# **GUEST SPEAKER'S ADDRESS**

R. C. Williams, C.O.O. James River Corporation

# **CHANGE AND THE 21st CENTURY**

Mr. Chairman, Ladies and Gentlemen, Fellow Papermakers - I am flattered to be opening this most prestigious symposium for our industry and I am humbled by doing so in the hallowed halls of Cambridge University, a paradox of permanence and change, since being founded in the year 1209.

Cambridge has housed some of the world's greatest intellectuals, from Sir Isaac Newton to John Maynard Keynes - both of whom were deeply concerned with change.

The former was devoted to the transition from aristotelian qualitative views of nature and a geocentric universe to rigorous, quantitative mathematical laws of physics. The latter dealt with economics, the causes of economic cycles and the interactions with industrial activity. We will apply some of their concepts later.

This morning, I would like to share with you some insights into the nature and magnitude of change that you and I, and others will be managing in our companies and in our countries over the next decade or so, as we accelerate into the 21st century.

Nothing is more vital today in management science than the understanding and guidance of change. Change can be large or small, fast or slow, controlled or uncontrolled, desirable of undesirable, evolutionary or revolutionary (no similarity implied here) involves opportunity, and danger or risk as these Chinese symbols indicate. Their companions are excitement and fear. In business, change usually involves materials, processes, products, economics and, most importantly - people. Change in business is normally undertaken to move to a higher level of performance.

We are all concerned about increasing the rate of change. This rate can be relative to competition or relative to time. To accelerate, or change the direction of motion:,

$$F = M \frac{dv}{dt}$$

a force is needed equal to the mass (of the issue) times the rate of change, or acceleration, per Newton's Second Law.

(Of course we hope that our competitors are covered by the first law [remaining at rest] which is generally not always a safe assumption).

Newton also showed us that the world is not ideal. We do encounter windage, friction and constraints (as my tech. mech. teacher used to put it) or resistance to motion, irrespective of force. Thus another engineering axiom.

# $FORCE = \frac{DRIVING \ FORCE}{RESISTANCE}$

Obviously, if both increase in proportion, rate does not change.

In dealing with social change we are a lot better at dealing with forces than we are with resistances.

And we are all sort of alike in one respect - behaving as gyroscopes or springs, when pushed = we push back. Newton was right again - for every action there is an equal and opposite reaction.

But, think of the potential if we developed the ability to convert resistance into driving force or increasing the numerator while decreasing the denominator. For example: having labour and management, and management and management, pulling in the same direction - toward shared goals, shared objectives, motivated by shared rewards and with energy levels and enthusiasm now only achieved in unusual or crisis situations. Is this happening in your company? To what extent? Where it does happen, companies and shareholders prosper and individuals enjoy more security, more opportunity, and a higher standard of living.

Now, broaden the scenario to include educators and legislators, also pulling in the same direction as management and labour.(See below). Then, ask the same question of your countries. Even further, suppose the nations of the world would pull together toward improving the total quality of life on this planet. Is it happening? Most countries could and should do better. Why aren't we?

### Government



Education

The issue is, of course, leadership.

To change the scene:

Twenty years ago, at the beginning of a new company to be called JAMES RIVER, we had the unique opportunity of "painting on a new canvas". We would have a small, failing company to pull out of the red: We would devise a strategy:

### Values and Beliefs

Ethics
Finding A Better Way
Value to Customer
Involvement
Ownership
Jobs First
Profit Orientation

We would play extra hard to win our business game: While we had to survive, we would play fair and by the rules:

### We Would:

- Play hard to win
- Play fair and by the rules
- Play creatively and as a team
- Share collective success

We would play creatively, as a team; and we would share our collective success. We would turn would be losers into winners and we would replace despair with pride and joy.

We would share profit and ownership. Volunteers would work continuously around the clock to survive a significant flood, without compensation. This spirit and camaraderie would provide a force that would lead to the rebirth of a new little paper company. Over time we would share these values with 42,000 associates worldwide.

