a commitment to waste minimization (Naylor, Gafoor and Ninela, 2003). FSC is an international certification system and there are also national governments' policies that the company is complying to. The national policies include the National Environmental Management Act, the Environmental Conservation Act, the National Atmospheric Pollution Act, the National Water Act and any other related regulations and bylaws.

Internal, national and international environmental assessments are done to ensure environmentally safe production practices in Mondi. The internal environmental auditing is done by Mondi staff. The national environmental audits are done by the national consultants who work independently from Mondi. In addition to this, there are also environmental auditing procedures done by international companies in order to ensure that Mondi gets FSC accreditation. Due to this large number of environmental audits and assessments that have been conducted satisfactorily, Mondi is assured that they comply with legislation, this makes policy implementation possible (Gafoor and Ninela, 2002).

According to Naylor, Gafoor and Ninela (2003), Mondi Paper Mill has a good Environmental Management System, and it has been awarded the ISO 14001 accreditation standard by the South African Bureau of Standards (SABS). The Mondi Paper Mill also has FSC chain-of-custody certification for business, education, and carbonless grades of paper. Ninela (2003), argued that their copy paper is a business grade and therefore it is also ISO 14001 certified. In addition, the Mondi Paper Division produces newsprint, which contains 25% to 30% recycled fibre.

3.2.1 The Elements of Cleaner Technology At Mondi

Gafoor and Ninela (2003), mentioned in an interview that Mondi Paper is familiar with the concept Cleaner Technology and that, in fact Cleaner Technology seems to work well at the Mondi Paper Mill. They claim that Cleaner Technology helps the company save some money, since by-product re-use and waste re-cycling reduces the

cost of buying raw material. This is an example of the product element of Cleaner Technology in use. They also believe that Cleaner Technology has some indirect monetary incentives for the organization or company management.

According to Ninela (2003), there are a lot of projects within Mondi Paper alone, which seeks to address environmental problems as part of their Environmental Management Systems. Mondi has started working on re-use and recycling of its timber products. This is accompanied by continued environmental assessments and improvements based on the recommendations made in the reports. The production process, raw material consumption, energy consumption, quality and the yield or any combination of these are continuously being monitored and reassessed.

The waste generated at the production plant at Merebank could easily escape to the ocean mostly because the Mondi Paper Mill is situated along the coast which can put the lives of the aquatic animals at risk. Cleaner Technology has helped the company to produce much less waste or produce waste material that is less damaging to the environment which may end up being taken to the rivers or sea. This is due to the reason that Cleaner Technology promotes the minimization of waste as close as possible to the point of production, as well as removing harmful manufacturing processes.

According to Gafoor (2003), if the company causes pollution, it has to pay for repair and remediation as the Polluter-Pays-Principle states. This is very important because companies can try their best to minimize waste and pollution, but to date they have not been able to stop it completely. Hence, they remain responsible for its costs.

The strategies that have been employed to adopt Cleaner Technology are, Environmental Management Systems, FSC certification, product modification, input substitution, technology modification, on-site recycling and re-use and good housekeeping. These will be discussed shortly.

According to Gafoor (2003), Mondi supports the recycling of other non timber material such as glass, drums and plastics from other uses such as packaging for their ingredients. These materials are sorted on site and collected by respective recyclers. I

had an opportunity to see of the trucks coming to collect drums for recycling. Mondi also argues that they take their non-recyclable waste to a licensed general landfill site.

3.2.2 Compliance To Environmental Policies

Mondi's adoption of Cleaner Technology is only voluntary. However, the Mondi Paper Mill has an environmental legal register, which is comprised of all legislation and bylaws applicable to the company. This register gives information about the Constitution of the Republic of South Africa, the National Environmental Management Act (Act 108 of 1998), the Environmental Conservation Act (Act No. 73 of 1989), Section 24 of the Bill of Rights, the National Water Act (No. 36 of 1998), the Durban Metropolitan Council Water Supply Bylaws, the Durban Metropolitan Council Sewage Disposal Bylaws, the Atmospheric Pollution Prevention Act, the Occupational Health and Safety Act and any other related regulations and bylaws.

This register is reviewed annually and any change to legislation, which may affect the organization, is highlighted, and where applicable, programmes are implemented to ensure compliance (Gafoor and Ninela, 2002). In responding to the questionnaire, Gafoor and Ninela (2002), argued that Mondi Paper Mill complies with the government's rules and regulations, including the local by-laws. This is in fact a requirement of the FSC and ISO 14001 accreditation standards.

Environmental policies and regulations are very important to the Mondi Paper Mill operations. They are also effective in guiding the Mondi activities to be in line with the country's laws and regulations (Gafoor, 2002). The Mondi Paper Mill at Merebank operates according to the Atmospheric Pollution Prevention Act. Since the Mondi Paper Mill is located in the South Durban Industrial Basin, which is regarded as the city's pollution hotspot, it is necessary for companies like Mondi to produce clean.

During the various interviews with Mondi staff, it became apparent that staff have high environmental values, and personally believe in the merits of environmental management. Pott (2002), for example said that, *humankind is running out of time on earth. Everyone has to change the way in which they relate to earth.* Everyone must

recycle and use less fossil fuel. Everyone must use fuel resources in such a way that these resources can remain for the future generations.

> *"We must make this world of ours sustainable. Cleaner Technology is very important for all of us to achieve sustainability of our natural resources" argues* (Pott, 2002).

Mondi Paper has started a lot of initiatives such as giving awards to their suppliers in their Mondi Suppliers Awards competition. They have also introduced a Mondi Paper Magazine Awards. As part of its involvement in the development of the general public and the communities surrounding it, Mondi has also contributed to the Community Land Ownership project in Piet Retief (Pott, 2002).

Naylor, Gafoor and Ninela (2003) all argued that Mondi has high production efficiency. Water is their largest ingredient in the manufacturing process, and they recognize the need for them to minimize effluents and waste production. They further argued that due to high organizational support, mainly intended products are produced in their Mill.

Environmental auditing is conducted three times a year, by internal auditors, twice per year for NOSA and once every year for FSC, by national and international auditors respectively. Based on the recommendations from auditing reports, the changes on big projects happen every five years while on small projects they take place yearly, this results in continuous improvements and new developments (Naylor, Gafoor and Ninela, 2003).

A company like Mondi will benefit a lot from adopting these. In addition to direct benefits, the above tools and strategies can help a company to comply with legislation. However, the results of the interviews with Mondi's environmental management team show that Mondi's compliance to legislation is mainly due to customer demand, it is out of self-regulation in an attempt to receive and retain their FSC and ISO 14001 accreditation.

As it has been discussed earlier, when relating Cleaner Technology to the sustainability of natural resources, Mondi Forests believes in sustainable development. Pott (2002) argued that all their polices are guided by principles of sustainable development. As a subsidiary company to Anglo-American Corporation PLC, Mondi wrote the OPTIMA Volume 48, number 1 of September 2002, which has special issues on sustainable development.

