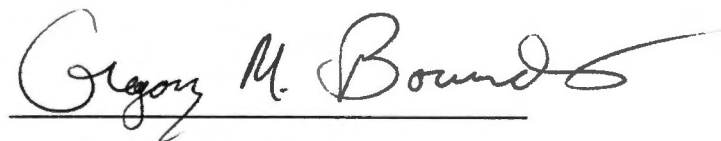


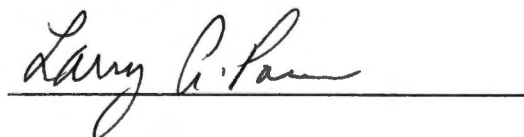
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ENVIRONMENTAL ANALYSIS OF HARDWOOD SAWMILLS
A SEGMENT OF THE
HARDWOOD FOREST PRODUCTS INDUSTRY

A Thesis
Presented for the
Master of Science
Degree
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ABSTRACT

Hardwood sawmills represent a primary manufacturing segment of the hardwood forest products industry. Each mill exists within and is dependent on its external business environment. The external environment is where the sawmill obtains inputs, deliver outputs and acquires information.

The purpose of this research was to explore important factors and recent changes in the hardwood sawmill external environment. The external business environment cannot be studied directly. It can, however, be viewed indirectly with the help of managerial perceptions relevant to the external environment and other pertinent information. The objectives of the study were to:

- 1) Identify the sectors in the operating and general sections of the external environment which are important as perceived by hardwood sawmill managers,
- 2) Identify which of those sectors are perceived by managers as variable, and
- 3) Document changes within the mills.

This paper presents the results of an exploratory study of the hardwood sawmill external environment in the language of general systems theory. The study consisted of a review of 879 journal articles and telephone interviews with 21 sawmill managers. A description of the external environment is developed and a typology is advanced.

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THE OAK IN WINTER (*Rossmäslar*).

CHAPTER I

INTRODUCTION

Hardwood sawmills represent a primary manufacturing segment of the hardwood forest products industry. Like all organizations hardwood sawmills are connected to a limitless constellation of inputs, outputs, and issues known as the external business environment.

The external environment is where mills obtain primary resources (logs from private woodlots and National Forests) and deliver relatively undifferentiated products (timber, lumber, cants, etc.) to secondary manufacturers (Cassens and Banks 1989; Daft and Steers 1986). This relationship makes the success of hardwood sawmills, as it is for all organizations, dependent on the external business environment (Narchal, Kittappa and Bhattacharya 1987).

The hardwood sawmill external environment is more than just physical resources and products. It is a field of information that exists beyond the sawmill's formal boundary (Hills and Cravens 1975). This informational environment is where managers unveil opportunities and threats which impact their firm's success (Ansoff 1975).

THE SITUATION

Factors are changing in the hardwood sawmill external environment. Change affects markets and may be as large in scope as the global marketplace. For example, in 1992 the European Community (EC) is scheduled to be fully active. The recent decay in communist party influence has prompted the EC to considering the inclusion of Hungary, Poland and East Germany as associate members. Will the EC be cooperative in market development for hardwood forest products?

External environmental changes also affect the availability of raw material resources at the national, regional and local mill level. Ecological environmental special interest groups are beginning to have an impact on timber prices, which may affect the success of hardwood sawmills, by reducing the amount of land open for timber production. Raw material resources are also being made scarce due to increasing intra-industry competition for timber which is suitable for hardwood pulp and composition products, hardwood lumber and dimensional products.

EXPLORATORY RESEARCH

To achieve and maintain organizational success hardwood sawmills, like all organizations, must adapt to external environmental changes. Adapting effectively necessitates that managers are cognizant of their external environment (Thompson 1967). The ultimate purpose of this research is to help hardwood sawmill managers better comprehend their external environment by providing them with a tool for viewing it. To accomplish this, an exploratory analysis of the hardwood sawmill external business environment was conducted. Environmental analysis includes scanning for important environmental information and presenting that information in a structured manner to decision makers (Wilson 1983). The objectives of the research were:

1. Identify the sectors in the operating and general sections of the external environment which are important as perceived by hardwood sawmill managers,
2. Identify which of those sectors managers perceive as variable, and
3. Document changes within the mills.

Secondary scanning information was derived from two trade journals and other papers relevant to hardwood sawmills. Scanning the hardwood sawmill external environment for primary information was conducted via a telephone canvass. In this survey, the perceptions of sawmill managers about their external environment was sought.

Data gathered from the exploratory environmental scan was structured using general systems theory and resulted in an initial definition and typology of the hardwood sawmill external business environment. The usefulness of an environmental typology is, as Jurkovich (1974) states:

...an analytical tool that may be applied as an instrument to stimulate thinking on alternative directions in which decision makers can move their organization (p.380).

A generic external business environment is explained in Chapter II. This explication is necessary for the logical flow of the paper as it provides a standard method for comprehending the external environment. Also in Chapter II the meaning of resistant and nonresistant organizational systems is presented.

The body of the survey methods and results are covered in Chapter III. Additional survey information can be found in the Appendix. The hardwood sawmill external environment is introduced in Chapter IV. Summary and recommendations are presented in Chapter V.

CHAPTER II

THE GENERIC BUSINESS ENVIRONMENT

GENERAL SYSTEMS THEORY

General systems theory is a useful tool for understanding the general business environment of organizations. This theory is based on the concept of internal and external business environments. Inputs and outputs are obtained from and delivered to the external environment.

Processing of the inputs takes place in the internal environment of the organization. An illustration of this standard concept is presented in Figure I.

In Figure I the organization is represented by the solid line rectangle labeled the Internal Environment. The solid line embodies the firm by delineating its internal boundaries (Aldrich 1979). Management concerns of the internal environment include establishing efficiency and organizational effectiveness criteria and the differentiation and integration of business functions. In this paper the activities of the internal environment are not emphasized as the purpose of the study was to focus on the external environment.

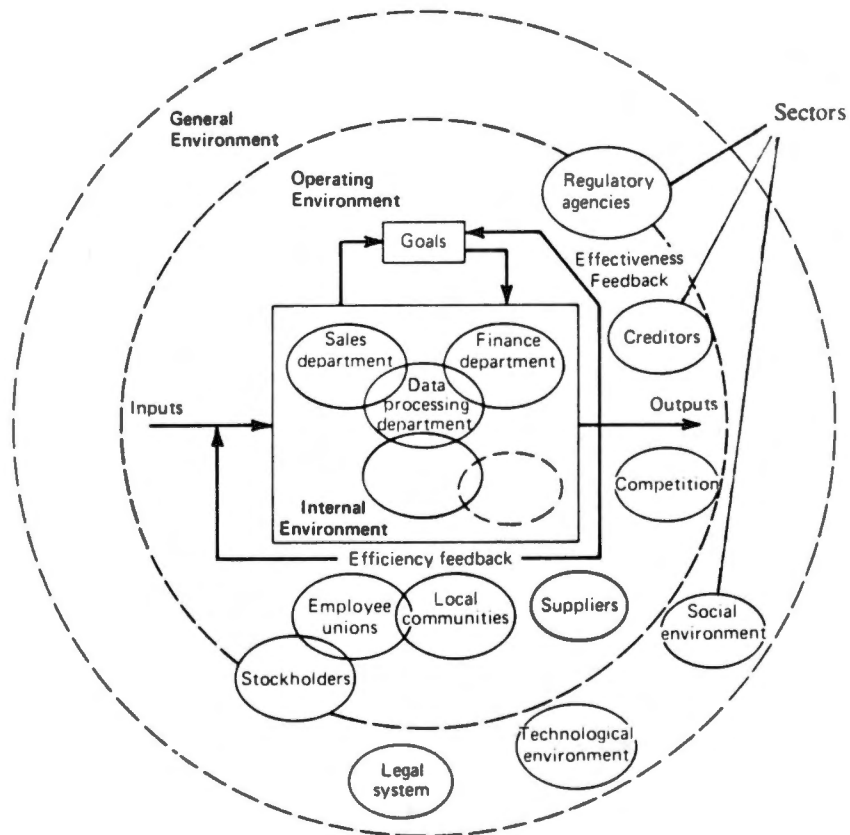


Figure I. The Organizational Business Environment

Source: Adapted from
 Cleland, D.I. and King, W.R. 1983.
 McGraw-Hill Series in Management p.23

Sector Influence

The external environment is a limitless physical and informational field beyond the internal boundary of the firm. This environment, for discussion purposes, is sectioned into two components, the operating and the general. The division is based on the dynamic influence of sectors. In Figure I the operating and general sections of the environment are encompassed by dashed circles; sectors are illustrated with solid line ovals and are labeled competition, suppliers, social environment, etcetera.

Sectors are formal and informal organizations of people who have the capability of affecting or of being affected by the actions of the firm (Terry 1977). These influences between the firm and sectors are either indirect, the general environment, or direct, the operating environment (Donnelly, Gibson and Ivancevich 1987; Thomas 1974). The indirect and direct nature of sector influence is readily apparent using the technological and competition sectors as an example.

