January 10, 1966

INDUSTRIAL RESEARCH AND PRODUCTIVITY IN CANADA

by

DR. O. M. SOLANDT

VICE PRESIDENT RESEARCH AND PLANNING

THE DE HAVILLAND AIRCRAFT OF CANADA LIMITED

Address to

THE CANADIAN CLUB OF TORONTO
January 10, 1966
by
Dr. O. M. Solandt

When Mr. Gathercole honoured me by the invitation to address you today, he suggested that I should give a general outline of the state of industrial research in Canada with emphasis on any current problems of particular interest or concern. I have now been speaking to Canadian audiences on industrial research and the closely related problems of defence research for just 20 years. Through all of that time, I can honestly say that I have been unhappy about the evolution of industrial research in Canada. The situation is now better than it has ever been before, and I feel that we can justly be proud of the accomplishments of the past few years but we are really just beginning so there is still no reason for complacency.

An important but little publicized evidence of the growth of industrial research in Canada was the formation two years ago of the Canadian Research Management Association. A few Canadians who were familiar with the Industrial Research Institute in the United States and with the excellent work that it had done in encouraging the growth of industrial research there felt that the time was ripe to start a similar organization in Canada. There was a large and ready response and at the first meeting in 1963 there were more than 50 people, each of whom was responsible for the day to day direction and administration of a significant group of research workers in a Canadian industry. Fifteen years earlier, it would have been difficult to assemble ten such

people in the whole of Canada.

In addition to this organizational evidence of the growing strength of industrial research, there is the physical evidence of the new laboratories that are springing up all over Canada. As you know, it is the fashion now to build laboratories in groups in order to share facilities and to help in the creation of a stimulating and attractive physical and psychological environment for the research workers. One of the largest and most advanced of these groups in Canada is now evolving at Sheridan Park around the planned laboratory for the Ontario Research Foundation. Seven buildings have been completed, five more are under construction, two more will be started in 1966, and more are being planned. There is a similar group of laboratories in Montreal and others are already appearing elsewhere in Canada. In addition to these major industrial research parks, several equally important research laboratories have been built either adjacent to the factories that they serve or in choice suburban localities selected for the desirable environment that they provide for the research staff.

However, even though industrial research in Canada is expanding rapidly, it still has serious problems. The most important of these is the difficulty of providing good research support for the small industry and most industries in Canada are very small, especially by U.S. standards. Even if a new company starts with good saleable products, it is difficult at first to earn enough to support the research and development program needed to devise new products or even to keep the old products competitive in the changing technological environment of today. Provincial

research foundations are being particularly helpful in the support of small industry. The Ontario Research Foundation was a pioneer in this field and now eight out of the ten provinces have provincial research councils that are devoting substantial resources to help small industries with their problems. In this field, most of them work closely with the National Research Council.

In the United Kingdom, the problem of the small industry has been to a considerable extent met by the formation of industry-wide research associations. While the concept of the research association has been generally accepted in the United Kingdom, it has never caught on either in the United States or in Canada. The only strong and aggressive industrial research association in Canada is the Pulp and Paper Research Association. There has recently been renewed interest in the idea and the possibility of forming new associations in Canada is being actively discussed. However, I doubt if they will become numerous, partly because Canadian industry is not yet used to the intimate co-operation that is needed to make an industrial research association work, and partly because the dominant effect of branch plants in many industries will prevent united action.

The second major problem of Canadian industrial research is the branch plant. For many years, many big U.S. and a few British and European companies had substantial manufacturing facilities in Canada but did no research here, importing all their technology from the parent plant. In the early days of the growth of Canadian industry, this was a satisfactory arrangement. By importing advanced technology at relatively low cost, Canadian industry was able to keep technically up to date in a way

that would have been quite impossible had we been entirely dependent on our own resources. However, as our industry matures, and as we have an increasing need to find challenging jobs for highly skilled people in Canada, there are strong arguments for insisting that these companies do part of their research in Canada. Happily, in recent years, many of these branch plants have developed first class research teams in Canada. I believe that this has resulted from two factors. First, the government tax incentives have proven very attractive to industries that had done no research in Canada in the past. They have been able to build laboratories, staff and equip them, and to get 150% cost allowance for income tax for the entire expenditure. In addition, those industries that have tried the experiment have found that they are in fact getting good value for the dollars that they spend on research in Canada quite apart from tax concessions. This is not surprising. It does not mean that Canadians are better research workers than Americans. It merely means that the percentage of university graduates who make first class research workers is quite small in any country. In the U.S., the competition for the first class research worker is extremely keen and any laboratory is fortunate to have even a few of the best. Companies recruiting in Canada find it just a little easier to get the top flight research workers especially if they offer challenging new jobs near home and so they find that if they already have a big laboratory in the United States, they can get more for their added dollars by starting a small laboratory in Canada than by adding to their big one in the States. This establishment of new laboratories is one of the very important results of the government's tax incentives. Continuation of the incentives should result in the spread of research into many more

branch plants in Canada because there are still many that have ignored the opportunity to do research here.