Also according to Mondi Paper's Sustainability Report 2002, Mondi Paper believes strongly in sustainable development. The Mondi Paper Mill's environmental management system is based on active waste minimization and continual improvement, which is consistent with the principle of sustainable development. One can sustain our natural resources by adopting Cleaner Technology and the principles of sustainable development.

As it has been stated before, the Wetlands Project, which is a joint venture between Mondi and the government, assist in conserving our natural environment more especially the wetlands and their ecosystems. Mondi has projects like these not only in South Africa but also in other parts of the world, where Mondi has its operations. This shows that similar type of organizational behaviour is seen in most of the areas where it operates.

Another Mondi project is a 50 / 50 programme which entails assisting the communities with resources that Mondi Forests might no longer be using. This is an excellent programme which is run not only on Mondi properties but in others as well. There is a relationship among economic factors, social factors, environmental factors and sustainable development. All these projects are some of Mondi's attempt to sustain the natural resources (Van Zyl, 2001:4).

While on a site visit to Mondi Paper there was a huge pile of wooden chips that were ready to be used in the production processes. The Mill operates 24 hours a day. Therefore, the production process is a continuous one. This means that the supply of raw materials have to be continuous too. The continuous amount of raw material required as an input to allow the process to continue for 24 hours is therefore a lot.

However, through the recent introduction of recycled paper products into the production process, some of this dependency on raw timber products is reduced.

Although Mondi has a recycling centre which takes all the used paper and use it in the production process to substitute the raw material, the supply of recycled or used paper is not enough to feed the whole production process because of the large quantities that are required. This problem of limited recycled material means that it cannot sustain the continuous production process which is a priority to business managers. The recycling idea is good but it cannot work in the main production line where production should not stop due to shortage of recycling material as input. This is an area identified by them where there is room for improvement.

If it is possible to determine what quantities of products can be recycled, one can see a need to promote the waste collection through establishing buy-back centers for the community to collect waste and sell it at the buy-back center. This will increase the quantity of products which comes back for recycling. For example, in the Mondi case study, 25 % is recycled at present.

Currently, there are no financial incentives offered by government, for companies adopting Cleaner Technology. In an interview with the environmental management team for Mondi Paper, it was evident that there are no monetary rewards or incentives that Mondi is getting from the government neither for Cleaner Technology nor for recycling programmes.

Irrespective of the above, Pott (2002) explained that Mondi's strongest incentive to be environmentally conscious and responsible is customer satisfaction and their own sense of social responsibility. Pott believes however that government should offer some incentives for the adoption of Cleaner Technology. Government should reward companies that have sound environmental management systems. With official recognition and acknowledgment gained because of Cleaner Technology, companies can gain a competitive advantage over others. This will act as an incentive on its own and may instill peer pressure amongst industries, and will indirectly encourage companies to comply to environmental regulations.

Partnerships and policy networks as they will be discussed in the next section are also key to implementing Cleaner Technology. It is through re-use and recycling that the product element of Cleaner Technology can be modified and the pollution problems can be addressed. In this process, Mondi depends on good working relations with the government, community, NGOs and other business people who are interested in collecting waste paper. Most institutions have a recycling system in place for separation on site and for collection by Mondi Recycling for recycling either in Mondi Paper Mill or Mondi Craft Mill. According to Naylor, Gafoor and Ninela (2003), Mondi Recyling does the collecting, sorting and sending for recycling at the Mill.

4. DISCUSSION OF THE RESEARCH FINDINGS

Based on the interviews with Ms Naylor, Mr Gafoor, Mr Ninela (an environmental management team at Mondi Paper) and Mr Pott from Mondi Forests, Mondi has a number of key partnerships with a range of interest groups such as NGO's, environmental groups, government, institutions, other companies, institutions of higher learning and the community. This also happens voluntarily.

Mondi contributed in the organizing of the World Summit on Sustainable Development held in South Africa in August 2002. Mr Pott was invited to write a chapter in a book called *Mainstreaming Biodiversity in Development: Case Studies from South Africa*, which was to be presented at the Summit. He was working with a team of academics from different disciplines. The chapter they wrote was on "Biodiversity Conservation in Plantation Forestry". The book was written for the World Bank Environment Division.

Mondi is a member and a sponsor of the KwaZulu-Natal Crane Foundation (Pott, 2002). Mondi Forests is also involved in nature conservation such as the Oribi and Blue Swallow Working Groups. Mondi also has close working relations with the Life Sciences departments of the University of Natal, at the Pietermaritzburg campus. They also consult with many people including Dr T. Edwards and Prof. J. Arkust from the same university. Ninela also explained that Mondi Limited is a division of Anglo American PLC group, which is a combination of different companies under one umbrella.

Mondi Paper has regular meetings with local government and traditional authorities and communities. Ninela explained that Mondi is a member of the Durban Air Quality Management Association, which comprises of government authorities, communities and industry. The main objective of this association is to manage the air quality in Durban (Gafoor, 2002). Gafoor considers the existing networks and partnerships as very useful such as the Mondi Wetlands Project. They are forums for sharing improved and recent knowledge that is used in improving management. These types of activities and relationships, argues Gafoor, help in building partnerships and networks.

Pott (2002) also argues that partnerships are very useful to all the stakeholders in the partnership. Another example of partnership projects is the Working for Water Project. In this project the Department of Water Affairs and Forestry (DWAF) is working with Mondi Forests in clearing watercourses of alien vegetation in order to improve and secure water supply for the future. The Working for Water project is a national Multi-Million Rand project. The project employs more than 40 000 people from previously disadvantaged communities.

Mondi is also involved in a number of community development projects. Rural people get employed in Mondi projects (Pott, 2002). There are also a number of rehabilitation programmes that Mondi is involved in. Mondi has Social Development Facilitators, interacting with the rural communities to find out what their needs are. This is because they would like to establish people's needs and hence contribute what they can, as part of their overall social responsibility policy.

In an interview with Pott (2002), he also explained that Mondi has a lot of property that they do not use and they would like to find the best way to use or donate these to the communities. Mondi has also trained people for Bee keeping projects. He claims that the participation of local communities in these projects is very high. According to Pott (2002), Mondi also has a large number of Community-Private Partnerships. Some examples are the Trash-for-Cash, Educating-the-Youth, Peace Gardens, Khulanathi Woodlot Scheme, Honey Production and Collecting of Forest Mushrooms community projects.

These types of partnerships provide jobs for people and contribute to wealth creation in the local community. The projects do not only create jobs for people but they also provide income for the contractors, and people acquire skills so that they can be employable in the future (Ninela, 2003).