The technological sector (an indirect sector in the general environment, Figure I) in this case is a trade association which has tasked itself with the development of a more efficient process for manufacturing a specific good. The trade association, after developing the new process, makes the technology available to the firm. The firm implements the new process, manufactures the product and delivers it to market at a price less than its competition. In this scenario, the trade association indirectly affects the success of the firm by providing a competitive advantage in the form of a new process. The firm directly affects its own success by manufacturing the competitive advantage into the good and delivering it to the market sector of the operating environment.

Environmental Change

The sectors making up the two external environments may not be the same for organizations in the same industry. A firm may have its own R&D department. This would place some aspects of the technological sector in that firm's operating environment as the department provides the means of directly affecting technology.

In addition, sectors for any organization are not constant during the life of the organization. These two variations make necessary the dashed circles encompassing the two external environments in Figure I (Neubauer and Solomon 1977).

Referring back to the technological example, the firm utilized a new technology (indirect) which resulted in a cost competitive product (direct). Most products, however, have a limited life span in the marketplace. A new product will lose its share of the market if the technology to produce it efficiently is available to competing firms, or consumer demand decreases ceteris paribus. This decline in product market share implies that the sectors in the environment are changing. For an organization to remain successful in a changing environment it must keep searching for new opportunities in the form of inputs (e.g., contracting skilled labor and purchasing needed raw materials at a cost below the competition) and improvements in the manufacturing process.

Remaining successful under varying environmental conditions, however, is not simply dependent on the firm's ability to competitively conduct a system of processing inputs into outputs; it also depends on the

firm's degree of alignment with all sectors in the external environment.

Environmental alignment helps the firm avoid friction between itself and sectors in its external environment such as legal, regulatory, social or the stockholders. Issues from these sectors include ecological environmental degradation, product quality standards, workers rights and return on investment. The overall ability of an organization to become and remain successful in a changing external environment depends largely on the firms degree of openness to information in the external environment and its willingness to make changes in the methods by which it does business.

INFORMATION ENVIRONMENT

General systems theory recognizes information as another environment which forms the linkage between the organization and the physical input/output external environment (Katz and Kahn 1971). This informational environment contains social issues, trends, expectations and other data which managers require to align their organization and guide it into the future (Dill 1958; Wilson 1983).

The informational environments of almost all U.S. industry has become increasingly uncertain and unstable (McLintock 1987; Wilson 1983). Organizational flexibility and adaption is the key to survival under these conditions (Cameron and Whetten, 1988).

Being flexible first requires that managers remain open to current environmental information (Thompson 1967; Wilson 1983). Unfortunately, in the midst of an evolving environment, many organizations refuse to incorporate new information and resist change (Ackoff and Emery 1972). Change, however, is ubiquitous. The following quote by Ervin Laszlo (1987) relates some of the changes which have occurred in dominate scientific theories. These modifications are analogous to the adjustments which must take place in legal corporate entities as new information is made available.

Systems scientific and philosophic...come and go. Each method of limited understanding is at length exhausted. In its prime each system is a triumphant success: in its decay it is an obstructive nuisance. [This] dictum is true of the systems and methods of the contemporary sciences. The triumphant success of the Newtonian system became an obstructive nuisance at the beginning of the century when Einstein's theory fought for acceptance, Darwin's synthetic theory remained an obstruction in the way of newer, more adequate theories of species evolution in the 1970s, and the positivistic

conception of history remains an obstacle in the way of sustained attempts to inquire into patterns in the evolution of societies still today (p.9).

Over time companies institutionalize procedures for how they will conduct business. These governing methods provide managers with excellent control over various organizational affairs; however, if these standard operating procedures are not adjusted to a dynamic external business environment then the organization will be misaligned and destined for obsolescence.

Formal management literature is replete with articles on why and how organizations should remain open to their external environment. In this section the focus is on why organizations refuse to evaluate their information environment and instead choose to follow antiquated management plans that invite organizational decline.

Resistant Systems

No organization resists all of the information coming from its dynamic external environment. The degree of resistance is dependant on the managers' cognitive structures (Jones and Twiss 1978). The human cognitive

structure as defined by Santrock (1986) is how we, "process information through mental processes such as attention, perception, memory, thinking, problem solving, imagery, and the like." The managers' cognitive structures as Nystrom and Starbuck (1988) have written:

...manifest themselves in perceptual frameworks, expectations, world views, plans, goals, sagas, stories, myths, rituals, symbols, jokes, and jargon. Not only do top managers' cognitive structures shape their own actions, they strongly influence their organizations' actions (p.325).

A company is composed of and held together by its managers, therefore, the future of the company is dependent on the managers' outlook on the business world.

Information is the root of managerial perceptions. The managers' cognitive structures are formed initially from experience gained from interaction with the external environment. In a young organization the manager is scrambling for all relevant information that will help build competitive advantages for the firm. This information includes data from sectors of the environment concerning consumer expectations and trends, market opportunities and constraints, which inputs will be used, how the throughput process will be performed, and how to

sell the outputs of the process. If this information is deemed useful, and is indeed successful, then it will be transformed into a kind of business knowledge that organizational theorists call business conduct, or standard operating procedures (Cyert and Marsh 1963). Formalization of procedures is what keeps the organization stable, where stability is defined as those characteristics of a system which after a small disturbance return that system to its original state.

After standard operating procedures are established little additional information is needed, consequently the focus of information gathering channels becomes limited. This reduction decreases or ceases the organization's ability to acquire new information and thus knowledge about its environment (Argyris and Schon 1978). Information which is now collected is that data which reconfirms the appropriateness of established operating controls. If the organization exists in a stable environment then a reduction in the flow of information is appropriate and cost effective as standard procedures are in place and the need for new information is negligible (Bennis 1966); however, if the environment is dynamic and change is occurring then as Kahalas (1977) notes this 'codification' of incoming information becomes

a barrier and serves to separate the organization from its environment.

The progress of an organization from flexible to rigid information gathering method as dependent on the managers' cognitive structures and has come to be known as organizational learning (Hedberg 1981). Organizational learning is a perceptual journey. Cameron and Whetten (1988) have derived a process which describes a company's progress along the organization's learning path. The first three stages of their model include:

...an entrepreneurial stage (early innovation, niche formation, creativity), a collectivity stage (high cohesion, commitment), [and] a formalization and control stage (stability and institutionalization) (p.51).

Organizational decline begins when the information which was gathered in the entrepreneurial and collectivity stages becomes antiquated, as a consequence business decisions in the formalization and control stage are faulty (Massie 1987). New technologies have come on the scene, competition is heating up, the organization is loosing market share, the customers are demanding greater value and diversity from the organization's products and services. Previous methods of doing business are no

longer sufficient to keep the organization effective. The environmental data gathered are limited to preset boundaries, incorrectly focused, overloaded with unfamiliar information, and no longer supportive of the organizations views. In this scenario the organization's external environment has changed significantly but the organization has not.

The dominant managerial effort at this point is to maintaining existing operating procedures. Staw, Sandelands, and Dutton (1988) in their "Threat-Rigidity Thesis" propose that managers in organizations faced with change view their dynamic external environment as a menacing threat. This affront to the manager's cognitive structure is a core problem behind the failure to respond with adaptive measures to environmental change. Managers experiencing the impacts of change on their organization will seek to restrict information processing (i.e., foster a low cognitive structure) and increase their managerial control in an attempt to reconfirm their historical policies, Figure II. The restriction of information and constriction in control are a function of the "cognitive and motivational manifestations of psychological stress, anxiety, and arousal" of the individual.

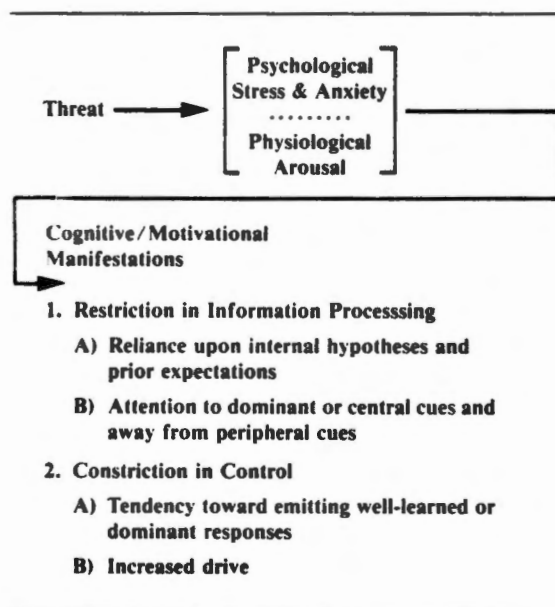


Figure II. Individual Response to Threatening Changes

Source: Adapted from
Staw, B.M. Sandelands, L.E. and Dutton, J.E.
Ballinger Publishing (1988) p.100

In a declining organization these individuals will rely on previous information that lead to past successes. These people, whether top management or hourly employees, "emit dominate, well-learned or habituated responses in threat situations", the scope of their perceptions will become narrower, which, in addition means they will probably not heed the indicators that disaster is imminent (Staw, Sandelands, and Dutton 1988).

As a result the restriction in information, information that would lead to more effective decision making, is increased (Manfred and Miller 1984).