After twenty years (Fig. 1), at \$6 billion in sales, 75% of these employees own stock in James River and nearly as many share profit (Fig. 2). These are high numbers for large companies. Yet they also suggest that 25% will not own stock and have only passive interest in sharing profit. Some still resist involvement and training, some use drugs and strike to hurt the company (and themselves) when negotiations do not suit them. Why is this?









From the beginning we also worked hard to sensitize all employees to the needs of customers and how to deliver greater value at low Early on we developed the Product Performance matrix cost. to define (in part) the dynamics of (Fig.3) our relative competitive position. This chart plots value delivered including design, conformance and service vs cost. indicates performance/cost parity and the strategic target area for all product lines, pointing to the top left quadrant. Moving up to the left has become known as the golden arrow dynamic.



### **Product Performance Matrix**

Fig. 3 Product Performance Matrix and the Golden Arrow Dynamic

Its driving forces and controls include people, supplies and technology as shown (Fig. 4) on the following page. Each step in the process of converting raw materials to consumer products is covered by a plan of control (Fig. 5). Every element in every step of the valued added chain is or should be defined and controlled (Fig. 6). Control loops are closed by computers and (mostly) by people. These conceptual diagrams have been helpful in strategy development and execution including the understanding of where various participants fit in the total picture - including technology participants.

So we have been working at it. But, did we paint the right picture? Was it, or is it, understood? Have we been sensitive to Newton's Second Law and Keynes thesis of good economics and full employment? We think so. But even though we are considered one of the best US paper companies to work for, we still have a long way to go in transforming resistance into a positive driving force. What can we do to further improve participation, and enthusiasm?



Fig. 4 Driving Forces in the Matrix.



Fig. 5 Product Performance Sequence; Plans of Control.



Fig. 6 Detail of Fig. 5 Definition and Control.

Part of the answer lies in better and continuous education - from youth to retirement - to enhance literacy, numeracy and technical skills, to improve business knowledge and trust, to improve interpersonal skills and teamwork, to advance human capability as a vital strategic driving force, and to develop leaders as role models.

With advancing personal strength and capability, delegation and empowerment must follow to achieve results which are assessed toward continuous improvement. As the upgrade process continues, advancement, fear, excitement, risk and reward accelerate. Goals and success in reaching them are shared. We must become so the positive that the negative pales to absorbed in insignificance.

Where is our company in this regard? It varies a lot but overall on a scale of (1) to (10) we are past (7). Where is our country in this regard - not nearly where it could or should be.

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Contemplating change on a broader scale - the universe is getting older, more disordered, entropy is increasing and our sun is cooling down. Yet, despite all this, our planet is becoming a better place to live.

While the struggle goes on with drug abuse, illiteracy and innumeracy, greed, graft and crime and unrealistic short term expectations, the human race does seem to be making progress. There are new signs of nations coming closer together politically to search for a better way to get along and to get ahead.

We all increasingly recognize that improved quality of life is best obtained through Economic competition, not military competition, as a practical matter.

Although some may not have recognised it, World War III is in progress and it is an economic war. While the objectives are much the same, the approach is considerably more civilised. And the game could be more fun. Some will do better than others, but there need not be losers.

Free enterprise and democratic life style seem to be evolving as preferred approaches. Citizens in nearly every society seek and anticipate, more. Fulfilling rising expectations represents a real management challenge for companies and for countries. Economic competition can provide the new opportunities people look for, in a time when brain rather than brawn can prevail, and cooperative, consolidated, dedicated approaches to competitiveness can achieve relative success. Today's productivity leaders (Germany, Korea, Japan) are examples of such success. Think of the change these societies have undertaken in the last 45 years. Think of their relative prosperity. (Then to Now). In a much shorter period of time, eastern and western Europe could reunite. starting with Hungary - then - Germany. The economic synergy between Germany and Russia (for example) is large and long term. Russia could become an important part of the EEC in time. This (total European) market could grow substantially as over 600 million people buy more each year. Russia, probably followed by China, will develop in the far east with the assistance of This Eurasian market will include nearly 4 Japan and Korea. billion people.