The educational projects are useful to the community because the youth gets education while at the same time, teachers get work and there is development in the area. Mondi's relationship with others is very good and Mondi Forests belongs to South African Forestry Association. Their relationship with NGO's and environmentalists is also strong because Mondi implements FSC and other standards

that are supported by environmentalists and communities. Mondi has made a substantial investment in rural schools and supports the Foundation and Intermediate Phase Classroom Reinforcement and Teacher Training programmes (Van Zyl, 2001:16).

Mondi regards all their different outreach programmes and their different partnerships and networks as key to their day-to-day operation, and see it as a fundamental principle of sustainable development. Mondi Limited produces a variety of products with pulp, paper, and packaging being the core products. The company is largely self-sufficient, procuring its fibre from its own plantations. No fibre is sourced from natural forests. This, they argue, is an attempt to sustain South Africa's natural resources.

5. CONCLUSION OF THE RESEARCH FINDINGS

There are a number of advantages in adopting Cleaner Technology, both for the industry concerned as well as for the government. These incentives are not necessarily in monetary terms but companies can benefit a lot from adopting Cleaner Technology. The people interviewed at Mondi felt that there is room for government to become more active. They suggest that government could sponsor some of the projects between business and the community such as waste recycling projects since these help in reducing waste that the government will otherwise have to manage on a landfill site. This could be seen as an opportunity for government to save waste management costs and help in minimizing environmental problems such as pollution.

Finding feasible and creative ways of implementing environmental policies need to be put onto the government's agenda so that they can encourage companies to minimize waste and produce more clearly clean. More awareness programmes on the concept of Cleaner Technology should be had. Government could thereby make many companies who do not comply to government's environmental policies comply because Cleaner Technology offers companies something in return to their good actions. Environmental policies are good because they make industry know what they must do in order to produce clean.

Partnerships and policy networks seems to be regarded as very important ways by which people or industries can share information and encourage each other on the significance and advantages of good environmental management systems. Companies in the policy network are able to learn from each other and can share recent developments and information on environmental legislation. An example of this is the way in which Mondi continually updates its environmental law and legislation register. This is very efficient and pro-active, it ensures that the company is not left behind.

Another important aspect about Cleaner Technology is the fact that most companies see it as way to ensure principles of sustainable development. Cleaner Technology tries to ensure that natural resources are not exploited but used efficiently and in a sustainable way. For example, when waste paper is recycled to produce other paper,

there will be less demand on timber. These initiatives show that something can be done as far as sustaining our natural resources and producing cleaner products.

According to Pott, environmental policy compliance and implementation mainly revolves around individual companies doing their own self-regulation as opposed to pressure from government (Pott, 2002). The only policy instrument applied by government at present is that of regulation. Government should perhaps consider rewarding pro-active behaviour through incentives. The government incentives can be in terms of providing funds for environmental impact assessment projects related to companies (Pott, 2002).

According to Naylor, Gafoor and Ninela (2003), different policy instruments are employed at Mondi Paper Mill. The Boulding approach, Hood approach, Burch and Wood approach, Etzioni approach and incentives are used at different levels in Mondi. Through some of these tools, they argued that Mondi goes beyond the legal requirements when it comes to compliance to legislation, and, in fact, they regulate themselves. Surely a company like this should receive government recognition or even be rewarded.

Government and its administrative agencies seeking to impose sanctions for regulatory violations can handle matters internally or through civil or criminal courts (Firestone, 2002:409). It was interesting to find a situation where (Mondi being a company itself) supports the use of the rule of law amongst other measures, to make companies comply with legislation. These influences play not only an important role in the development and implementation of regulations, but in enforcement decisions as well (Firestone, 2002:409). With a directive, the message is specified as a rule or standard, while an incentive can be thought of as a positive reward, such as public recognition, a subsidy, or a tax break (Mitnick 1998 cited in Firestone, 2002:409).

PART III: DISCUSSION AND CONCLUSION

1. INTRODUCTION

Part I of this thesis discussed public policy in detail and as a concept on its own. Part IIA and Part IIB dealt with the background of environmentalism and Cleaner Technology respectively, with particular reference to Mondi. This part will look at all of the above concepts and try to establish some links between related concepts. This part is mainly the discussion and the conclusion of the whole research project.

In this section, I will also look at the ways in which Cleaner Technology can be promoted and lastly the efficiency and profitability of Cleaner Technology. Therefore issues such as the need for change, industry and environmental management, the efficiency through Cleaner Technology, the benefits of sustaining our natural resources will be discussed in this section.

The early sections have highlighted that the environmental problems that we have are as a result of people's attitude towards and use of the environment. If sustainable development is to be achieved, something has to be done in order to change this human attitude and behaviour. Enforcing Cleaner Technology can be a signal to companies that there is a need to produce clean. It can also raise the public awareness on environmental issues.

In order to adopt Cleaner technology some funds might be required for technology transfer, hence these will be discussed. For Cleaner Technology to succeed, capacity building, good housekeeping, partnerships and networks are crucial. Therefore the tools for a successful adoption of Cleaner technology together with the advantages for Cleaner Technology will be considered.

2. INDUSTRY AND ENVIRONMENTAL MANAGEMENT

Time has changed and environmental problems such as pollution and waste production should be on the government's agenda. It is very important that South Africa manages its natural resources very well since the increased production which the government and most private companies call for, results in an increase in utilisation of the country's natural resources.

Pollution problems will increase if there is no proper enforcement of legislation to address this situation. Industry is at the forefront when coming to pollution since their production processes yield unwanted by-products that pollutes the atmosphere, land and water. Industry needs to contribute to pollution prevention as some companies are already doing.

The South African Bureau of Standards has established some limits or standards that are regarded or perceived as acceptable pollution levels. The polluter-pays-principle provided for in our legislation, authorises government to control the situation. However, big companies that have money continue to pollute and if caught and found guilty, they pay the fine. In this situation big companies weigh the benefits of increased production against those of polluting. If they find that they are gaining through the use of polluting production techniques more than they lose by paying any fine, their production technique remain the same.

Mondi Limited is familiar with all the government's environmental policies. Their adoption of Cleaner Technology in the highly polluted area like the South Durban Industrial Basin is very commendable, both for industry and community in the area. The benefits from its adoption are already making progress towards rehabilitating the area as it is highly polluted and the soil is highly contaminated while there is also a very bad smell in the area. Mondi and other neighbouring companies in the area network, raise public awareness, and look at ways of improving their production processes such as raw

material substitution, good housekeeping, product modification and recycling and re-use their waste products.

The study determined that one of the forces behind the adoption of Cleaner Technology has been customer demand. Companies tend to adhere to, or prescribe to certain requirements and try to get some certification as per their customer requirements. This is one major factor which contributes to the company's decision to adopt Cleaner Technology.

International customers such as Mondi's are very good at forcing compliance to environmental legislation since their country's regulatory framework is very strict. Customers would not buy certain products if those are polluting or if those products are not certified by an authorizing agency. Therefore in the fear of no compliance no customers, South African companies tend to comply with legislation so that they can access the international markets.