Resistant system managers are naturally reacting to what they perceive as risk inherent with change (Moore and Gergen 1985). Eventually the manifestations of managerial risk aversion may be processed through group dynamics and from the group extended to the organization as a whole. An individual can have an enormous impact on the organization. Take for instance a top level manager who demands more control in a threat situation and thus increases centralization of control, or the individual manager who dominates a group and can only see things his or her way (Hambrick 1981). Staw, Sandelands and Dutton describe the group impact as it occurs:

When a threat has been attributed to an external source....The group will seek consensus and in so doing will generally support the policies or positions of the existing group leadership. Reaching consensus, however, will often entail the restriction of information, ignoring divergent solutions and downplaying the role of deviant positions. Consensus seeking also involves a constriction of control, such that the opinions of the dominant members may prevail and their influence may become more centralized. Such changes in information and control processes may, of course, lead to faulty group decision making (p.108).

As mentioned at the beginning of this section no organizational system is completely resistant to change (Katz and Kahn 1971). A firm may go from birth to death, or reorganize as its environment changes (Prigogine 1984). The essence of a resistant system is that managers perceive information from environmental sectors as constant and, therefore, as parameters for management decisions. With parameterization the organization is a resistant system.

If, however, the sectors are perceived as evolving and new information is gathered on them, then the organization can alter its methods and proceed to change with its dynamic environment thus becoming a nonresistant system organization.

Nonresistant Systems

An organization operating as a nonresistant system is cognizant of the variations in its external environment and is willing to adapt. Before this can happen it is necessary that the managers "unlearn" any unproductive or even harmful knowledge which they had acquired (Hedberg 1980; Nystrom and Starbuck 1988). This means that not only do the organization's people need to release the old knowledge, but they must also allow the more recent and useful information to be transformed into knowledge (Evered and Selman 1988). This is not a painless task, as Pondy and Mitroff (1979) write:

Escaping old assumptions is especially hard when they served us well, when they have provided reliable guidance to our inquiry, and when they have helped us to frame questions that were unanswerable....Creating fresh viewpoints can be equally hard, because it seems to force us to work outside any structure whatsoever (p.4).

This view is quite real and helps create stability within the organization. However, contrast Pondy and Mitroff with Laszlo (1987) and his view of the advent of a new technology:

A major technological breakthrough makes...the abnormal and the unthinkable normal and even commonplace....It challenges people's values and practices and shakes the foundations of established institutions....A technology innovation is not just the invention of a tool, but the stretching of the imagination and the transformation of common sense (p.93).

The degree of nonresistance to environmental information is dependant on the managers' cognitive structures. Here, again beginning with the manager, there must first be the perception of a need for change. This perceptual expansion, for instance, may begin when the organization is in decline. Decline is evident as the organization experiences problems such as losses in productivity and profitability, corporate morale and public image (Moore and Gergen 1988). Hedberg (1980) describes these problems as "triggers" for relearning.

In becoming a nonresistant organization the power of those managers who would have the organization adopt new and more appropriate managerial techniques is greater than those who would choose otherwise. This power, according to Beckhard and Harris (1987) is:

...a critical mass of individuals or groups whose active commitment is necessary to provide the energy for the change to occur. It is impossible to quantify the number of people or the roles necessary to make a critical difference (p.92).

A "critical mass" is composed of individuals termed by Pinchot (1985) as "intrapreneurs", i.e., entrepreneurs within an already established organization. Intrapreneurs interpret the risk of organizational change as consequences which will be incurred by not changing. As Hedberg (1980) writes this type of person should be able to:

...perceive reality in different terms...
redefine their problems, unlearn old behaviors,
and replace them with new responses almost
instantaneously (p.22).

These managers have heeded the incoming danger signals of organizational decline. They will take it upon themselves to reorient the organization and place it in line with its environment.

Reorientation of the organization requires the cooperation of all employees. Alignment with a changing environment will be difficult as it requires the alteration of the organization's culture to one that is

less risk averse (Pinchott 1985). Achieving this alteration may require the dismissal of those managers and employees who refuse or cannot adapt with the new organizational path. Change will also require directing and assisting those who can. For the organizational transition to be successful the intrapreneurs must be what Kanter (1983) has called "change masters". Change masters are the leaders who can manage the uncertainty and risks of organizational change while being able to successfully manage people in the long term. Change masters are responsible for helping these people cope with the perceived risk of change. Managing risk aversion in the work force means improving employee self confidence to a point where it effectively overtops the perception of risk.

Handling uncertainty is a unique talent of great importance which can only be generated by personal commitment, for no amount of information about the past accompanied with probability statements of future conditions can hint at or determine the uncertain future. This unique talent for handling uncertainty is what may be called "entrepreneurial spirit" or what J.M. Keynes concluded was the consequence of "animal spirits" (Davidson 1978). Managing uncertainty is to manage the

unexpected. Managing for the unexpected provides the flexibility which is necessary during the turbulent initial stages of change and the continuing success of the organization.

Managing for an uncertain future is to manage the perceive risk of environmental change to the organization. Here risk is defined as the probability of change not uncertainty. Reducing the risk of organizational change requires that valid information be made available for risk calculations, forecasting, contingency planning and other decision making needs. Valid, current and relevant information is the essence of making correct decisions more times than not (Whetten 1980).

As more correct decisions are made, additional members of the organization will join forces with the core of change masters thus creating a joint effort and resulting in further dissipation of perceived risk (Kanter 1983). With the increase in organizational self confidence the situation within the organization becomes more like an adventure not crises, however, as Waterman (1987) states:

Adventure and risk go together. One man's risk is another's terror, and if the risk is too high, adventure becomes disaster. We don't learn, and we don't renew. Behind the ability to risk has to be a basis for security (p.290).

Reorganization is a continuous event. The incorporation of new information and human resource programs should be designed and redesigned to keep the organization from passing into organizational decline. This implies that the critical mass which provided the energy for the latest reorientation does not hinder the emergence of new ideas.

CHAPTER III

THE EXPLORATORY RESEARCH

OBJECTIVES

General systems theory defines the external environment as that amorphous field where organizations obtain inputs and deliver outputs. A main attribute of this physical organizational-environmental relationship is information. The central purpose of this research was to explore the important and variable sectors of the hardwood sawmill external environment and present it in a clear and easily understood manner using general systems theory.

Exploring the hardwood sawmill external environment consisted of a literature review of industry specific publications and gathering information from hardwood sawmill managers as to their perceptions relevant to important environmental sectors. The research objectives were:

- 1) Identify the sectors in the task and general sections of the total environment which are important as perceived by the managers in the hardwood sawmill industry,

- 2) Identify which of those sectors managers perceive as variable, and
- 3) Document organizational changes.

METHODS

It was assumed that articles published in leading relevant industry journals were indicators of what factors in the external environment are important to sawmill managers. Traditionally this type of secondary review includes end of the year business reports and other documents like U.S. Census of Manufactures, Annual Survey of Manufactures, etc (Kefalas and Schoderbek 1973). Due to the brief research time and the relative scarcity of secondary data specific to hardwood sawmills, only trade journals were classified and tabulated.

The telephone survey was constructed in such a manner as to derive what is important to managers. The meaning of 'important' environmental factors relevant to sawmill managers, however, required qualification. For the purpose of the first two study objectives the term important consisted of a five dimensional perspective incorporating issues which are important relevant to:

- 1) the sawmill manager,
- 2) information acquisition,
- 3) actual or potential opportunities,
- 4) actual or potential problems or threats, and
- 5) external environmental change.

The article review was targeted to objective 1. All objectives, 1 through 3, were addresses in the telephone survey.

Article Review

An article scan was conducted using the two periodicals: Forests Products Journal. 1985-1989. 35-39(1-12); and Forest Industries. 1985-1989. 112-116 (1-12).

Telephone Survey

Questions were structured as open-ended. According to Dillman (1978) open-ended questions:

...give respondents a chance to vent frustrations and strong opinions. They are indispensable for exploratory studies in which the researcher's main purpose is to find the most salient aspects of a topic, perhaps in preparation for developing closed-ended questions for a later survey (p.87).

Questions requested belief information for objectives 1 & 2 and behavior information for objective 3 (Dillman 1978). Open-ended questions generate expansive answers. In this survey the 21 respondents gave 235 responses to the survey questions. The role of the administrator of the survey was to classify the responses into a meaningful and manageable form. The survey responses were tabulated in a manner to show the magnitudes of important sectors based on the percent of responses given for that specific question.

In order to preserve the robustness of the survey responses subsectors were developed. The criteria for subsector classification was based on work by Aguillar (1967) and Kefalas and Schoderbek (1973), and modified to include issues specific to hardwood sawmill managers. Sector and subsector titles are:

Sector: Political

Subsectors: relevant federal, state and local government services and regulatory agencies.

Sector: Economic

Subsectors: mergers, acquisitions, joint ventures, takeovers, the stock and bond markets, GNP, inflation & interest rates, taxes, housing starts and macroeconomic indicators.

Sector: International Markets

Subsectors: foreign investment, exports, market development, exchange rates, imports.

Sector: Technological

Subsectors: new products, new processes (quality control, etc.), licensing, information technology.

Sector: Social Environment

Subsectors: ecological environmental concerns, trends, expectations, demographics.