Both sides of South America will develop even faster, as will Indonesia, especially in our industry. Africa will too, but later. The western hemisphere and Africa will include about 800 MM people each. Increased demand in North America will be modest compared to higher rates elsewhere. Everyone will be seeking Third World costs and first world prices. Most of you will recognise the most cost effective pulp mill in the world. This will be an ongoing productivity challenge to first world workers, engineers and managers. Eventually the gap will close from both sides.

Thus, the outlook for strong economic growth is very favourable. The outlook for widespread prosperity is better than ever before. So the stage is set. Opportunity? Immense! Risk? Immense! We are facing real, and significant change. The issue? Can we manage it? Can we learn to learn faster? Who will do better? Lots of important questions.

How do we establish the rules? Who does this? How do we enforce the rules? Do we even need rules - or will free trade do it? If so, how do we keep free trade free? How do we get free trade in the first place? Can we sustain a sense of equity as economic prosperity develops and spreads, and how can this be done? Clearly, rules will be necessary. More than 6 billion people will be involved; better informed people demanding people with a sense of their own power and full of expectations. A strong peace keeping force also will be necessary - but its presence will be enough. The right joint venture could do it. The concepts of free trade will necessarily spread world wide. Compatible values, principles and goals will be surfaced to guide world leaders. An expanded, reoriented UN may provide the mechanism. And then there is leadership. An issue to ponder.

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As we enter the 21st century, leaders of our countries, especially America and Russia, will be developing new priorities in a rapidly changing world - committing considerably greater portions of GNP, to technology, capitalization of industry, and education, and considerably less to the military. Fig. 7. America will come to grips with its trade imbalance and excessive spending - but will establish equal and opposite barriers and subsidies until real free trade occurs. These are some of the gut issues of our global economic war as we enter the new century.





### Hardball Rules

Balance Trade Level the Playing Field Balance the Budget

Fig. 7

But assume that it all comes off well in the coming 10-15 years. World population will likely expand to 6.5 billion. Considering the upside scenario, per capita consumption of paper on average, could increase over 2% per year. What are the implications of this magnitude of change for our industry?

Worldwide paper consumption, Fig. 8., could extend beyond 400,000,000 tons by the year 2002 or so, nearly double today's level. We could grow as much in the next 10-15 years as we have in the past 100.



Fig. 8. World Wide Paper Consumption (1870-2010).

If the cyclical growth that we have experienced over the past 100 years driven up by worldwide prosperity, the coming 10 to 15 years could be very exciting Fig. 9 - especially in terms of supply and demand and related industry prosperity. In fact, this magnitude of growth would be extremely difficult to bring off. If half of this paper is made from recycled fibre, 200 MM tons will be required, from this source, up more than 3-fold current recycling If the balance is from virgin pulp, capacity will need to rates. increase nearly 50 MMT/YR. This requires 100 new pulp mills at 500,000 T/YR, or 10 each year. If we add recycle mills, substitute some high yield pulp mills, add paper machines and converting, new process financing could require \$40B each year.



Fig. 9. World Wide Paper Consumption (1970-2010)

An investment bankers dream. If we produce 200 tons per year per employee our industry will employ 2 million people and create nearly 1 million new jobs early into the coming century.

### 1 Million New Jobs + Capital Constraints

### SUBSIDIES

Subsidisation to secure some part of 1 million new jobs (etc) will likely be irresistible. Is it possible to grow at this rate? It is very interesting to visit the elements of what, where, when and how of this in greater detail. But, you are all doing this in your long range planning so no need to elaborate here.

Now - let's have some fun speculating on what some of the moving parts of our industry might look like in the next century.