South Africa as a leading developing country in Africa, must lead both from the public sector and from the private sector as far as the move towards Cleaner Technology is concerned. Some positive steps have been taken. South Africa has launched its first National Cleaner Production Centre (NCPC) at the World Summit on Sustainable Development (WSSD) in 2002.

The National Minister of the Department of Trade and Industry (DTI) Mr Alec Erwin, signed the agreement for the launch of the NCPC in the presence of the representatives of its donors, the Swiss and Austrian governments.

The NCPC is part of a cooperative programme between the United Nations, Industry and Development Organization (UNIDO), the DTI and Council for Scientific Institute Research (CSIR) to increase the competitiveness and productivity of South African industries by increasing industry capacity for cleaner production. It also promotes

dialogue between industry and government, and the development and transfer of environmentally sound technologies.

Ingwe Coal Corporation Limited (a wholly owned South African subsidiary of the Energy Coal Division of BHP Billiton), has introduced what is called Cleaner Coal Technology (CCT). They use their CCT as a means to reduce emissions, reduce waste and increase the amount of energy gained from each tone of coal produced. This method includes methane capture during coal mining, improved coal preparation, increasing use of combustion by-products and wastes synergies with renewables, increasing thermal efficiency and emerging power generation technologies (www.ingwecoal).

Cleaner Technology needs cooperative action to take place, all the parties have to be involved and committed in producing cleaner. Private organizations can be consulted to do some work for large companies. Universities can do research for large companies, government and other interested parties on Cleaner Technology. Universities can benefit from this since they might get funding for their research projects. At the same time there is a common objective that is to address environmental pollution and other related problems.

It is not that these changes substantially 'green' business, but they certainly lessen the impact of business on the environment while maintaining a business-as-usual stance that is attractive to managers and shareholders (Doyle and McEathern, 1998:36). Doyle and McEathern (1998:142) argue that the fact that some businesses make such changes shows that it is possible for business to show care for the environment, however only up to a point. The fact that it is possible does not mean that all business can or will make the appropriate changes.

The reality too is that the same company operating in a number of different countries may pursue high-efficiency solutions in one setting and low-efficiency solutions in others, protecting the environment in one and harming it in another. It is always possible for the companies to display these different characters if companies perceive the respective

governments to be protecting the environment or controlling pollution. Governments therefore play a crucial role in protecting both the environment and the public. Environmental impact assessment processes can be entered into for public relations purposes, and they can play their part in making business sensitive to the advantages of changed ways of producing and using waste products, internalising forms of ecological rationality in the process.

According to Moore (2001), the public needs to change the way it looks at nature and the environment. The eyes of human kind need to get beyond the immediate visual impression and to understand a little more about science, ecology, and biodiversity. This is perhaps the single most important task of the forestry industry.

Moore (2001) argues that the public tends to judge the health of the environment with the same eyes they use to judge the aesthetics of the land. The tendency is therefore to be overly critical of the timber industry. However, Moore argues that there are a lot of advantages to the timber industries. People need to appreciate the full range of impacts caused by the forests industries various activities, for example paper is made from forestry. When it comes to biodiversity conservation if approached correctly, there is no primary industry more sustainable than forestry (Moore, 2001).

The contribution of Cleaner Technology in sustainable production can also be seen from the fact that, the production process does not only rely on raw materials but also on recycled material. The strategies used to practice Cleaner Technology helps in the sustainability of natural resources.

All production processes of industries lead to waste production. However, one may not be able to completely do away with these by-products. This makes it necessary for companies to adopt cleaner techniques for making their production more efficient and less harmful to the environment. This, together with the recycling of waste material, changing to new production techniques, changing the raw materials such as putting 50 %

waste and 50 % new raw material in the early stages of the production process can all lead to sustainable development.

By promoting the adoption of Cleaner Technology, the government can contribute towards building a Cleaner South Africa. The government can in the process of building a Cleaner South Africa encourage South Africans to respect themselves, their environment and other fellow South Africans while also educating the community and the industry about the importance of not wasting our natural resources such as water, air and land.

The government can also encourage people to take more responsibility for their waste and ensure that we do not pollute our water, air or land. Mondi's education programmes for example, have already helped with teaching people from a young age that one can even make some money from certain waste products. Recycling certain products can generate some income or waste materials can be transformed into other products.

Through legislation and enforcement of Cleaner Technology, we can try and sustain our natural resources while they are still there, instead of waiting until there are none. The production process can also be sustained through recycling, re-use and sustaining the natural resources. With sustained production, the country's economy will also be sustained or improved.

3. CLEANER TECHNOLOGY AS A POLICY OPTION

This research project would like to conclude by making the case for Cleaner Technology as a policy to improve environmental management within industries. Policy has been discussed in part one of this thesis and policy formulation steps can be applied in developing a Cleaner Technology related policy. At the moment, some industries (such as Mondi) are implementing Cleaner Technology on voluntary basis. There is enough evidence to suggest that government should legislate the need for industries to adopt Cleaner Technology, and consider what the appropriate policy instruments are to ensure compliance.

I will now identify and summarize some of the key elements of Cleaner Technology as determined by the research findings. I wish to argue that if these elements are put into operation, then Cleaner Technology will produce a number of valuable advantages. This will then substantiate my argument why I believe that the South African government should put Cleaner Technology onto the policymaking agenda.

To reiterate, Cleaner Technology can be defined as a process of continual minimization of waste production as close as possible to the point source. Cleaner Technology depends on a number issues which in turn, will lead to a number of positive developments:

(i) Capacity building

In order for companies to have access to, and have a clear understanding of Cleaner Technology, new developments, information needs to be shared, and capacity built amongst the employees. If this knowledge is weak, limited or does not exist, Cleaner Technology will not succeed. Capacity building is necessary for companies to know what Cleaner Technology entails and how to implement it. Capacity building should include educating the employers and employees about Cleaner Technology and the importance of producing in an environmentally friendly way.

(ii) Good housekeeping

Good housekeeping is key to environmental management systems and Cleaner Technology. Good housekeeping is about the management of processes, the collection of information on production impacts and outcomes. It entails continuous assessments and evaluation. For Cleaner Technology to be successful, good housekeeping has to be implemented within a company. With good housekeeping, a company ensures that nothing is wasted. Good housekeeping is essentially about how the company and its production processes are managed and administered.

(iii) On-site re-use and recycling

On-site recycling and re-use is another aspect of Cleaner Technology. It aims to avoid or limit the transportation of waste and hence minimizes the cost of recycling and increases the amount of raw materials available. It is also an indirect incentive for companies to adopt Cleaner Technology. Re-use also reduces the money spent on buying raw materials or processing the initially unwanted products. Re-use and re-cycling will also help sustain our natural resources.