Sector: Resources

Subsectors: Personnel, capital, raw material (i.e., logs).

Sector: Market

Subsectors: Market potential, value added, purchasing, competition, customers, pricing, sales, costs, distribution.

One alteration to the survey instrument, which was suggested during the pretest, was to reduce the number of response sectors. For survey purposes, therefore, the Social Environment sector, a potentially broad sector, was included in an other(s) category. The other(s) category also provided for the recording of factors for which no previous classification existed.

Questions I-I(c) & II (actual survey questions and a survey response sheet are presented in the appendix) were designed to gather data necessary to help identify what

managers believe are important external environmental factors. Factors were defined as actual or potential impacts from sectors, thus identifying a factor also identified the sector. The term 'area' is synonymous with factor and sector.

Question I, requested that managers: respond with regard to external environmental factors that are important to them based on how that factor impacts the success of their business.

Questions I(a) through I(c) did not reiterate the emphasis on impact to the firm or the factors identified in the answering of that question but instead requested that the respondents answer what is important as dependant on information, opportunities, and problems or threats. The underlying purpose of noniteration is to hopefully obtain some variation in the sectors given as answers based on each dimension of importance. Some variation in the respondents answers should provide data for the analysis of characteristics and magnitudes of important factors; however, even if no variation emerges the first objective would essentially be achieved.

Question II repeated those sectors given as answers to the proceeding questions and requested that the respondents relate which of those were variable. The

question was meant primarily to identify dynamic factors thereby achieving the second research objective.

Question II was also relevant to the first objective. Change in the environment was considered important because it is a source of uncertainty. Therefore, factors identified in Question II made up the fifth dimensional perspective for the identification of important environmental factors.

Question III was an open-ended exploratory behavioral informational question meant to obtain the data necessary to achieve the third research objective.

Survey Test Results and Attributes

The survey instrument was pretested with the help of two University of Tennessee Department of Forestry, Wildlife and Fisheries professors who have a good working knowledge of hardwood sawmills. These individuals played the role of a sawmill manager in a telephone pretest of the survey instrument. After a few adjustments the survey instrument was further tested with one sawmill located in North Carolina, one wholesaler located in Tennessee and one wholesaler located in Wisconsin. No further changes were required.

The full telephone survey was administered with the help of the executive manager of the National Hardwood Lumber Association (NHLA) who generated a list of potential sawmill contacts. Twenty-one sawmill managers participated. Of these ten were presidents, nine vice presidents, one secretary/treasurer and one sales manager.

The study area included 11 states in the U.S. and two Canadian provinces Ontario and Quebec. The U.S. states were, Tennessee, North Carolina, Mississippi, Alabama, Georgia, Virginia, Maryland, Wisconsin, Indiana, Pennsylvania and New York.

Relative size ranking was accomplished using the participating sawmills 5 year average annual capacity in mmbf (million board feet). Sizes ranged from 1 mmbf to 70 mmbf with the average being 22 mmbf.

RESULTS

Article Review

Of the 879 articles classified an overwhelming 89 percent were directed to the technological sector, Table I. At first this may not seem surprising as one of

Table I
 Classification of Journal Articles
 in Percent (n = 879)

Sector	% Articles
Technological	
Transport and mill	81%
Information	8
Market	4
International	2
Resources	1
Economic	1
Political	0.3
Other	
Management	2
Environmentalists	0.7

Total %	100%

these was a technical journal, but the technology addressed in the articles was primarily concerned with transportation and mill machinery. Articles addressing information technology were a scant eight percent of the total.

Restating the assumption that if journal articles are a representation of what sawmill managers perceive as important then the technological sector must be considered an important sector of the hardwood sawmill external environment.

Telephone Survey

Question 1 of the telephone survey asked sawmill managers which external environmental factors, to them, were important to the success of their firm. The twenty-one respondents gave 60 responses, Table II. The resources sector was noted most often, representing thirty-five percent of the responses given. Seventeen percent of the responses pertaining to the resources sector were specifically concerned with the reduced availability of suitable timber (i.e., size, species and grade). Two core problems were attributed to this reduction in supply: competition from timber companies

Table II

Important Sectors Relevant to Sawmill Managers.
Percent of Question Responses (n = 60)

Sector	% Responses	Subsector	% Responses
Resources	35%	Logs	17%
		Labor	13
		Capital	5
Market	30	Sales	8
		Market development	7
		Purchasing	5
		Product development	5
		Pricing	5
Technological	12	New processes for existing products	12
Economic	7	Interest rates	5
		Housing starts	2
International	7	Exchange rates	7
Political	2	Regulations	2
Other	8	Good management	5
		Environmentalists	3
Total %	101% *		101% *

* Error due to rounding

which utilized hardwood chips (this type of input does not require large, clear trees; because of this short rotation periods are being established on hardwood timberland) and ecological environmental special interest group intervention.

Thirteen percent of the resources responses concerned the limited supply of a willing to work and skilled labor force. One core labor problem was the competition for personnel from better paying, unionized pulp and paper companies. Another core problem was the low skill level labor pool in areas where hardwood timber suitable for lumber and dimension products is found (e.g., remote hill and mountain country such as Appalachia).

Of all the question's responses only twelve percent related the technological sector as important. When compared to Table I, there appears a discrepancy between what sectors managers consider important and information published in trade journals. Technology that millers considered important targeted efficiencies in the established production process, for example the utilization of wood that would otherwise be wasted and equipment upgrade.

Question I(a) asked managers what areas (sectors) of the external environment they would like to have better information on. This question explicitly stated to managers that they may respond in any area they would like and that any and all information could be made available. The 21 respondents gave 45 responses to this question. Thirty-eight percent of the responses were addressed to the market sector, Table III. Within this sector 20 percent of the response were oriented toward the potential of markets. Hence, new and expanding markets comprised the most important subsector.

The second most frequently mentioned area subsector was for no additional information as the information currently available was sufficient. The meaning of sufficient is not clear and will require a more in depth survey. A partial definition of what is considered sufficient information was disclosed in a recurring statement by these and other respondents that they already receive good information from associations, universities and trade journals. The dependency on information from these sources, especially the associations, is elaborated on in the final section of this chapter.

Table III

Important Areas of Information.
Percent of Question Responses (n = 45)

Sector	% Responses	Subsector	% Responses
Market	38%	Potential	20%
		Purchasing	7
		Sales	7
		Competition	4
Technological	13	New processes	7
		Yield factors	2
		Grading	2
		Log rules	2
Resources	11	Log availability	7
		Timber management	2
		Capital	2
International	7*	Market potential	4
		Exchange rates	2
Political	4	Regulations	4
Economic	4	Interest rates	4
Other	22	Sufficient info.	16
		Environmentalists	4
		None	2
Total %	99% *		98% *

* Error due to rounding

Question I(b) asked sawmillers to identify areas in the external environment they perceived as opportunities for their firm. This question yielded 45 responses. The responses to this question are additive. An overriding push in the hardwood forest products industry is to enter international markets. This goal is in response to increased demands from overseas markets. Many hardwood sawmillers wish to perform more of the manufacturing process in order to obtain larger profits and not be subject to the fluctuations in a commodity market. As one miller responded, "...this would give the mill a niche to fill." The rest of the responses were spread the other five sectors. Hence, although additional information requested pertained to non-market factors, there is no clear consensus on the type of information needed.

It is assumed that there is a correlation between market opportunities and international opportunities. The growth of the export market in recent years has attributed significantly to the increase in total market growth. Twenty-five percent of the responses identified the international sector as a great opportunity, Table IV.

Table IV

Areas of Opportunities.
Percent of Question Responses (n = 45)

Sector	% Responses	Subsector	% Responses
Market	33%	Finished products	24%
		Strong market	9
Technological	33	New processes	13
		Increased capacity	11
		New Products	7
		Grading standards	2
International	25	Exports	25
Resources	4	Timberland	4
Political	2	Services	2
Economic	0	N/A	0
Other	2	Educate environmentalists	2
Total %	99% *		99% *

* Error due to rounding

To meet increased foreign and domestic demand 33 percent of the responses addressed issues in the technological sector. Thirty-one percent of these responses addressed new processes, for existing products (i.e., efficiency, reduced sticker stain), new products and ways to increase capacity. Twenty-four percent of the responses were directed toward more finished products. One miller stated that he was attempting to enter the wooden bridges market. A market he felt, "...is the future."

The economic sector received no responses. Although many sawmill managers commented that a favorable U.S. economic situation would be good for business, none would specifically identify that sector as an opportunity.

Question I(c) asked sawmill managers what were important external environmental areas as far as problems and threats to their firm. There were 52 responses to this question. The results of this question are closely related. Industries that deal with natural resources have traditionally been subjected to interdiction by environmental special interest groups. The hardwood sawmill industry is no exception. Twenty-three percent of the responses, Table V, identified the reduction in the availability of logs as a major problem

Table V

Areas of Problems/Threats.
Percent of Question Responses (n = 52)

Sector	% Responses	Subsector	% Responses
Resources	35%	Log availability	23%
		Labor	8
		Capital	4
Political	21	Regulations	19
		Trade policy	2
Market	15*	Competition	8
		Low prices	4
		Purchasing	2
		Distribution	2
Economic	6	Interest rates	4
		Uncertainty	2
International	4	Trade barriers	2
		Exchange rates	2
Technological	2	Process problems	2
Other	17	Environmentalists	15
		Bad management	2
Total %	100%		101% *

* Error due to rounding

for their mill. Nineteen percent of the responses attributed this reduction to political regulations on harvest. Fifteen percent of the responses attributes the political regulations to environmental special interest groups.