Over the years, I have also joined the chorus who from time to time have bemoaned the relationship of the government to industrial research. Here again, things are much better than they were. Several government schemes for the support of industrial research are going well. The contact of government laboratories with industry has improved immensely. At the moment, I think that most industries are beginning to worry whether the government will take too much interest in their research rather than too little. There is certainly a tendency for the enthusiastic young scientists and engineers in government to use their position as advisers on government expenditure to gain a remarkable measure of control of industrial programs.

Another perennial cause of concern was the lack of close contact between industrial research and the universities. This also is improving rapidly and is evidenced by such things as the growth of co-operative courses in Engineering at Waterloo University, the evolution of the Master of Engineering course at the University of Toronto, and the occasional complaint among university administrators that the professors are making too much money from consulting work in industry.

It would be most ungrateful for any one connected with de Havilland Canada to discuss these subjects without giving heartfelt thanks to the National Research Council and the University of Toronto for the splendid co-operation that has flourished over many years. Since I had no personal responsibility for establishing this relationship, I can praise it freely. DH Canada has long been the major industrial user of the wind tunnelsof the National Research Council and the National Aeronautical

Establishment in Ottawa and much of the NRC's own aerodynamic research program has been directed into fields of interest to de Havilland.

The Institute for Aerospace Studies at the University of Toronto has supplied many graduates and much research assistance to DHC. In turn, DHC engineering staff have given lectures and supervised research at the IAS. Without these twin pillars of support, DHC could not have maintained the technical leadership that has enabled it to sell aircraft in competitive markets around the world.

Progress toward the solution of these problems has undoubtedly contributed a good deal toward the growth of industrial research in Canada. However, probably the most important factor in the increasing effectiveness of industrial research in recent years is a rather intangible one. Thirty years ago, the scientific community in Canada tended to look down on industrial research as being rather beneath the dignity of a real scientist. In general, industry returned the compliment by ignoring scientists and the possibility of getting help from them. This whole attitude is changing and more and more scientists and managers are becoming aware of the economic value and importance of research. I believe that the remaining problems of industrial research in Canada will quite rapidly be brought under control when everybody in the scientific community, from the university teachers right through to the men who run production in the mines and factories, are firmly aware of the important economic contribution that their work can make toward the prosperity of Canada and when management is equally aware of the value of research.

So much for a very brief progress report on the present state of industrial research in Canada. I have avoided statistics but the statistics do support in detail the general impression that industrial research is at last on the move in Canada. Let's keep it growing. The fastest growth that we can achieve will barely keep us abreast of a rapidly changing world.

Now to return to the title of my address, Industrial Research and Productivity in Canada. I have tried to indicate to you that, in the field of industrial research we have made progress but have no reason to rest on our oars. We must do still more to keep our place in the race. In the field of productivity, the Second Annual Review of the Economic Council of Canada which appeared last week gives a detailed picture of our present situation. In its conclusions and recommendations, the section on 'Policies for Improved Productivity', which is prominently placed at the beginning of the Chapter starts with the sentence - 'Continuing improvements in productivity are an essential basis for the satisfactory achievement of all our social and economic goals'.

In the report of the Economic Council, the term productivity is used in its general economic sense. It is a rather crude but very useful measure of the efficiency of the entire productive system. I shall not attempt to discuss all the factors that enter into productivity but will merely mention some that are very much influenced by industrial research. However, before doing this let us look at some of the facts about productivity, national income and education that are described in the report.

The salient fact is that productivity gains during 1965 have been disappointing. Unemployment was very low, less than 4%, the labour force increased at the unusually high rate of 3-1/2% per annum, hence the growth in total output was a satisfactory 6%. The economy also operated at 97% of its potential but, in spite of all this, the growth of productivity was below the target. To quote from the report - "Consequently, to attain potential output in 1970 the rate of productivity expansion required for 1965-70 will be higher than apparently actually occurred in 1964 and 1965".

Our performance relative to the United States is also unsatisfactory. Our output per employed person is increasing less rapidly and our average hourly earnings in manufacturing more rapidly than the same measures in the U.S. At the same time, our average income per person has remained about 25% below the U.S. and shows no signs of catching up.

I shall not attempt to speculate upon the causes of these disappointing results nor upon all the possible remedies. I do want to discuss how more and better industrial research can help but before doing so might mention that the Economic Council's report also calls attention to the quantitative deficiencies in education in Canada when compared to the U.S. The U.S. worker who earns 25% more than his Canadian counterpart has at least two years more schooling and this difference has been increasing, not decreasing in recent years. If I might be excused for putting on my Chancellorial cap for a moment, I might also point out that at the university level the U.S. labour force contains about twice the percentage of graduates that we have in Canada. The report of the Economic Council emphasizes the great economic

importance of more and better education so I shall not belabour the point further.