### PEOPLE

Labour and management cost will be reduced on a unit of production basis as industrial production (and wealth creation) expands. An issue will be whether more people should work fewer hours per day and days per week. Probably so, if the fixed cost of employment can be controlled. The outcome, with cultural as well as economic implications, will have an important impact on competitiveness.

21st Century people will be better educated, better trained, better motivated and better paid. A much higher portion of their compensation will be performance related, or variable (compared to fixed) in nature.

All employees will likely have the same benefits programmes. Compensation will reflect responsibility (risk) and skill, and overall business performance. The percentage of variable compensation will increase with pay level. While automation and robotics technology will advance, concern for removing human involvement in products will increase. Artificial intelligence and expert systems will help. And, full employment must be the objective. Interesting issue!

Where unions exist they will be much more involved in education and training and preventing abuse of power, and much less involved in compensation and work rules. In better companies the term "labour relations" will disappear. The "all salaried" work force concept will continue to advance.

The best and brightest will be even better and will have the opportunity to rise to the top of their fields, departments and companies more quickly. Management, however, will still be optimising the balance of individual competition, opportunity and rewards. Successful companies will have continuous schools for all personnel. Illiteracy and innumeracy as limiting factors will be virtually eliminated as control systems become more capable and complete. Organisation design will reflect more advanced information technology and business control systems. Systems suppliers will bring complete packages to manufacturing companies as we progress from CIM to CI Business. Use of such comprehensive systems will be required for competitive quality conformance, optimisation, cost and profit.

People will be happier as they are more involved with their work, as they experience new satisfaction in shaping a better way of life along the way for themselves and their families.

### MATERIALS

Fibre will be at least 50% recycled on average, with a wider quality range from unbleached to deinked and bleached. Inks, binders, stickies and other sources of contamination will be modified for better compatibility with recycling. The newspaper delivery system will be reversed to include pick up to provide complete recycle potential. Municipal solid waste problems worldwide will drive these changes. The quality of recycled fibre will be improved in all respects and utilisation will be advanced by separation for optimum application in various parts of the sheet structure. Fibre economics will be a more important driving force in advancing technology in multi-layer and stratified sheet forming.

The same optimisation of use will apply to virgin pulps, including springwood and summerwood, hardwoods and softwoods, eucalyptus and radiata, grasses, and fines.

Chemical pulps will be stronger and the premier fibre will still be (Northern) softwood but even more so. This will be affected by supply and demand as well as the need for reduced basis weight in all products.

Extended delignification and bleaching without chlorine will be commonplace worldwide. As chlorine disappears caustic supply will become a real issue. With advances in process water treatment and control, mill effluent will be reduced to insignificance. Optical properties as desired from fibre, fillers, additives, mechanical treatments, coating and printing will be changed and re-optimised. Binders, activated lignin and fillers will become more important.

The balance of growth of chemical versus other kinds of pulps such as Alcell, Stake, BCTMP, etc., will be sensitive to the cost of capital, subsidisation of wood consumption and our ability to maximise best use. Assuming that strength is controlling, this is one current view of fibre value: This chart shows the

|                                  | Variabi                         | e Cost | or sius | n Pulp | (\$/ST) |
|----------------------------------|---------------------------------|--------|---------|--------|---------|
|                                  | NSWK                            | SSWK   | NHWK    | Eucal  | BCTMP   |
| Excl. Cost of Capital            | 300                             | 230    | 210     | 100    | 260     |
| Cost of Capital                  | 140                             | 140    | 120     | 140    | 50      |
| Inc. Cost of Capital             | 440                             | 370    | 330     | 240    | 310     |
|                                  | Cost of Strength (\$/Equiv.Ton) |        |         |        |         |
| Excl. Cost of Capital            | 300                             | 253    | 336     | 160    | 468     |
| Incl. Cost of Capital            | 440                             | 407    | 528     | 384    | 558     |
| Relative Weight                  |                                 |        |         |        |         |
| for Equiv. Strength <sup>2</sup> | 1.0                             | 1.1    | 1.6     | 1.6    | 1.8     |

These relative values assume a homogenous sheet structure where basis weight is controller by strength. There are other controlling properties such as formation, smoothness, opacity, bulk, modulus, etc in various paper grades of course, that provide very different results. But these decisions are made every day and provide optimum results.