Many sawmillers who responded in the survey believed that a core problem with environmentalist concerns stem from the public's perception of the industry as a land raping, inefficient backwoods operation. Millers feel that they are ecologically environmentally conscious, and millers are the first to admit that the industry has not always performed satisfactory land stewardship; however, they are striving to improve. Millers would like to see the hardwood forest products industry better appreciated. According to most of the survey respondents this appreciation would be gained by educating the public on the process by which trees are converted into wood products. Two of the survey respondents had established interpretive tours of their mills for the general public.

Question II addressed the second research objective. There were 33 responses to question II. Forty-two percent of the responses associated market and resources with those sectors experiencing the greatest change. Each sector received 21 percent of the responses, Table VI.

Table VI

Recent Areas of External Change.
Percent of Question Responses (n = 33)

Sector	% Responses	Subsector	% Responses
Market	21%	Fluctuations	9%
		Prices	3
		Sales	3
		Purchasing	3
		Development	3
Resources	21	Log availability	12
		Labor	6
		Capital	3
Technological	15	Computerization	9
		New processes	6
International	15	Markets	15
Political	9	Regulations	9
Economic	6	Inflation	3
		Interest rates	3
Other	12	Environmental issues	12
Total %	99% *		99% *

* Error due to rounding

The largest subsector change, 15 percent, was for international markets. This is in line with previous responses concerning opportunities for sawmills. The 12 percent response for environmental issues and 12 percent response for log availability reflects the concern previously mentioned regarding raw material problems for sawmills.

Although the sector rate of change and the degree of complexity could not be established, a preliminary conclusion is that sawmill managers are aware of changes in their external environment.

The third research objective required the collection of information regarding changes inside the mill. It would have been desirable to indicate that the internal changes listed in Table VII were determined by changes in the external environment, but it would require personal interviews or a written survey, not a telephone questionnaire, to derive accurate information about goal alteration, or other changes, as dependent on the external environment.

Of all the 58 responses to the telephone survey question about things which have changed inside their mill, 17 percent mentioned kiln technology as a new and important addition. The importance of the kiln technology

Table VII

Recent Changes Within the Mill.
Percent of Question Responses (n = 58)

Item of Change	% Responses
Added dry kiln	17%
General machinery upgrade	14
Plant expansion	14
Employee development programs	10
Office technology	9
Safety programs	7
Doing custom order processing and ship	7
Now exporting	7
Packaging cosmetics	5
Computerization (mill efficiency)	5
Added pre-dryers	3
None	2

Total %	100%

was attributed by sawmill managers to the recent increase in domestic and international demand for lighter colored hardwoods (i.e., air drying produces darker lumber). General upgrade of machinery and plant expansion were second in frequency each receiving 14 percent of the responses. The 10 percent response to employee development reflected internal measures to solve the skilled, willing to work labor pool deficit.

DISCUSSION

The two most striking issues revealed in the survey were how sawmillers acquire information from their external environment and the discrepancy between the amount of technological data available (89 percent of the journal articles) and the request by millers for more information on markets (38 percent of the question on areas of information responses).

All survey respondents were members of the National Hardwood Lumber Association (NHLA), and all respondents rely on the NHLA in part to provide them with accurate and precise external environmental information, especially strategic, general environmental information.

As will be discussed in the following subsections, smaller firms such as hardwood sawmills normally do not have the capital and personnel resources to perform continuous and systematic environmental analysis. These smaller organizations, therefore, become members of national and state trade organization in order to take advantage of a pool of resources which then can be directed at long-term, general environmental issues of a strategic nature.

Nonresistant Systems Revisited

Being a nonresistant organizational system means being aware of the interconnections between the firm and its external environment (Hayward 1987). A nonresistant organization needs an ongoing procedure for keeping the firm open to a changing external environment. One method for accomplishing this is environmental analysis.

Environmental analysis is a process by which relevant external environment information is obtained and delivered to decision makers and planners in a readily accessible and easily understood form (Douglas and Craig 1983; Wilson 1983; Keegan 1980; Thomas 1980). The value of environmental analysis is as an input to effective

planning (Thomas 1974); effective planning is a necessary condition for any organization that strives to achieve and maintain excellence (Pace 1989).

Environmental Scanning

Environmental scanning is the first step in a "future-directed" environmental analysis process (Stubbart 1982). Scanning the environment may range in forms from a 'conditioned scan' conducted by managers who gather information via newspapers and journals to a 'formal search' which involves structured research (In essence, this paper is a formal search of hardwood sawmills; for a complete explanation of environmental scanning see Aguilar 1967).

Sawmill managers, for example, might care to have information either on one or all of the following issues: how will the European Community (EC) go about standardizing the testing and certification of hardwood lumber products? How will consumer demand shift with respect to hardwoods? What hardwood lumber substitutes are being developed which could command superior market share?

Millers could keep up with these issues (conditioned scan) at a minimal cost of a subscription to a trade journal. As based on the article scan, however, this implies that managers would primarily be reading about the technological sector. There are more sectors in the external environment of the sawmill than the technological.

Gathering information on the areas used in the above examples will require more structured research. Research necessary to uncover this information and guide managers is resource extensive and prohibitively expensive. Formal search environmental scanning is usually performed by a special department within the company or by a committee of top level managers. Hardwood sawmills, however, like most small organizations, normally do not have sufficient resources for scanning procedures and the systematic evaluation and synthesis of the data collected; therefore, hardwood sawmills rely on membership in private groups and associations such as the NHLA and federal and state government agencies for their more involved external environment information needs. These institutions are performing the role of environmental scanning units for hardwood sawmills. As Preble (1978) wrote:

...the majority of medium-size and small firms...have neither the resources nor perhaps the inclination to hire a company economist or gaggle of MBAs to do future scanning. Typically, these firms must rely upon consultants, subscription services, briefing seminars, or written reports by specialized services to do the bulk of their scanning for them (p.12).

It is important that these organizations are themselves nonresistant systems and capable of performing systematic environmental scanning. It is important that these organizations transfer information to hardwood sawmills that managers want (i.e., resources and market sectors), is free of unspecific jargon and prejudices, and is not focused completely on the technological sector (Ljungburg 1982; Treille 1982).

Input to Planning

Environmental scanning provides the key information for planning (Hambrick 1982). In this paper the term planning, relevant to hardwood sawmills, refers more to what is called strategic planning. Strategy in this sense is not what Henderson (1983) equates with a competitive, military type strategy, but instead it is the strategy of organizational alignment with its external environmental

Nonresistant systems strategic planning requires that sawmill managers think strategically. Thinking strategically means developing scenarios about external environmental opportunities and threats that impact the success of the mill (Mason 1986; Ansoff 1975). Considering these impacts is crucial when a manager is planning the methods by which to create preferred future condition for the firm (Cateora 1985).

To fill the needs of strategic planning environmental scanning should be oriented towards opportunities and threats emanating from the external environment and not restricted to the operational sectors of market and resources (Murphy 1989). As mentioned above, formal search environmental data are acquired from associations and other institutions. When it comes to strategic information almost all of the data will be acquired by these organizations. This stems from the fact that hardwood sawmill managers are predominately occupied with operational affairs (i.e., resources and markets). The time and resources necessary to develop, implement and monitor a strategic plan is practically nonexistent even for larger mills, of the larger mills participating in the survey only one had designed and filled a job position for handling environmental issues.

Organization which provide scanning services to sawmills should not only be concerned with the operational information which is requested from mill but should also be concerned with formulating premises, gathering and evaluating information about the direction towards which the industry should be headed and how to get it there. This logically means that scanning organizations must also practice strategic thought and planning. As one respondent in the survey said about hardwood sawmills, "[We] don't always know what we need because we don't know what's coming or where we are going."

In Chapter IV the survey data will be combined and presented with further discussion that will provide the initial construction and the definition of type of external environment for hardwood sawmills.

CHAPTER IV

THE HARDWOOD SAWMILL EXTERNAL ENVIRONMENT

Specific characteristics of the hardwood sawmill external environment are profiled in the following two sections. The first section describes the operating and general hardwood sawmill environments. The overall type of the environment is advanced in the last section.

EXTERNAL ENVIRONMENT

Based on the survey data presented in Chapter III and the general systems theory information presented in Chapter II, the hardwood sawmill external environment can now be introduced. In Table VIII, the combined responses of the 21 sawmill managers who participated in the telephone survey is presented. Fifty percent of the overall responses addressed either the market or resources sectors. Twenty-five percent were directed to the technological and international sectors while a relatively small 13 percent were attributed to the political and economic sectors.