(iv) Partnerships and policy networks

Policy networks can support Cleaner Technology since information is brought together and shared by different members of the network. The more the information, the better the chances of a better decision. One obvious characteristic of the network is the intensity of the interaction among the actors or members of the network. Another factor that influences interaction is the way in which the objectives, information and sources of power are distributed among members of the network.

Partnerships and policy networks can assist companies that wish to consider adopting Cleaner Technology. Government itself could become a more active member of such partnerships. After all government departments or administrative agencies will be involved in policy implementation, hence they can also help companies with advice and expert on how to achieve this.

Also, the government alone cannot enforce compliance and cannot manage and preserve nature, if business and the public are not involved. Therefore establishing partnerships and working together can result in a better situation where knowledge can be shared between partners which in turn can improve the chances of changing behaviour. The working together of all the role-players could morally co-opt industry to comply with legislation out of their own free will. Mondi is one industry that through will and the passion for the environment and customer satisfaction has come to comply with legislation.

In conclusion, Cleaner Technology steps include planning through policy, depending on the organization's vision and mission. Regular reviews of the data on site are also required. Collection of data and site inspection for understanding the current situation is also recommended. The identification of problem areas or areas of potential improvement will be easy after a site visit. Detailed data can be collected to identify Cleaner Technology options.

The next step is to list possible ways to improve areas of concern, through weighing the company's targets and objectives. Options need to be evaluated and a choice has to be made on available alternatives. These choices could be on projects, programmes, structure, training, communication, documents, control and operational (Hillary, 1997:53). These can be implemented through control, as emergency, monitoring, non-conformance records, audits and reviews.

Through the above positive developments and the company's ability to successfully implement Cleaner Technology a number of benefits emerge for that company, the benefits include the following:

(i) Efficiency

One of the advantages of Cleaner technology is efficiency. Individual companies are able to respond to increased environmental care in a way that is both good for its profits and for the environment (Doyle and McEathern, 1998:142).

Cleaner Technology is an attempt to consider some economic and technical improvements that can lessen the impact on the environment of crucial production processes. For example, it is possible for buildings to be retrofilled to improve their energy efficiency and lower their running costs. This can boost profits, lessen the demand for electricity and lessen the production of greenhouse gas emissions from power stations. It is a little thing but no less important (Doyle and McEathern, 1998:142).

In a related way, firms can adopt zero-waste strategies and concentrate on redesigning production so that waste products (including heat) can be turned into inputs for other processes, improving efficiency and lowering the impact on the environment (Doyle and McEathern, 1998:142).

Cleaner Technology involves changing attitudes, improving technology and management systems. It enables better economic efficiencies as a result of cost savings on the purchase of energy, raw materials and on the limitations of disposal of waste and emissions. A company will save on costs for transporting waste, disposing waste and rehabilitation. Another advantage is that Cleaner Technology helps companies to save money as opposed to being fined for polluting according to the polluter-pays-principle.

(ii) Costs benefits

Industries have been reluctant to adopt Cleaner Technology because of the fear of high costs involved in changing traditional production processes to those of Cleaner Technology. However, they will save money in the long run. In addition, some financial support is available to industry. Industries are able to apply for financial support mechanism from the government and the United Nations for adopting Cleaner Technology. This support is meant to enable change in production techniques, buying machinery and other required equipments.

In South Africa, the National Department of Trade and Industry has started a fund called the Technology Transfer Guarantee Fund that offers some assistance to Small Medium and Micro-Enterprises (SMME). The fund can help SMMEs, since the purpose of the

fund is to allow for access to cleaner technology by introducing a technology transfer guarantee fund. The fund aims to facilitate access by SMMEs to local and international technology.

With Cleaner Technology some technologies may be transferred from other countries to South Africa. For the purpose of the Technology Transfer Guarantee Fund, technology means, any process or technology, or any knowledge or know-how or information relating to a process or technique or product. That has to be something which has been written down or otherwise recorded or set out in a usable form, and which, when used by a person, would enable them to create wealth or value, or increase their effectiveness in the creation of wealth or value.

(iii) Sustainability of resources

The problem of waste production can look as a loss of resources, however the law of conservation of matter tells us that matter can neither be created nor be destroyed by human activity, but it merely transform from one state to another (Common, 1995:35). Efficiency through Cleaner Technology increases output while at the same time reducing waste production. This then make the companies to use less natural resources since they can make the best or utilize most of the material they have.

I would also argue that waste is a resource in an unwanted state or form. Left unattended, it is a threat to our health and environment. The recycling of this waste, or transforming waste from its unwanted form into a form that can be used as an intended product is desirable. As Mondi is already busy in the waste recycling campaign, other companies can also adopt Cleaner Technology and be involved in sustaining of our natural resources. The concept promotes the production of the wanted or useful forms of nature as opposed to waste, through material reuse and recycling of waste (Common, 1995:23).

The use of natural resources in the production processes of different companies could result in the degradation of the environment. The emissions from industries can also contribute negatively to the environment. With Cleaner Technology these emissions are

reduced, for example in the case of Mondi, they have bought an incinerator and a scrubber that will treat the emissions before gases are released to the atmosphere and hence reduce pollution. This will also improve the quality of our environment. At the same time we can sustain our natural resources through these types of activities or responsible behaviour.

(iv) Accreditation or Certification

Cleaner Technology has largely been driven by the certification of forests and timber products. The certification of these products emerged during the 1990's as an environmental initiative to halt the destruction of the world's forests. Certification encompasses an independent regular assessment of an organization's forest management practices to measure compliance with a range of internationally recognized social, economic and environmental standards.

Certification provides the consumers with the assurance that the timber products they buy, originate from a well managed forests. The better the management of the forests is, the higher the quality of the trees from that forest. In return, the higher the quality of trees from that forest is, the better quality of the timber products from those trees or forest (Van Zyl, 2001:14).

Certification increases the possibility of trading internationally since FSC is an international accreditation system. This is a benefit on its own as increased exports reflect positively on the company's income. More sales and more profits, just through good environmental management. The regulation of Cleaner Technology will hence assist a lot of companies to compete internationally and enable the government to deal with environmental problems generated by industries.

4. THE NEED FOR GOVERNMENT REGULATIONS ON CLEANER TECHNOLOGY

South Africa is currently in a transitional phase of individual history where companies are still inexperienced in dealing creatively with environmental issues (Van der Linde and Porter, 2002:99). In the last six years, South Africa's environmental policies have been reviewed and redrafted. Van der Linde and Porter (2002) argue that the knowledge about environmental impacts is still rudimentary in many companies, elevating uncertainty about innovation benefits.

Customers are also unaware of the costs of resource inefficiency in the packaging they discard, the scrap value they forego and the disposal costs they bear. Rather than attempting to innovate in every direction at once, companies in fact made choices based on how they perceive their competitive situation and the world around them (Van der Linde and Porter, 2002:99).