As wood cost continues to rise and availability becomes an increasing issue, and as chemical pulping and bleaching costs escalate with sophistication and control, and as municipal solid waste becomes a real social/political issue - the technology and use of recycled fibre will advance rapidly. Further advances will also be made to improve lignin bonding in high yield pulps. These forces could bring about the decline of new hardwood kraft mills with the exception of eucalyptus or equivalent in developing regions of the world.

But "Free Sheet" will become somewhat of a speciality as recycle laws get tougher. New surfaces will blur the difference between coated and uncoated papers. Our preoccupation with gloss and brightness of substrates will decrease.

<sup>1</sup>Assume 12% Cost of Capital (Int. + Depr.): Direct Cost incl. materials, energy, labour

<sup>2</sup><u>T</u>otal <u>Strength</u> <u>Factor</u> - BL + Burst + Tear

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### NEW PAPER MACHINES

will be:

• Shorter, faster but no wider (except Europe)

will include:

- Layering capability with modified high consistency forming
- White water treatment with continuous chemistry control
- Wide nip presses
- Displacement, impulse and restraint drying
- Even higher solids size press coaters
- Several soft calendars, perhaps a hot one or so
- On line strength, optical and weight/moisture controls
- Combined process control and information systems with cost (and profit) information built in to allow on line, real time optimisation action and reporting.
- Predictive maintenance with continuous monitoring of temperature, vibration and other indicators.

These machines will need high tech operators, probably process engineers in most mills. These people will be very valuable and will work without shift supervision as delayering continues. It would be great if all managers of the future held such jobs. No substitute for profound knowledge.

Material handling automation will continue with advancing robotics.

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#### ENVIRONMENT

The challenge of environmental issues will continue to escalate on a world wide basis. As dioxin and chlorinated organics are put to rest the following will require increasing attention.

The greenhouse effect from excess  $CO_2$  from burning (and breathing) and insufficient  $CO_2$  absorption and  $O_2$  generation from plant life will remain an important and difficult issue. Reduction of burning in a growing population with increasing affluence will not be easy.

Ozone layer degradation from VOC's, CFC's etc, will be much improved with controls currently advancing - but world wide control will remain an issue.

Acid rain will be substantially reduced with control of sulphur (as in coal) burning, scrubbers and filters in advanced countries. This will increase the cost of energy and represents another competitiveness issue.

Toxic materials that are known today will have been essentially eliminated from waste streams and products in responsible countries.

### TECHNOLOGY

You know this area much better than I. The need for strategic and technological alliances will increase as truly global economies and trade develop. Mankind issue technology such as Dioxin will be shared openly.

Sharing within countries will increase toward maximisation of returns on total national assets in the best interest of citizens.

Co-operative, co-ordinated development of technology in the US needs to improve the most. The separation of basic vs proprietary (product related) technology will sharpen to facilitate this.

### CONCLUSION

Change will accelerate and our ability to lead it must and will improve. We will learn to learn faster - some more than others.

Conclusions Into the 21st Century

- Change (growth) will accelerate
- People will be happier

### - If we co-operate

- If we make it fun
- The paper industry will prosper
- Leaders will evolve
- The world will be better

The world can and will be a better, healthier, more rewarding place to live. We can and will make it so. Leadership in this direction must be recognised and supported.

Where will the talent come from? For our industry, some, without doubt, are in this room today. More will develop within our companies and we will attract more and better talent from our high schools and colleges. We will do a better job developing existing employees as well. (All of them).