Table VIII

Sectors of Relative Importance
to Hardwood Sawmill Managers.
Percent of Total Responses (n = 235)

Sector	% Responses
Market	28%
Resources	22
Technological	14
International	11
Political	8
Economic	5
Other	
Environmentalists	10
Management	2

Total %	100%

Operating Environment

The operating environment, as expressed in general systems theory literature, is that environment where managers can directly affect or are directly affected by the occupant sectors. Being able to directly affect a sector gives the manager some degree of controllability over the operating environment. Accordingly, this environment is where opportunities and threats posed to the firm are of an immediate concern.

In 1973 Kefalas and Schoderbek proposed, and supported through empirical research, that managers spend more time learning about controllable sectors. Kefalas and Schoderbek also made the assumption that if managers are spending a relatively larger portion of their time learning about a specific sector then that sector must be relatively more important.

A high percentage of the aggregate survey responses were allotted to the market and resources sectors. If it is assumed that managers will chose as most important those sectors with direct affects, then the resources and market sectors belong in the operating environment, Figure III.

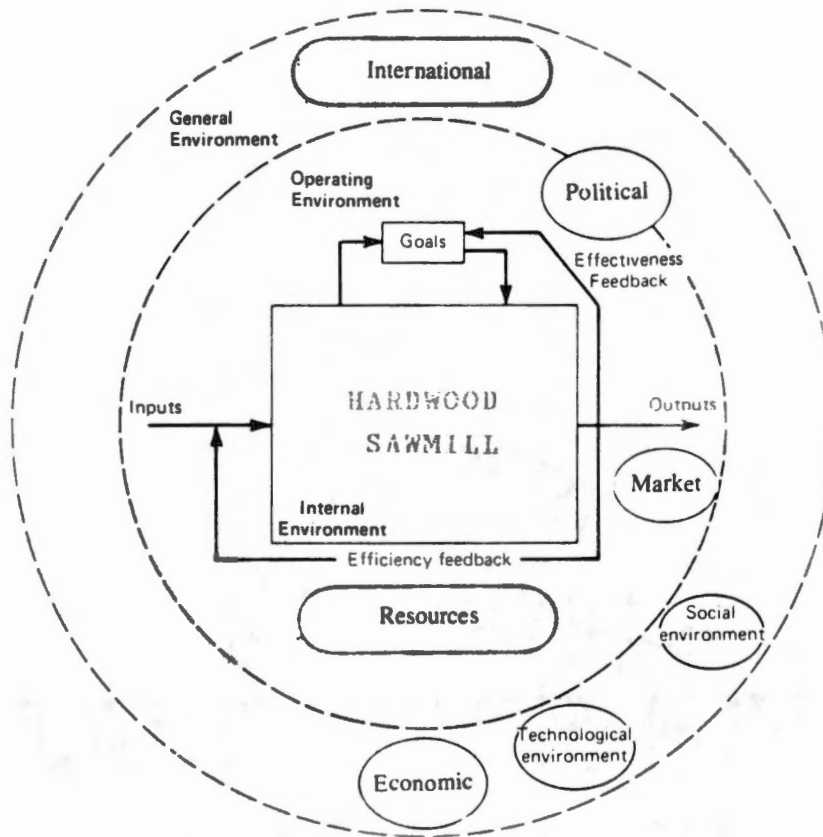


Figure III. The Hardwood Sawmill External Environment

Source: Adapted from
 Cleland, D.I. and King, W.R. 1983.
 McGraw-Hill Series in Management p.23

General Environment

The general hardwood sawmill environment harbors what Darr (1987) termed "macro-forces". These indirect, large scale forces affect the hardwood sawmill operating environment in a similar manner as they affect most other industries (e.g., economic = interest and inflation rates). This does not mean that the sectors in the general environment are not unique; this simply means that the impacts from these sectors are not equally realized by all industries (Thomas 1974).

For example, a domestic political climate in favor of alleviating offshore market structural trade barriers to U.S. industry would positively affect a range of companies; however, before government policy can effectively meet the needs of the hardwood forest products industry, specific market features such as foreign building codes for wood structures must be addressed.

Based on the article review, the technological sector is very important and would belong to the operating environment. The hardwood sawmill facility, however, is one of those relatively small operations that rely on outside research efforts. This and the lesser

overall survey response places the technological sector in the general environment, Figure III.

The international sector is another example of the indirect influential nature of the general environment. Although sawmill managers cannot directly influence the international marketplace, international activity has been the source of a demand increase for hardwood products resulting in an expanded, direct market sector opportunity for sawmill output. Millers viewed the export market as strong and steady, however, several millers were concerned that only top grade undifferentiated products were being exported leaving them with lesser grade commodity products which have a weak and discontinuous market (Wisdom 1988).

The political sector was assigned low importance eventhough it is an obvious conductor of indirect general environmental influences to direct operating environment influences, hence its position in both external environments. Transformation of these influences via the political sector is exceedingly clear when viewing the controversies between environmental special interest groups (social environment sector) and timber related industries.

Environmentalists indirectly influence the success of hardwood sawmills by lobbying the political sector for the enactment of legislation to reduce the amount of harvesting on public lands. If environmental groups are successful in their efforts then the political sector will be obliged to implement regulations to reduce the harvest on public lands and provide enforcement through regulatory agencies. The reduction of logs to the mill due to the indirect efforts of environmentalists is realized as a direct impact on the mill's supply, a subsector of the resources sector in the operating environment. This very type of impact was cited by K.S. Cameron (1980) in his article on organizational effectiveness:

For example, Boise Cascade--one of the largest, fastest growing corporations in America in the late 1960s--set a 20 percent growth in earnings per share per year as its major goal. The firm reached and even surpassed that goal for 12 consecutive years until 1971. In order to reach the goal, however, the firm had developed a form of operation that involved taking on risky projects that ignored certain environmental groups--a policy that brought bankruptcy and forced financial reorganization in 1972 (p.68).

Political affects on the sawmill in the form improved safety standards and most importantly harvest restrictions is growing. The relative importance of this sector, therefore, should increase. As one miller stated, "...a competitive advantage is being able to meet government regulations and surviving."

The economic sector was identify as least important. During the telephone interviews several mill managers alluded to the importance of the economic sector as it determined much of future market conditions. The general feeling was, however, that this sector could not be pinpointed as either an opportunity or a threat as the dynamics of the U.S. economic sector were so much out of the control of millers.

The low response to the economic and political sectors is important to note. As is brought out in the survey, millers consider overall the market and resources sectors as most important. Many of the impacts to the success of the mill which are felt in the resources and market sectors have origins in the economic and political sectors. A preliminary conclusion is that sawmill managers are not assigning importance to these (i.e., economic and political) sectors because they (the managers) have little or no control over them. In reality

the political and economic sectors are of great importance to the success of the firm eventhough managers are not in direct contact with them.

As mentioned in Chapter III, managing the sectors in the operational environment consumes much of the resources of smaller organization and, therefore, managing the more strategic nature of the general environment becomes the domain of organizations such as the NHLA. This reemphasizes the necessity for organizations which perform environmental analysis and assist in planning for hardwood sawmill to be themselves nonresistant systems.

ENVIRONMENTAL TYPE

The previous section described the hardwood sawmill external environment with partial general and operating sector level influences. When taken together as a whole the simultaneous influence of all sectors increases the complexity of the external environmental. This higher degree of environmental complexity makes it necessary to regard the external environment with respect to its type.

In 1965, F.E. Emery and E.L. Trist introduced a descriptive method for typing external environments. Applying this method, the hardwood sawmill external environment can well be described as a clustered, disturbed-reactive environment. In a clustered environment, Emery and Trist indicated (1965):

...the relevant objective is that of 'optimal location', some positions being discernable as potentially richer than others (p.25).

The term 'clustered', for purposes relevant to hardwood sawmills, refers to the characteristics of resources as inputs to the mill. The most obvious clustering of a resource is the distribution of hardwood forests. Quality commercial hardwood forest are restricted to geographic regions where the climate and soil factors are conducive for growth and other land use factors have not depleted or restricted the resource.

The clustered nature of hardwood resources combined with a projected 79 percent increase in domestic demand and a steadily increasing global demand for hardwood products over the next 50 years poses problems and opportunities for hardwood sawmills (Darr 1990). The expected trend in demand incorporates traditional

hardwood products such as lumber and dimension stock as well as other products like hardwood chips for paper and composition building materials (Maloney 1988). In order to satisfy new demand for hardwood logs, chips, lumber and veneer products, the trend in hardwood sawmills is to increase mill capacity by acquiring other mills, outbidding other mills for available timber and gaining control over the timber resource. The resulting competition for hardwood timber inputs for both types of outputs demanded is generating some concern among millers over the future supply of suitable hardwood timber i.e., grade, diameter and species composition of hardwood timber.

The other prominent feature of the hardwood sawmill external environmental type is the reactive environment. According to Emery and Trist this environment:

...can also give rise to situations in which stability can be obtained only by a certain coming-to-terms between competitors, whether enterprise, interest groups, or government. One has to know when not to fight to the death (p.26).

