What's next for greater prosperity?

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The pulp and paper industry's image as a resource-hungry destroyer of the environment is fading and is being replaced by one that is built on ecologically sustainable foundations.

Are you and your company making more money now than you were a decade ago? Is your process smooth enough to allow you the freedom to innovate? Are environmental issues a drain on your resources, or are they a hidden opportunity? Are you creating wealth for shareholders and exciting careers for the next generation? These questions face all manufacturers, not just papermakers.

If you were making plastics, steel, computer chips, or even chemicals, you would face the same issues but with decidedly different concerns and opportunities. While papermakers, unlike silicon chip makers, don't have the luxury of packing greater quantities of information into thumbnail-sized products and being paid accordingly, they can continually adapt products to meet higher expectations and new market niches with relative ease. The leading paper and paperboard producers refer to one third of their product mix as "new" every year. Who ever heard of plain paper fax, ink jet paper, photo quality ink jet paper or multi-layer, multi-furnish-constructed board a generation ago?

Let's not forget that paper has an ecocycle advantage over most competitive materials. The balance between economics and ecology is commendable when observing the whole---from forestry, pulping, papermaking, converting, and printing to the consumer, and then to disposal, and finally to reuse. So why isn't the paper industry the topic of discussion for CNN, Fortune Magazine and investor groups? First of all, the paper industry is not new. Like gold mining, potmaking and agriculture, papermaking has been around for thousands of years. Yet glamorous innovations like the Internet, satellite links, software, and digital imaging are all closely linked to paper. There are literally thousands of reinvented and totally new grades to meet societal needs.

Paperboard packages are a key element of presentation and create the mood for a myriad of products. The package appearance in some cases can be the deciding factor in the final sale of a product. Even so, the paper industry is not widely perceived by society on the level of many other industries. However, the paper industry has received considerable coverage on the environmental front, where alarmist concerns about its contribution to already overburdened landfills, negative effects on waterways and potential health risks associated with paper and paperboard products grab the headlines. While truth in these cases may be limited, and the damage not as extensive as that of the Exxon Valdez or Bophal, the negative publicity can't be ignored.

Paper, the unsung hero

While the paper industry has made great strides, it can accomplish considerably more in partnership with its suppliers as a team resource. Do we begin to enhance the well being of the paper industry and create a healthy environment for present and future generations? Understanding the major issues is an essential enabling force in bringing the full power of ingenuity to the papermaking process. When a problem-solving team realizes that the issues of environment, performance, consumer demands and cost are linked, papermakers and suppliers can form new partnerships for success. As providers of intelligent solutions to the process and to value-added end products, the key chemical, process automation and equipment suppliers must actively pursue solutions to industry issues as well as

*Anon., *Paper in the Ecocycle* (A. Thorén, Ed.), Eka Nobel AB, Bohus, Sweden, 1995, pp. 13–39.v

*The production and use of pulp and paper are evolving into an ecocycle that is in balance with the environment.**

Children's creativity is often expressed on paper.

The ecocycle of forests and paper products

process issues. The big-picture approach is central to success. This means achieving eco-balance, which we define as economic and ecological prosperity.

Paper, compared with most manmade materials, fits admirably into the ecocycle and the economic cycle. We have already focused on and optimized the use of wood through whole tree utilization, forest biology and tree farm management. After performing admirably for its intended purpose, a paper product can be recycled as part of or 100% of a paper grade. It may also be used beyond our expectations. Why shouldn't we look further to capture and re-use other output streams from the process and turn them into value?

Making higher-value products or equal value for lower overall cost is the economics side of eco-balance. The ecological side of the equation is simple: less is more. Higher effectiveness and retention of all raw materials mean greater economic and ecological efficiency. Fewer chemicals, applied wisely, will result in more papermaking power.

With this proactive framework of thinking about the industry, it's easy to recognize the impact of change beyond the boundaries of the mill itself. We must pay more

Landscape planning of the forest—Here the felled areas have been landscaped so that they merge into the surrounding countryside in a natural way.

attention to the lands that we harvest and replant, the water that we use and return, the air emissions that are created, and the health and safety of our employees and the community at large. We also need to think beyond the concept of paper being endlessly produced and recycled as paper. In some cases, incineration of paper or rolling it into firelogs may be a more productive use of spent material than recycling it into paper, after major fiber degradation has occurred.

The key point is that forests, pulp, and paper can all be an integral part of sustainable development of natural resources, contributing to man, society, and the well-being of the planet for future generations. Is this simple to say yet complex to execute? Not really, if you pull apart the concept piece by piece and reassemble it in harmony. From a supplier's view, combining the knowledge, chemistry, and equipment to improve the eco-balance of the papermaking process is the most important concept that we can contribute. Consider the following vital issues:

Consumer demands
Functional requirements
Cost
Environmental stewardship
Legal/regulatory concerns
Not-in-kind competition

The Ural owl has found a place to make its nest. Tall tree stumps that are left behind after the felling process can provide natural habitats.

A look at the vital issues

The first and foremost issue that we need to understand is consumer demands. This is best examined by taking into consideration not-in-kind competition. What will consumers expect and/or accept in the future? On a global basis, this will vary from region to region. In most developed markets, consumers have come to expect high-quality paper products at a low cost. We're talking about bright, white printing and writing papers that provide crisp color images with new-technology printers. Attractive packages are part of the draw to the product inside and part of the ultimate decision to make the purchase. Sturdy packages provide protection and transport of durable goods. Personal hygiene products, with a soft texture and colorful shades, fit into the current home-decorating color scheme.

