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SOME THOUGHTS ON WOOD UTILIZATION RESEARCH

For over 17 years our small group of scientists has worked to improve utilization of southern wood species. From these years of experience, I have distilled some thoughts on research objectives, attributes of scientists who accomplish the objectives, administration of research, and transferring results from laboratory to industry. I would like to share these thoughts with you.

It seems to me that more emphasis is needed on developing innovative materials processing techniques that will result in major improvements in productivity, rather than marginal development of existing processes. As an example, major new technology is needed to cheaply harvest and profitably convert large tonnages of barky chips (i.e., complete-tree or whole-tree chips) of mixed hardwood and/or softwood species into useful commodities. Too frequently, processing improvements are of only an incremental nature and without major significance.

To increase the effectiveness of available scientists and facilities, mechanisms should be improved to promote cooperative materials research and development among industry, government, and universities. Also, pressure to show short-term results should be reduced to favor pursuit of long-term technological and economic benefits.

For scientists to effectively accomplish research, it seems to me that they must have three attributes:

1. The experience, vision, and imagination to *know what to do*.
2. The training, or the will and ability to obtain the training, to *know how to do it*.
3. The energy and drive to *do it*.

Few scientists work alone. Most are a part of some organization; research administration is therefore necessary. In my view, good research administration is most simply defined as removal of obstacles to research. In addition to continuity of administrative purpose, essential services that must be responsively provided include:

1. Timely and adequate funding and facilities.
2. Timely supply of qualified people.
3. Prompt purchasing of needed supplies, services, and equipment.

Identifying a significant field of activity, hiring scientists with needed attributes, and establishing an effective research administration are necessary precursors for successful institutional research. Problem selection, design and execution of experiments, and technology transfer can then be undertaken. The sequence is easier to describe than to accomplish. Whatever successes our group has had in accomplishing this sequence have resulted from the following procedure.

The first efforts of our small team are to gain a comprehensive and deep understanding of the resource, traditional processes for its conversion to products, and the characteristics of these products. With this understanding, our next task is to select, by unanimous agreement of the team, two or three major research objectives—with timetables for their accomplishment. Extended consultations with industry and evaluation of our ambitions, talents, and facilities precede our drive for unanimity in selection of objectives.

Merging of these limited objectives with an understanding of resource, processes, and products results in a flow of ideas leading to invention of a concept. The concept is tested with a laboratory model. From knowledge gained about the process from the model, a commercial prototype is conceived. Potential equipment manufacturers and potential users of the concept are consulted in an effort to find an interested pair. The effort continues until a congruent pair is located. A cooperative agreement is then drawn among the three interested parties: The Forest Service as inventor, the machine company as manufacturer of the process equipment, and the forest products firm as user of the process. All three contribute risk capital to cover prototype design, manufacture, shop trials, revision, field trials, and publication of results. The transfer process is considered complete when the prototype process is demonstrated to be feasible; at this point there is a proven source for the process equipment and an experienced user of the process.

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