For hardwood sawmills the reactive portion of their external environment is an issue of environmental alignment. For example, a large portion of available hardwood resources is held in private nonindustrial forest ownership (Buchanan 1988). The changing pattern of timberland utilization on privately owned land has fueled supply concerns at hardwood sawmills (McLintock 1987). The pattern shows a major trend towards the nonconsumptive land utilization pattern of recreation and wildlife aesthetics (Brown and Manfredo M.J. 1987; Rolston 1987; Shaw 1987). This nonconsumptive pattern is also being implemented on publicly owned hardwood forestland due to the efforts of ecological environmental special interest groups.

The future success of hardwood sawmills is hinged on the sawmill managers' abilities to compete. Simultaneously, managers must utilizing available resources in an manner that is acceptable to employees, land owners, professional foresters and environmental special interest groups as well as other sectors in both the operational and general sections of their external environment.

How well sawmills meet the competitive challenges ahead will depend greatly on their degree of resistance to a changing external environment and their willingness to alter their business methods.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

SUMMARY

The exploratory research yielded the data necessary to meet the three study objectives:

1. Identify the sectors in the operating and general sections of the external environment which are important as perceived by hardwood sawmill managers,
2. Identify which of those sectors managers perceive as variable, and
3. Document changes within the mills.

Objective 1. Based on the article review and telephone survey the three most important external environmental sectors were the technological, market and resources sectors. Collecting data for objective 1 brought forth several issues. One was the difference between the importance of the technological sector as signified by the abundant information published in trade journals surveyed and the lesser degree of importance as designated by the survey respondents to the technological

sector. Another issue was the sawmill manager emphasis on the market and resources sectors, and their lack of emphasis on the economic and political sectors. A final issues was the means by which millers acquire information.

Objective 2. Responses to the question on environmental change were evenly distributed. The market and resources sectors were identified as the most important areas of recent external environmental change. Technological and international sectors were close seconds. The few remaining responses were spread over the political and economic sectors and environmentalist issues.

Objective 3. Response to question III allowed the documentation of kiln drying, general machinery upgrade, plant expansion and employee development programs as the most frequently mentioned internal changes.

Hardwood sawmills are faced with an expected increase in domestic and global demand for various hardwood products. This poses opportunities and threats for millers. Not all sawmillers, however, wish to continue the production of undifferentiated commodity goods. These managers would like to see demand channeled through market development for finished products.

An increase in demand will require the expansion of mill capacity. Expanding capacity for value added products will necessitate some increases in technology and the demand for skilled labor.

Hardwood products are dependent on a clustered hardwood resource. Out of this hardwood cluster two inputs are demanded, and these are thought to be mutually exclusive: small diameter, homogeneous species, short rotation trees for chips used in pulp and composition products; and larger diameter, diverse species, long-term rotation trees for tradition products such as lumber, cants and veneer. Hardwood sawmillers, who are bent on delivering value added products to an expanding market, prefer that the latter resource specifications abound. This preference is founded on the belief that a market niche for quality, value added hardwood products cannot be continuously supplied if the available logs are small in diameter and homogeneous in species (Burt 1989).

The major drawbacks to the plans for increasing mill capacity and profits are the issues of renewable natural resources, skilled labor, intervention by ecological environmental interest groups and changing land use patterns.

RECOMMENDATIONS FOR FURTHER STUDY

There is potential for growth in the hardwood sawmill segment of the hardwood forest products industry. The expected increase in domestic and global demand for hardwood products and the resource problems outlined above will create a bevy of opportunities and threats for hardwood sawmills. Increasing growth implies more competition for hardwood log inputs and increasing visibility to ecological special interest groups.

Changes within sectors of the external environment will be a source of instability. Hardwood sawmills may also be subjected to mergers, acquisitions and takeovers. This would open new sectors in the environment. The addition of new sectors, such as stockholders, will add complexity to the external environment.

To remain successful under the conditions of an increasingly complex and unstable external environment, hardwood sawmills will require the assistance of trade associations, like the NHLA, universities and other research and information institutions. Organization such as these are the environmental analysis and planning assistance units for the mills. Trade associations, hardwood sawmills and research and information

institutions form a hardwood sawmill industrial trinity. This association=research=sawmill triad is itself a system and should be the level of analysis for further research.

As mentioned in Chapter III, trade associations, like the NHLA, are performing environmental analysis for hardwood sawmills. It is important that these organizations remain cognizant of changes in the external environment and reevaluate and adjust internal management issues and goals such as: Why are we here? What is our mission? How can we, as a trade association, interpret and plan to meet the needs of hardwood sawmills?

Research should be focused on how trade organizations answer these and other management questions. This research should provide insight as to the strengths and weaknesses of these associations as environmental analysis and strategic planning units.

The principal members of the trinity are hardwood sawmills. As mills grow and progress it will become crucial that they keep in alignment with their external environment. This means that managers must focus their attention not only on the resources and market sectors of their operational environment but also on the general environmental sectors which have indirect effects on

their business. As mentioned in this paper, hardwood sawmills do rely on trade associations for data on the indirect sectors of the general environment. Research here should focus on how millers communicate their management needs to, and receive information from, trade associations. An effective communications linkage between trade association and hardwood sawmills is a necessary condition for effective cooperative planning.

Making improvements in the means by which trade associations and sawmills convey information is the function of third member of the triad, the universities and other research and information institutions. These members provide knowledge to trade associations and hardwood sawmills on technological processes; how to perform environmental analysis procedures; the implementation, monitoring and adjusting of strategic plans; methods for assessing organization effectiveness; and organizational development programs and data. Most importantly, they provide standard concepts for comprehending the external environment. A standardization of methodology and terminology will greatly facilitate the transfer of information among the trinity.

Research focused on the third level of the triad should: accurately determine what are the management and information needs of sawmills and trade associations. This research should result in the development of effective communications and planning methods with applications to the hardwood forest products industry and its various associations.

Hardwood sawmills together with associations and universities form an association=research=sawmill triad which is itself a system. It is important that this system function with minimal resistance to change in the external environment and have smooth communication flow between its parts.

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LIST OF REFERENCES

- Ackoff, R.L. and Emery, F.E. 1972. On Purposeful Systems. Chicago: Aldine-Atherton.
- Aguilar, F.J. 1967. Scanning the Business Environment, New York: The Macmillian Co.
- Aldrich, H.E. 1979. Organizations and Environments, Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Ansoff, H.I. 1975. "Managing Strategic Surprise by Response to Weak Signals," California Management Review, 18(2):21-33.
- Argyris, C. and Schon, D.A. 1978. Organizational Transitions: A Theory of Action Perspective, Reading, Massachusetts: Addison-Wesley Publishing Co.
- Beckhard, B. and Harris, H.T. 1987. Organizational Transitions: Managing Complex Change second ed., Reading Massachusetts: Addison-Wesley Publishing Co.
- Bennis, W.G. 1966. Changing Organizations, New York, NY: McGraw-Hill Book Co.
- Brown, J.P. Manfredo, M.J. 1987. "Social Values Defined," in D.J. Decker and G.R. Goff, eds., Valuing Wildlife Economic and Social Perspectives, pp. 5-11.
- Buchanan, R.W. Jr. 1988. "A Look Ahead at Hardwoods in Industry," in O.F. Hall and R.L. McElwee (eds.), Eastern Hardwoods -An Emerging Forestry Frontier, Eighteenth Forestry Forum, Virginia Tech, Blacksburg, VA.
- Burt, D. N. 1989. "Managing Product Quality through Strategic Purchasing," Sloan Management Review, 30(3):39-48.
- Cameron, K.S. 1980. "Critical Questions in Assessing Organizational Effectiveness," Organizational Dynamics, Autumn:66-80.
- Cameron, K.S. and Whetten, D.A. 1988. "Models of the Organizational Life Cycle: Applications to Higher Education," in K.S. Cameron, R.I. Sutton and D.A. Whetten (eds.), Readings in Organizational Decline, Cambridge, MA: Ballinger Publication Co.

- Cassens, D. L. and Banks, S. 1989. "Characterization of hardwood wholesalers and concentration/distribution yards," Forest Products Journal, 39(5):43-45.
- Cateora, P. 1985. Strategic International Marketing, Homewood, IL:Dow Jones-Irwin, Inc.
- Cleland, D. I. and King, W. R. 1983. Systems Analysis and Project Management, McGraw-Hill Book Co.
- Cyert, R.M. March, J.G. 1963. A Behavioral Theory of the Firm, Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Daft, R.L. and Steers, R.M. 1986. Organizations A Micro/Macro Approach, Glenview, IL: Scott, Foresman and Company.
- Darr, D. 1990. "Timber Demands and Supplies to the Year 2000 and Beyond," in "Policy Update," Journal of Forestry, p. 7.
- . 1987. "United States of America," in E.G. Richards, ed., Forestry and the Forest Industry: Past and Future, Martin Nijhoff Publishers, pp. 407-419.
- Davidson, P. 1978. Money and the Real World second ed., The Macmillan Press LTD.
- Dill, W.R. 1958. "Environment as an Influence on Managerial Autonomy," Administrative Science Quarterly, 2:409-443.
- Dillman, D. A. 1978. Mail and Telephone Surveys, Wiley-Interscience Publication.
- Donnelly, J.H., Gibson, J.L. and Ivancevich, J.M. 1987. Fundamentals of Management (sixth edition), Plano, Texas:Business Publications, Inc.
- Douglas, S.P. and Craig, S.C. 1983. International Marketing Research, Prentice-Hall International Series in Management.
- Emery, F.E. and Trist E.L. 1965. "The Causal Texture of Organizational Environments," Human Relations, 18(1):21-32.