In such a context, there is a need for government to be more involved and create a more detailed regulatory framework. In such a world, regulation can be an important influence on the direction of innovation. According to Van der Linde and Porter (2002:99), properly crafted environmental regulation can serve at least the following six purposes. I will briefly discuss these below as they can also serve as a recommendation for improving environmental management within industries.

First, regulation signals companies about likely resource inefficiencies and potential technological improvements. Companies are still inexperienced in measuring their discharge, understanding the full costs of incomplete utilization of resources and toxicity, and conceiving new approaches to minimize wastes, discharges and eliminate hazardous substances. Regulation rivets attention on this area of innovation (Van der Linde and Porter, 2002:99). As Lukes have defined power in part one of this thesis, government has that power to influence the regulations taken in the country. The same can happen with Cleaner Technology.

Second is raising public awareness. Regulation focused on information gathering can achieve many benefits by raising cooperate awareness (Van der Linde and Porter, 2002:100). For example, in the United States of America, toxic release inventories are published annually as part of the 1986 Superfund re-authorization requirement, more than 20 000 manufacturing plants are to report their releases of some 320 toxic chemicals. Under the provisions of the Compensation and Liability Act, companies must report potential toxic spills and releases greater than a clearly defined minimum (Welford, 2002:3).

This kind of reporting can also be applied in South Africa. The information gathered can help inform the state about the environmental situation in the country. Such information, argues Van der Linde and Porter (2002), often leads to environmental improvement without mandating pollution reduction, sometimes even at lower costs (Van der Linde and Porter, 2002:100).

Third is the reduction of uncertainty on South Africa's ability to handle environmental issues. Regulation can reduce the uncertainty of industry that the investments that they have made to improve environmental management will be valuable. Greater regulatory certainty encourages investment by any company (Van der Linde and Porter, 2002:100). The reduction of uncertainty can even contribute positively to the economy of the country. Many foreign investors would like to invest in a country where there is proper and predictable regulation to be followed. On the other hand the absence of regulation can attract those companies who would like to exploit the environment in the countries where environmental legislation is weak, or allow them to use outdated environmentally harmful technologies.

Fourth is the creation of pressure for innovation among industries and communities that are involved in Cleaner Technology campaigns. Regulation creates peer pressure amongst industries and this in turn can motivate innovation and lowering of price. Van der Linde and Porter's broader research on competitiveness highlights the important role of creating pressure in the innovation process, to overcome organizational inertia,

fostering pro-active thinking and mitigate agency problems (Van der Linde and Porter, 2002:100).

Economists are used to the argument that pressure for innovation can come from strong competitors, demanding customers or rising prices of raw materials. Van der Linde and Porter (2002:100) argue that properly crafted regulation can provide such pressure.

Fifth is creating an opportunistic gain position. Regulation could level the traditional playing field by forcing every company to comply with legislation and benefiting from the adoption of Cleaner Technology. No harmful competition but instead, companies work together in complying with legislation while at the same time benefiting from using technologies which are environmentally friendly. Van der Linde and Porter (2002:100) argue that regulation provides a buffer until new technologies become proven and learning effects reduces their costs.

Sixth is the improving of environmental quality through regulation. This is needed in the case of incomplete offsets. Van der Linde and Porter (2002:100) readily argue that innovation cannot always completely offset the costs of compliance, especially in the short-term before learning can reduce the costs of innovation-based solutions. In such cases, regulation will be necessary to improve environmental quality (Van der Linde and Porter, 2002:100).

Government might also like to reward companies like Mondi which have already adopted Cleaner Technology. This can encourage other companies to do the same and government can put Cleaner Technology into a legislation so that all companies can adopt Cleaner Technology. If Cleaner Technology can be put into legislation, companies will be forced to comply as opposed to the current situation where adopting Cleaner Technology is a voluntary exercise. Companies like Mondi deserve some form of recognition in what they are doing because it has a potential of being a legislation and they are doing it voluntarily.

5. CONCLUSION

In conclusion the results from the research addresses the objectives of the study as outlined in the Part IIB. Firstly, Mondi knows about Cleaner Technology. Secondly, they are doing something to show that they want to follow the efficient production techniques. Thirdly, it was also clear that there is no monetary incentive that they are getting from government for adopting Cleaner Technology. Lastly, government should look into the possibility of putting Cleaner Technology into legislation, recognize companies who adopt Cleaner Technology and also monitor the compliance to Cleaner Technology legislation, if it can be developed.

What also came out clearly in Part IIB is that companies like Mondi adopt Cleaner Technology Through their own will. There is no enforcement of Cleaner Technology as yet, hence companies who adopt it do it through their own will. This is a good start for government to start introducing it, because it can be easily monitored if it is government controlled. Companies will be forced to comply with Cleaner Technology regulations or policies.

Educating the public on the right to a clean and healthy environment is one way to ensure that people insist on the kind of environment they live in. This education should start in primary school, where children can learn to take pride in and for living in a clean neighbourhood and a healthy environment. Education can reduce some of the problems which arise from poor environmental management as the cases explained in part II A of this thesis. This is because companies who adopt Cleaner Technology can also improve their housekeeping.

Through workshops, conferences, seminars, and formal education, the attitude towards the environment might change. Educational campaigns can make people aware of waste reduction, re-use, recycling and the adoption of proper ways of disposing waste. This knowledge in turn, can empower people to hold industries accountable and to enforce Cleaner Technology onto industry. Cleaner Technology can be introduced to any society

through educating people about the need, significance and better ways for waste reduction.

One of the most important structures prescribed by the constitution to achieve integrated and sustainable environmental management, is co-operative governance. The Preamble of the Act provides explicitly for the provision of co-operative governance by means of principles for decision-making on matters affecting the environment. The National Environmental Management Act also talks about co-operative environmental governance as an approach to manage and sustain our natural resources.

Cleaner Technology is a means to improve industry efficiency and protecting the environment. It is equally an effective device for complying with the complex array of rules, policies and regulations designed to protect the environment, as it has been discussed in Part I of this thesis. These policies include the requirements for international adherence to international conventions. Industry and countries which embrace Cleaner Technology will find that, in so doing, they automatically fulfil many of their international obligations to the environment.

There are three important steps involved in establishing the necessary preconditions for a Cleaner Technology programme:
One, is the establishment of a shared vision and consensus about the best way forward as far as environmental management is concerned.
Two, is understanding and assessing the existing systems, so that areas and sectors requiring change in behaviour or operation can be identified.
Three, is moving forward from assessment to implementation of the initial version step by step, through the use of pilot projects and similar small scale technologies.

Both government and industries need to have a clear understanding of how their existing systems works in relation to Cleaner Technology and if there are obstacles to its implementation. These obstacles will have to be addressed. Obstacles may be

conceptual or knowledge related, organizational, technical (or related to techniques used), and / or economic (related to financing the implementation process).