Our industry will continue to evolve as one of the very best to allow wealth creation for our countries and our related stakeholders. With renewable and recyclable raw materials making products than enhance the quality of life in developed and developing societies, we can't miss if we do it right.

Now, back to the leadership issue and business environments in our various countries. Where does it come from? How do we get all constituencies to co-operate and pull together. In some fortunate countries effective government leaders will bring it off recognising the best approach to the better life. In other countries where political gridlock resists leadership and self interest groups impede co-operation and teamwork, it will fall upon industry to lead the way. Hopefully in these countries, industry, at least, will co-operate and work together as partners toward inter-national competitiveness. New leaders will be merging over the coming decade, especially where political systems become more enlightened, business like, and worldly.

And a final thought on change:

### The man of yesterday has died in that of today,

### That of today dies in that of tomorrow.

### Plutarch

Thank you for your indulgence in listening to my views of the future. You all have them as well, probably "better than mine". I hope that you have heard an idea or two that stimulates your thinking. Especially toward the human side of enterprise. Progress in our industry is largely in your hands and I want you to do well by it. The Paper Industry has certainly been kind to me over my 43 years of involvement.

My best wishes to you in making the world a better place as we proceed into the 21st Century.

### **Transcription of Discussion**

### **GUEST SPEAKER'S ADDRESS**

### R. C. Williams

### C.O.O. James River Corporation

### Prof. J. Marton, S.U.N.Y.

Mr. Williams, you have painted a very interesting and almost delicious picture of the time to come. I recently visited Eastern Europe, most specifically Hungary, and came away with the impression that their economic growth cannot be fulfilled without the direct participation of Western industries, and this is also true for the paper industry. What role do you anticipate that the western industries, specifically the paper industry, should or could play in this direction? Frankly, there are no wonders of the 21st Century available for these people unless we help them to achieve it. The conflict in the economic sphere is more reassuring than the conflict on the battle field. You certainly showed that, and certainly the former is less expensive.

### R.C. Williams

I wasn't implying that, my own personal opinion is that Eastern Europe is going to develop at a much greater rate with the Iron Curtain going up, and where people are seeking freedom and free enterprise as we are seeing now in Hungary and some of the other countries that are bordering on the East/West interface. When this happens, as it surely will, there are many synergies between the East and West, which could be developed if the right atmosphere prevails. From economic and financial synergies to technical synergies to sharing products and markets. Of course, what many of these countries, including Russia, need are products on the supermarket shelves. They are seeking help from the West, including the U.S. for supplying those products and eventually to be making those products. So, developing trust, together with the desire to participate, is the way we can help the most. Does this answer your question?

### Prof. J. Marton

You have formulated the answer very well as to how we should proceed.

### Prof. D. Wahren, Stora

Thank you for a very stimulating talk. You said two things, and I wonder if they were just smoke screens, or if you believed in them. I noticed you paid a lot of attention to strength and showed it's cost, then, a few minutes later, turned round and said that brightness, gloss and similar properties should be thrown to the wolves. Is that what you really believe?

### R.C. Williams

Obviously, I am not going to tell you everything. No, that isn't what I really mean. Strength is a property that, when we talk about pulp quality, we tend to spend a lot of time on, and historically in homogeneous sheet structures which, for the most part, will not be that way in 10 to 15 years time. Brightness and gloss are a different issue as is how to acheive the optical properties which are attractive to consumers. It is some people's view, including my own, that we do not have the optimum set of properties yet, although we make a good sheet of paper sometimes. I believe that I added that if you wanted to get into sheet structures, you can apply the same approach and come up with a dozen tables similar to the ones I showed.

### P. Whiting, Abitibi-Price

Over the next 10 to 15 years, a large amount of capital money will be spent on environmental treatment facilities, etc. Do you know if anyone has estimated what the expenses will be for the industry worldwide over the next 10 to 15 years, and secondly whether or not the amount of money being spent on Research and Development to reduce those costs is adequate?