This then gives us a picture of the Canadian economy that differs somewhat from our usual view of ourselves. It shows a country working almost to capacity, with very full employment but with unsatisfactory growth in productivity and a lower per capita income and less education than its neighbours to the south. I shall leave the problems of income and education to others and talk briefly about productivity.

There seems to be general agreement that we in Canada can only continue to be prosperous if our productivity increases as fast or faster than those with whom we compete in world markets. This can only be done by the continuous introduction of new or improved products, new production methods and better management.

Industrial research lies at the very heart of this whole process. Many people, even in industry, still think of industrial research as being primarily product oriented. To them, the invention of the better mouse trap is the goal of industrial research. They think only of new products or of continual improvement of old ones. This is undoubtedly an important goal of industrial research but industrial research also makes a major contribution to the success of competitive industry by devising new production methods, new machines and new ways of using old machines; by finding new materials and new applications for old materials, and even by devising new systems for production and management.

There was a time when increasi ng productivity was interpreted by most people as the process of making the working man work harder. Now-a-days, that is a very small part of the task of increasing productivity. Providing better designed

products that are easier to make, better and more automatic machines, and particularly improved organization of work, better planning, more skilled supervision and more perceptive management all come before making the man at the bench work harder. There is no doubt that the output per man hour in Canadian manufacturing industry is in most cases below that of a similar plant in the U.S. We are accustomed to attributing this to small production runs, limited tooling and other factors beyond our control. Such factors undoubtedly explain a large part of the difference but if we are realistic we must at least discuss the possibility that both management and labour prefer to work at a less hectic pace and that our staff work is less complete. It is just as difficult for a small factory to afford the best in planning and management staffs as it is to afford the best in automatic tools. But in both cases,we in Canada must squarely face the problem and do our best to solve it. The thought that I want to leave with you is that good industrial research includes the management sciences and that they have been rather neglected in Canada.

In advocating an increase in the volume of research and in the pace of technological change in Canadian industry, I am not suggesting anything that is unfamiliar. Our present prosperity is largely due to the increasing application of the results of science in industry. In the past, most of the science came from outside Canada. This will continue but we must rapidly increase both our ability to absorb outside help and the extent of our own contribution. The world is changing so rapidly that we must run hard to stay where we are. There are a good many thoughtful people who feel that what we are experiencing is far more than an acceleration of the familiar process of mechanization. They feel that it is a new and threatening process called automation which will lead not to increasing prosperity but to mass unemployment. In taking this view they seem to be forgetting that it is the application of science to

industry and particularly the part that we call automation that has produced our present prosperity. Consider for instance our modern automobile industry. I wonder how many industrial workers throughout the world would be driving automobiles to work today if they were still being made by hand as they were fifty years ago. Try to imagine what our industrial economy would be like if the automobile industry consisted only of a small number of craftsmen putting out a few thousand hand made cars each year. Where would be all our employment in building roads, refining and distributing gasoline, and operating the huge travel industry?

I am deeply convinced that if we handle it correctly, automation can produce a continuing rise in the standard of living for all of us. Unfortunately, it will also inevitably cause dislocations in employment and these dislocations can be very serious for the individual but if as a nation we wish to remain materially prosperous, we must welcome and encourage automation and find out how to deal sympathetically and generously with those whose lives are upset by it. The younger ones can be retrained and the older ones must either be found congenial employment or adequately pensioned. It is also sensible to try to increase the pace of automation in times of full employment such as we now enjoy. This will produce more immediate benefits and less hardship than similar changes made when there is more slack in the economy.

If we in Canada fight against automation, our competitive position in world markets will suffer and there will be a steady decline in our standard of living and a rise in unemployment with all its attendant misery and poverty. We are living and competing in a changing world. Unless we change to keep pace with our environment,

we will lose our place in the race. Right now, in 1966, automation is being introduced in Canada faster than ever before. Employment and income are at an all time high. One of the few real worries of the economic planners is that productivity is not rising as fast as it should for us to keep pace with world competition. It is certainly not rising any faster than it has many times in the past when automation was not even mentioned. A time may well come in the future when the social problems arising from automation will force us to slow down. For the present, I believe that Canada is in more danger from too little automation than from too much.

I have talked mainly about the material prosperity of the nation and of the problems that will be encountered in maintaining and even increasing it. In spite of our problems we are one of the most favoured nations in the world. Mere affluence is not an adequate goal for such a nation, nor does it satisfy most Canadians. We agree with the idea that General Vanier express in his inspiring New Year's message - 'Oh, what a responsibility affluence carries with it -- a responsibility to all humanity, to those who are handicapped, to those who are miserable, to those who are hungry.'

Let us therefore resolve that in 1966 we Canadians will not only strive to maintain our affluence but will also labour to discharge the responsibilities of this affluence by helping those in need both within our own borders and throughout the world.