The presence of the large number of environmental problems associated with industrial pollution, complaints from communities affected by these and the decrease in the country's natural resources signal for a need for change.

In a developing country like South Africa, the government needs to introduce policies that will allow development to take place, but at the same time ensure the sustainability of our natural resources. In an attempt to do this, Cleaner Technology encourages the change in behaviour. As the Mondi case study highlighted, this can be done through product modification, input substitution, technology modification, good housekeeping and re-use and re-cycling. Any combination of these strategies can be used at any given time and place, the important thing is the way they are applied.

In order to apply the above strategies, the company needs to have an interest and see a need for committing itself to such an activity. The above strategies for Cleaner Technology can be effective if the knowledge, techniques, products, and economic aspects of an organization are effective. This means that it is the organization that will see a need for change and the direction for such change in order to maintain its activities while complying with environmental legislation.

The introduction of Cleaner Technology into a company's environmental management plans can assist a company to produce clean and more efficiently, with less damage to the environment and at the same time lead to an increase in customers through competitive advantage. Industry in South Africa still has a long way to go in order to sustain our environment.

The constitution has laid the foundation for co-operative governance in which democratic norms and values such as, openness, transparency, public representation and participation, and accountability play a crucial role. The National Environmental

Management Act has been at the forefront of constitutional reform in environmental affairs. It is therefore not surprising that co-operative governance has received a pivotal place in protecting the environment.

Hence, I believe that in National, Provincial and Local government, the success of the government in policy implementation will in addition to enforcement, require the introduction of incentives as a way of recognition and appreciation. Financial incentives are currently being used by many countries and are increasing employment and income (Robins *et al,* 2001:129). This is because people tend to work hard in collecting the recyclable material and taking it to the recycling companies and as a result they get some income.

The use of the incentive system have shown to enhance staff productivity as individual staff members like to do well when he is free to work and make decisions pertaining to his work. It have been said that "let individuals make their own decisions, thus enhancing freedom and voluntarism and yet (under the right circumstances) achieves desired goals at the lowest possible cost to society" (Anderson, 1997:257).

While I have argued that industries which successfully implement Cleaner Technology should be rewarded, those who do not should be punished. The South African government can look at the possibility of taxing companies for all negative environmental impacts. Until recently, the literature on environmental taxes has ignored the revenue arising from their use (Common, 1995:233). I also like to share the same sentiments as Common, that the use of environmental tax is another option which the government can look at in order to minimize pollution. These will not displace the need for conduction environmental impact assessments (EIAs), it is actually through EIAs that these taxes can be determined. Related to this is that companies who produce clean can qualify for tax rebates.

In conclusion, Cleaner Technology is a continuous process, it is the continual evaluation and improvement of the processes which minimises waste production while the quality of products improve. If companies adopt Cleaner Technology, they will simultaneously be

in better position to implement and comply with environmental policy. It is not only industry that will benefit but the community at large since there will be reduced emissions and the effluents discharged into the river will be much less and will further decrease with time, as the processes continue to improve.

At the end of the Poverty Hearings on the Environment held in 1998 throughout South Africa, one of the commissioners, Mr Barney Pityana, argued that the hearings emphasized that there is an inter-linkage between issues of the environment, health, jobs, economic development, and how all of these things go towards improving the quality of lives of people (Sunday Independent, 10 October 1999).

However, in a country like South Africa where there is a high need for development and jobs, the environment often takes a back seat. Only when people fall ill does the choice between a clean, healthy environment and a job become a less difficult one to make. However poverty alleviation and a healthy environment are not mutually incompatible. Public awareness campaigns can help in educating people about the need and the advantages of living in a clean environment.

Government would be wise to invest some time and resources into Cleaner Technology. Through a clear awareness building campaign and continuous financial support (such as the Technology Transfer Guarantee Fund), it can make positive steps towards environmental policy implementation and highlight the advantages that Cleaner Technology holds for industry and society alike.

The adoption and the implementation of Cleaner Technology is voluntary at the moment. Mondi adopted Cleaner Technology out of their will. This makes it necessary for the South African government to recognise those companies who know about Cleaner Technology. In addition to knowing about Cleaner Technology companies should aim at adopting Cleaner Technology and produce clean products through using better production techniques.

BIBLIOGRAPHY

Primary Sources:

Gafoor, R 2002. Senior Environmental Co-ordinator at Mondi Paper, e-mail to K. S. Mokoena (author). 5 Nov.

Gafoor, R 2002. Senior Environmental Co-ordinator at Mondi Paper, Returned questionnaire to K. S. Mokoena (author). 8 Nov.

Gafoor, R. 2003. Senior Environmental Co-ordinator at Mondi Paper, Interviewed by K.S. Mokoena (author). Durban, 14 Aug.

Naylor, G. 2003. Environmental Manager at Mondi Paper, Interviewed by K.S. Mokoena (author). Durban, 14 Aug.

Ninela, P. 2002. Environmental Co-ordinator at Mondi Paper, e-mail to K. S. Mokoena (author). 5 Nov.

Ninela, P. 2002. Environmental Co-ordinator at Mondi Paper, Returned questionnaire to K. S. Mokoena (author). 8 Nov.

Ninela, P. 2003. Environmental Co-ordinator at Mondi Paper, Conversation and interviewed by K. S. Mokoena (author). Durban, 14 Aug.

Pott, R. M. 2002. Provincial Environmental Manager at Mondi Forests. Conversation, questionnaire and interviewed by K. S. Mokoena (author). Pietermaritzburg 24 Sept.

Secondary Sources:

Anderson, J. E. 1984. *Public Policy Making: An Introduction.* Boston: Houghton Mifflin Company.

Babbie, E. 2002. *The Basics of Social Research, 2nd ed.* USA. New York: Wadworths Group.

Christie, I; Rolfe, H. and Legard, R. 1995. *Cleaner Production in Industry: Integrating Business Goals and Environmental Management.* London: Policy Study Institute (PSI).

Cock, J and Koch, E (eds) 1991. *Going Green: People, Politics and the Environment in South Africa.* Oxford: Oxford University Press.

Common, M. 1995. *Sustainability and Policy: Limits to Economics.* New York: Cambridge University Press.

Diamond, L. 1999. *Developing Democracy: Toward Consolidation.* Baltimore: The John Hopkins University Press.

Dommen, E. 1993. *Fair Principles for Sustainable Development: Essays on Environmental Policy and Developing Countries*. USA, Vermont: Edward Elgar Publishing Ltd.

Doyle, T. and McEathern, D. 1998. *Environment and Politics: Routledge Introductions to Environment Series.* London: Routledge.

Duchin, F. and Lange, G. 1994. *The Future of the Environment: Ecological Economics and Technical Change.* New York: Oxford University Press.

Grindle, M.S. 1997. *Getting Good Government: Capacity Building in the Public Sectors of Developing Countries.* Harvard University Press.