### R.C. Williams

I do not know whether anyone has estimated those costs, but we are studying ours in two steps. The first is to replace chlorine by chlorine dioxide, and the second is extended delignification in oxygen stages. In our Company, this investment is approaching 300 million dollars worth and we are making about 4 million tons If you scale this up to the 220 million tons of of product. product currently made, this will give you some idea of the total investment. The second part of the question dealt with Research and Development and if enough was being spent. I think we know how to do it, and I think personally that enough is being spent on it, we know the route and that it is expensive and there is no easy way to do it. I think that if we go to extended delignification and chlorine dioxide bleaching, then there is an opportunity to upgrade strength in this process as opposed to down grading it as is the current experience. I think this is an opportunity that we have not done enough work on, so as to the concern which is being shown and the work that is being done on this issue, my own thoughts are that we need to do more work on the upside, whilst winding down other approaches. As pulping and bleaching become more expensive, then a lot of opportunities will open up.

### Dr. R. Grant, Consultant & Pulp & Paper International

You make a very good point that motivation and leadership are the principle factors. Working as a consultant with companies, both large and small, one sees an increasing alienation of the individual in terms of motivation and pulling in the same direction as the company gets larger. Now companies are getting larger. Your Company has grown from a one machine mill to, we hear, the largest in the world. Could you tell us about your change of approach to maintaining the individual's motivation as your Company got larger?

### R.C. Williams

This was mentioned in the paper and we are not happy with where we are. However, involvement in decision making and sharing in our collective success are some of the more important variables. 75% of our 42,000 people own stock in the Company, and almost as many are in profit sharing plans. These kind of things help. As I have said previously, we are not really satisfied with where we are. It is still inconceivable to me that 25% of our people will not share in ownership and only have a passive interest in profit sharing. So we need to work harder, and a lot of it has to do with misunderstanding, not being against the establishment, but not understanding what ownership is all about as well as what profit is. This is what we have found when dealing with people on both subjects, so clarification is a part of it as well as education and continuous involvement. We have acquired 40 companies over the last 20 years and there are a lot of cultures to bring together. Trust is, of course, the other requirement.

### S.F. Loveday, Townsend Hook

The EEC achieved the use of 47% recycled fibre last year. Is your 50% useage by the end of the Century high enough?

### R.C. Williams

Perhaps not, the 50% was worldwide, some countries are going to have problems. We in the U.S. will have a hard time getting to that level. It needs to be done so some countries will achieve higher than that as in Japan and the EEC, others will be lower.

### H.P. Didwania, Jefferson Smurfitt

Would you like to comment on the changing outlook as to the way the paper industry will be conducting research?

### R.C. Williams

I hope that there is more co-operative research going on worldwide as well as co-operative research within countries. In my opinion, the country which has the most progress to make in this regard is the United States. However, there will be a lot more communication within the industry worldwide and R. Estridge is working on better research communication within the United States, and I can see this evolving positively. Will it change much within companies? For the future, I would like to see our Company R. & D. get closer to these strategic missions and plans of control, with the needs in the market place understood directly. These are just a few miscellaneous comments on a complicated issue.

### B. Radvan, B.R. Research & Consultancy Ltd

In the earlier part of your report, you singled out John Maynard Keynes and his teaching. It is fair to say that over the last 10 years or so, the teaching of Keynes has been very unpopular in this country and I rather think in America. I understand that you are not of that opinion and do you therefore believe that Keynes teaching will play a large part in economical management of the future?

### R.C. Williams

I don't believe I said that. I think that Keynes economics were first applied during the Roosevelt administration and the depression, and the so called "pump priming economics" worked out very well for our country. There are times when that kind of Government involvement is necessary. Part of it goes on to apply site economics, but I do not think that I was implying that Keynes economics are no longer appropriate. It is nice when heavy Government subsidisation is not necessary, and should not be so in good healthy economics and competitiveness.