If this were all the consumer wanted, our job would be easy. The demands are more far-reaching, however. It's important to maximize recycled content without sacrificing quality. We must also fulfill the unwritten contract that guarantees that the product is not harmful to human health and carries no unknown risk in its aftermarket use or disposal. These considerations, along with an analysis of not-in-kind competition (non-paper alternatives), prepare the way for addressing the remaining vital issues.

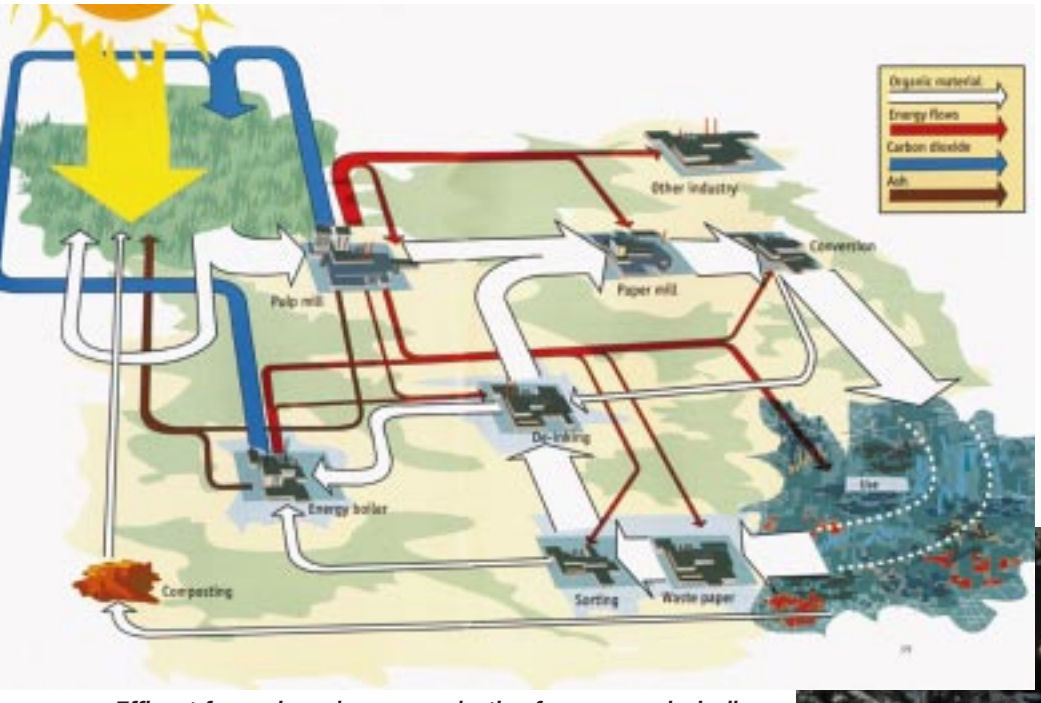
Which paper properties are truly functional as compared with those adding luxury or appeal? Will future consumers accept printing and writing grades that are functional but less bright and white? Is use of unbleached fiber as part of a food-grade package an acceptable product characteristic to the consumer? The need for paper will continue. Physical properties of the sheet must continue to improve to remain competitive with alternative materials.

Paper will be compared with other materials in terms of composition hazards, recycled content, reuse, and impact on the environment. Can you imagine pizza delivered in something other than a paperboard box? How about the common cold without tissue paper? Of course not! One thing is for sure: As we move into the future, flexibility on the part of the consumer and the papermaker will be necessary to maintain paper as a lifestyle component. Acceptance of the idea that pulp and paper manufacture is a single continuous process---only fully optimized through the management of raw material inputs, chemistry, and processes---is our starting point. In fact, this loop really extends outside the mill to the tree farms, converters, printers, consumers, and the recycle collection chains. With an understanding of this concept as an operating system, choices can be made to further eco-balance.

Cost and productivity

How does eco-balance as an operating system bring economic gain? To totally address the cost issue, we must consider all mill inputs and outputs, the state of equipment,

Office waste is no longer discarded. It can be used again as a raw material or as a fuel.



Effluent-free pulp and paper production forms an ecologically balanced system.

process methods of the mill, the capability of individuals, environmental regulations, and market conditions. Every mill, whether designed for virgin or recycled furnish (or both), has common inputs and outputs. Input streams are virgin or urban fiber, chemicals, additives, water and air. Output streams are pulp and paper products, salable by-products such as tall oil, and electricity. Inputs are complicated on the recycling side by inks, metals, polymers, and other materials. Although these materials add value to paper products, they must be dealt with as contaminants in recycled fiber, when they are reintroduced to the mill.

Any input or mechanism that can improve yield, increase end-product value, or reduce costs becomes a key parameter to the operating system. For this reason, chemistry and chemically engineered processes and real-time process control will take on an ever-increasing role in this operating system. Making optimum use of all inputs is one example of chemistry at work. Using chemically engineered processes to treat water at various stages will allow linkage of different process areas for improved efficiencies and reduced water use. Recovering valuable inputs other than fiber from mill waste streams for recycle or re-use in other products can create internal efficiencies and outside revenue streams for the mill.

One of the largest investments that a pulp and paper mill makes is in its people. By interacting with the paper customers and mill suppliers, those employees educated and armed with the technical knowledge of this holistic operating system will be able to work with the big picture of eco-balance. Who are the best activists for paper as a vital resource and industry to be proud of? Who will attract the best and brightest of the next generation? You don't have to look far to get the answer. TJ

Cleaner water and a healthier environment for the benefit of society and nature are the result of the environmental measures taken by the forest industry.

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