Hallows, D (ed)1993. *Hidden Faces-Environment, Development, Justice: South Africa and the Global Context.* Pietermaritzburg: Earthlife Africa.

Hempel, L. C. 1996. *Environmental Governance: The global challenge.* Washington, D.C. Island Press.

Hillary, R. 1997. *Environmental Management Systems and Cleaner Production.* USA, New York, John Wiley & Sons, Inc.

John, P. 1998. *Analysing Public Policy.* London: Pinter.

Kingdon, J. W. 1995. *Agendas, Alternatives, and Public Policies.* New York: Harper Collins College Publishers.

Klingmann, H. and Goodin, R. E. 1996. *A New Handbook of Political Science (eds).* Oxford: Oxford University Press.

Long, F.J. and Arnold, M. B. 1995. *The Power of Environmental Partnerships.* USA, Toronto: The Dryden Press.

Lukes, S. 1974. *Power: A Radical View.* London: The MacMillan Press LTD.

Mouton, E.B.J. and Babbie, E. 2001. *The Practice of Social Research.* South Africa. Cape Town: Oxford University Press.

Mouton, J. 2001. *How to Succeed in Your Masters and Doctoral Studies.* Pretoria: Van Schaik.

Parsons, W. 1995. *Public Policy: An Introduction to the Theory and Practice of Policy Analysis.* UK, Aldershot: Edward Elgar Publishing Company.

Pressman, J. and Wildavsky, A. 1987. *Implementation*. Berkeley, University of California Press.

Princen, T. and Finger, M. 1994. *Environmental NGO's in World Politics: Linking the Local and the Global.* London: Routledge.

Riker, H.W. 1993. *Agenda Formation.* USA, Michigan: The University of Michigan.

Rhodes, R.A.W. 1997. *Understanding Governance: Policy Networks, Governance, Reflexivity and Accountability.* Buckingham: Open University Press.

Roe, E. 1994. *Narrative Policy Analysis: Theory and Practice.* Durham: Duke University Press.

Sayre, D. 1995. *Inside ISO 14000: The Competitive Advantage of Environmental Management.* USA, Florida, Delray Beach; St. Lucie Press.

Smith, M. J. 1993. *Pressure, Power and Policy: State Autonomy and Policy Networks in Britain and the United States.* New York: Harvester Wheatsheaf.

Terre Blanche, M. and Durrheim, K. (eds) 1999. *Research in Practice: Applied Methods for the Social Sciences.* Cape Town: Cape Town University Press.

Turner, M. and Hulme, D. 1997. *Governance, Administration and Development: Making the State.* London: MacMillan Press LTD.

Journal Articles

Bray, Elmene 1999. Focus on the National Environmental Management Act: Co-operative Governance in the Context of the National Environmental Management Act 107 of 1998. *South African Journal of Environmental Law and Policy* 6:1-12.

Deere, D. R. and Welch, F. 2002. Inequality, Incentives and Opportunity. *Social Philosophy and Policy Foundation* 84-109.

Eckersley, R 1988. 'The Road To Ecotopia? Socialism vs Environmentalism'. *The Ecologist* 18(4/5):142 – 147.

Gregory, R. McDaniels, T. and Fields, D. 2001. Decision Aiding, Not Dispute Resolution: Creating insights through structured environmental decisions. *Journal of Policy Analysis and Management* 20(3):415-432.

Henry, G. T. and Rubenstein, R. 2002. Paying for Grades: Impact of Merit-Based Financial Aid on Educational Quality. *Journal of Policy Analysis and Management* 21(1):93-109.

Kahn, M.E. 2002. Demographic Change and the Demand for Environmental Regulation. *Journal of Policy Analysis and Management* 21(1):45-62.

Quinlan, T. 1992. "The Rainbow Alliance; Populist Limitations of South Africa's 'Green' Movement". *Transformation* 17:87-101.

Remmen, A. 2001. Greening of Danish Industry-Changes in Concepts and Policies. *Technologies Analysis and Strategic Management* 13(1): 52-69.

Robins, P. K.; Michalopoulos, C. and Pan, E. 2000. Financial Incentives and Welfare Reform in the United States. *Journal of Policy Analysis and Management* 20(1):129-149.

Special Issues on Sustainable Development 2002. *OPTIMA* 48(Sep):1.

Sunday Independent 10 October 1999.

Unpublished Works

Barton, J. R. and Lynch, P. R. 2002. Mondi Paper Environmental Policy. Mondi Paper Publication.

South Africa, Department of Environmental Affairs and Tourism: Directorate, Environment Information and Reporting, October 1999. State of the Environment - South Africa: Response to Change National State of the Environment Report - South Africa. How are We Responding to Environmental Change, and Is It Effective?

South Africa, Department of Environmental Affairs and Tourism, June 2002. Environmental Management Co-operation Agreements: A Guide for their Design and Use.

Dune, N. 2000. The Impact of Environmental Certification on the South African Forest Products Supply Chain; Report 29: Industrial Restructuring Project, School of Development Studies. (Incorporating CSDS), University of Natal; Durban, South Africa.

Hadebe, T. 2001. Issues Arising from the Implementation of Language Policy in Historically Disadvantaged Schools in Greater Pietermaritzburg: A policy analysis. Pietermariztburg: University of Natal.

Moore, P. 2001. Founder Member Of Greenpeace in Van Zyl, A. 2001. Our Roots Are in Your Future. Mondi Forests Publication.

National Environmental Management Act (NEMA) Act 108 of 1998.

Rock, M. 1998. United States - Asia Environmental Production: A Policy Menu for Cleaner Production.

Smink, C. K. 1999. Reforming Environmental Regulation: New Ways to Accomplish Industrial Appropriation of Pollution Prevention. 1 in Industry and Environment in South Africa: Environment management and development in an intercultural context, Sacude course readings 2002.

Thompson, A. and Hosuel 1999. Mondi Forests Environmental Policy. Mondi Forests Publication.

Thrane, M. 1997. Traineeship Report: Cleaner Technology in Caster Rico, Aalborg University Denmark, in Industry and Environment in South Africa: Environment management and development in an intercultural context, Sacude course readings 2002.

Van Berkel, C. W. M. 1999. Cleaner Production: A profitable road for sustainable development of Australian Industry.

Van Zyl, A. 2001. Our Roots Are in Your Future. Mondi Forests Publication.

Internet Websites

http://www.bhpbilliton.com/bb/SustainableDevelopment/environment/environmentalissues.jsp

http://www.caudit.edu.au/ centre/jc/jcii/research/ cpu/cp_canov1999.htm

http://www.ingwe.co.za/home.htm/

http://www.eu.org

http:///www.mondipaper.co.za

http://www.mondi.co.za/timber

http://www.ngo.grida.no./soesa/nsoer/response/general/

http://www.usaep.org/policy/rock4.htm