- Evered, R. and Selman, J. "Managers Anonymous," New Management, 6:56-61.
- Hambrick, D.C. 1982. "Environmental Analysis and Organizational Strategy," Strategic Management Journal, 3:159-174.
- , 1981. "Environment, Strategy, and Power Within Top Management Teams," Administrative Science Quarterly, 26:253-276.
- Hayward, J.W. 1987. Shifting Worlds, Changing Minds, Boston & London: New Science Library, Shambhala.
- Hedberg, B. 1980. "How Organizations Learn and Unlearn," in P.C. Nystrom and Starbuck W.H. (Eds.) Handbook of Organizational Design, Oxford University Press.
- Henderson, B.D. 1983. "The Concept of Strategy", in K.J. Albert, ed., The Strategic Management Handbook, McGraw-Hill Book Co., pp. 1-3-1-26.
- Hills, G.E. and Cravens, D.W. 1975. "A Conceptual Approach for Analyzing Social/External Information Forces," Technological Forecasting and Social Changes, 8:131-145.
- Jones, H. and Twiss, B.C. 1978. Forecasting Technology for Planning Decisions, New York, NY:PBI.
- Jurkovich, R. 1974. "A Core Typology of Organizational Environments," Administrative Science Quarterly, 19:380-394.
- Kanter, R.M. 1983. The Change Masters, New York, NY:Simon & Schuster, Inc.
- Katz, D. and Kahn, R. 1971. "Open-System Theory," in J.G. Maurer (ed.), Readings in Organization Theory: Open-Systems Approaches, Random House.
- Keegan, W.J. 1980. Multinational Marketing Management, Englewood Cliffs, NJ:Prentice-Hall, Inc.
- Kefalas, A. and Schoderbek, P.P. 1973. "Scanning the Business Environment--Some Empirical Results," Decision Sciences, 4:63-74.

- Kehalas, H. 1977. "Long Range Planning -An Open Systems View," Long Range Planning, 10:78-82.
- Lawrence, P. R. and Lorsch, J. W. 1969. Organization and Environment, Richard D. Irwin, Inc.
- Laszlo, J.L. 1987. Evolution: The Grand Synthesis, Shambhala.
- Ljungberg, S. 1982. "How Can A Well Organized I&D Service Help To Improve The Innovation Process In A Company?" in, B.T Stern ed., Information and Innovation, North-Holland Publishing Co. pp.49-61.
- Maloney, T.M. 1988. "The New Composition or Composite Materials in Forest Products Trade," in J.A. Johnson and W.R. Smith (eds.) Forest Products Trade: Market Trends and Technical Developments, University of Washington Press, Seattle.
- Mason, J. 1986. "Developing Strategic Thinking," Long Range Planning, 19(3):72-80.
- Massie, J.L. 1987. Essential of Management, Prentice-Hall, Inc.
- McLintock, T. F. 1987. Research Priorities for Eastern Hardwoods, Hardwood Research Council.
- Moore, M. and Gergen, P. 1985. "Risk Taking and Organizational Change," Training and Development Journal, 39(6):15-37.
- Murphy, J.J. 1989. "Identifying Strategic Issues," Long Range Planning, 22(2):101-105.
- Narchal, R. M., Kittappa, K. and Bhattacharya, P. 1987. "An Environmental Scanning System for Business Planning," Long Range Planning, 20(6):96-105.
- Neubauer, F.F. and Solomon, N.B. 1977. "A Managerial Approach to Environmental Assessment," Long Range Planning, 10:13-20.
- Nystrom, P.C. and Starbuck, W.H. 1988. "To Avoid Organizational Crises, Unlearn," in K.S. Cameron, R.I. Sutton and D.A. Whetten (eds.), Readings in Organizational Decline, Cambridge, MA:Ballinger Publication Co.

- Pace, L. A. 1989. "Moving Toward Systems Integration," Survey of Business, 25(1):57-61.
- Pinchot, G. III. 1985. Intrapreneuring, New York, NY: Harper & Row, Publishers.
- Pondy, L.R. and Mitroff, I.I. 1979. "Beyond Open Systems Models of Organization," in B.M. Staw (ed.), Research in Organizational Behavior, Greenwich, CT:JAI Press.
- Preble, J.F. 1978. "Corporate Use of Environmental Scanning," University of Michigan Business Review, 30(5):12-17.
- Prigogine, I. 1984. Order Out of Chaos, Bantam Books.
- Rolston, H. III. 1987. "Beauty and the Beast: Aesthetic Experiences of Wildlife," in D.J. Decker and G.R. Goff, eds., Valuing Wildlife Economic and Social Perspectives, pp. 187-196.
- Santrock, J.W. 1986. Psychology The Science of the Mind and Behavior, Dubuque, Iowa:WM. C. Brown Publishers.
- Shaw, W.W. 1987. "The Recreational Benefits of Wildlife to People," in D.J. Decker and G.R. Goff, eds., Valuing Wildlife Economic and Social Perspectives, pp. 208-213.
- Staw, B.M., Sandelands, L.E. and Dutton, J.E. 1988. "Threat-Rigidity Effects in Organizational Behavior," in K.S. Cameron, R.I. Sutton and D.A. Whetten (eds.), Readings in Organizational Decline, Cambridge, MA:Ballinger Publication Co.
- Terry, P.T. 1977. "Mechanisms for Environmental Scanning," Long Range Planning, 10:2-9.
- Thomas, P.S. 1974. "Environmental Analysis for Corporate Planning," Business Horizons, 17:27-38.
- . 1980. "Environmental Scanning the State of the Art," Long Range Planning, 13:20-27.
- Thompson, J.D. 1967. Organizations in Action, McGraw-Hill Book co.

- Treille, Jean-Michel. 1982. "Economic Information As An Aid To Innovation," in, B.T Stern ed., Information and Innovation, North-Holland Publishing Co. pp.149-156.
- Waterman, R.H. Jr. 1987. The Renewal Factor, New York, NY:Bantam Books.
- Wilson, I. 1983. "The Benefits of Environmental Analysis", in K.J. Albert, ed., The Strategic Management Handbook, McGraw-Hill Book Co., pp. 9-1-9-19.
- Wisdom, H.W. 1988. "Hardwood Export Trends and Prospects," in O.F. Hall and R.L. McElwee (eds.), Eastern Hardwoods -An Emerging Forestry Frontier, Eighteenth Forestry Forum, Virginia Tech, Blacksburg, VA.

APPENDIX

TELEPHONE SURVEY QUESTIONS

INTRODUCTION

As was mentioned in the letter from Mr. Stebbins, the University of Tennessee is pursuing some research which would allow us to help the hardwood lumber industry deal with change. Before we can do this, however, it is first necessary that we better understand the important factors in the hardwood lumber business. Our conversation will be regarded as confidential.

QUESTIONS

I. Will you list for me those major kinds of factors (factors may be large or small, direct impacts, or concerns) that you feel are important because of their impact on the success of your company? (specifics --are there any others?)

I(a). In managing your business what are some factors you would like to have more information on? (specifics --are there any others?)

I(b). In managing your business what areas pose opportunities? (specifics --are there any others?)

I(c). In the environment outside of your business what areas pose problems or threats? (specifics --are there any others?)

II. You've mentioned several things which you feel are important. You listed X, Y, & Z as important because they impact the success of you company; W, X, Y, & Z were identified as important because you would like to learn more about them, they were opportunities, or they were problems. Out of all these which ones have changed the most during last five years? (specifics --are there any others?)

III. We've talked about many things that you consider as important to your company. Generally speaking what are the major changes that have been made by your company over the last five years? (specifics --are there any others?)

SAMPLE TELEPHONE SURVEY RESPONSE SHEET

State: _____ Tel# _____ Date: _____

Firm: _____

Type: _____

Name: _____

5yr Average Annual Production: _____ mmbf.

I. What do you feel are some important factors that impact the success of your company?

(m)arket _____, (r)esources _____, (t)echnology _____,

(p)olitical _____, (e)conomic _____, (i)nter, _____,

(o)ther(s) _____.

Description: _____.

I(a). Areas of information? _____.

I(b). Areas as opportunities? _____.

I(c). Areas as problems/threats? _____.

II. Which factors have changed? _____.

III. Changes in the firm? _____.

VITA

Mr. Kenneth J. Bible was borne in Greeneville, Tennessee on August 18, 1960. He attended elementary school and his freshman year of high school in Pheonix, Arizona. After a tour of duty in the United States Air Force, he entered the University of Tennessee and received his Bachelor of Science in Forestry in 1988. In the Fall of 1988 he accepted a research assistantship at The University of Tennessee and began study toward a Master of Science in Forestry degree. This Degree was awarded in August 1990.

The author is a member of the Alpha Kappa chapter of Xi Sigma Pi and the K/T chapter of the Society of American Foresters. Mr. Bible will begin study toward his Ph.D. in marketing of forest products at the University of Washington, Seattle and employed at the Center for International Trade in Forest Products (CINTRAFOR) also in Seattle.