

Science Week Ireland 2008

Address by NCC Chair, Dr Don Thornhill at the Teagasc Walsh Fellowships Seminar, RDS, 12 November 2008.

Summary

We need to maintain investment in the knowledge society despite difficult economic and fiscal circumstances. The Government has committed to making substantial investments in making Ireland a knowledge society. The challenge now is to maintain this commitment in difficult times.

We have made progress in putting resources into knowledge development but we are not by any means heading the investment tables. Faltering now would be a major policy error.

We need to pay particular attention to PhD education. Is it time to set up a stream within the PhD programmes where some PhD students would do courses which would provide them with much of the experience and learning of MBA

students? This is not an option which would appeal to all PhD students by any means but it could develop into an extremely prestigious educational option attractive to candidates who want to pursue careers in business and in the public service. Graduates of this stream would be attractive to employers. They would have advanced scientific and engineering knowledge, a familiarity with working at the knowledge frontier but because of their wider training and learning, they would be equipped to contribute immediately across a range of business functions. This could become an extremely attractive educational career option which would enhance the attractiveness of taking science in school and in college and in pursuing careers in science and technology. This new generation of business managers would be leaders in knowledge transfer and the exploitation of knowledge generated in Ireland and across the world for business, economic and social gain. They could be key agents in delivering the objectives of the Strategy for Science Technology and Innovation.

Mr Chairman

Introduction – Dr Tom Walsh

It is a great honour indeed to have been asked to speak at the Walsh Fellowships Seminar in the historic surroundings of the RDS. The late Dr Tom Walsh devoted his life to the development of Irish agriculture, the economy and society. He would certainly have approved of the RDS as the venue for this important meeting. The RDS was established in 1731. Its foundation objectives, which are still pursued by the Society, are to promote and develop agriculture, arts, industry, and science in Ireland. The Society organises many awards, shows, recitals, concerts, competitions, seminars and lectures annually to promote these activities. Its keynote activities include the Boyle Medal for excellence in science which is the premier individual award made in Ireland for Irish Scientists.

The foundation activities and programmes of the RDS resonate very well with Dr Tom Walsh's ambitions for his country which motivated his remarkable contribution to agriculture in Ireland and to Irish development.

When I was growing up in provincial Ireland in the 1950s and early 1960s, Dr Tom Walsh was one of a small group of people who were icons in our society. These included the leaders of what we then called semi-state bodies (an interesting term in itself with the implication that there was something better about being semi rather than full state!). These organisations enjoyed considerable prestige. They were seen as epitomising Séan Lemass's ambition of leading Ireland into full participation in the world economy. In many ways these organisations represented, at a psychological level, the first wave of the critically needed break with the past inward looking economic policies. The key strategic thinking which underpinned the policy decisions to move to an outward looking

stance and the battle for the hearts and minds of government was undertaken by Dr T K Whitaker and his colleagues in the Department of Finance while on the ground the modernisers included such men as Dr Todd Andrews of Board na Mona, General M J Costello of the Sugar Company and Dr Tom Walsh of An Foras Taluntais or the Agricultural Institute. An interesting contrast perhaps with today, and a saddening one, if this contrast is correct, was that these men and other contemporaries were not only motivated by very practical patriotism but were publicly acknowledged as such. Their actions and positions were often vigorously contested at the time but their motivations and commitment to the country were never in doubt. Sadly, public figures and leaders are not seen so positively, or accorded the same degree of trust, today.

Tom Walsh as we know was born in Wexford in 1914 and the new State was just about 20 years old when he was awarded his PhD in 1941. I was lucky as a young civil servant to have met him in the early 1980s. The meeting arose from a policy disagreement with an organisation called DEVCO which he chaired. I cannot remember what the issue was but one day in the Department of Finance I got a phone call from a very cross Tom Walsh who bluntly left me in no doubt that he disapproved of some line of action which the Department was proposing. I made some efforts to explain our position and got nowhere. He did though agree to a meeting. I remember the atmosphere of the meeting but not the detail. But I do remember being impressed by his personal authority and his wily charm, and I came away with a sense of privilege at having met such a historically significant and substantial figure.

There are some parallels between the current policy emphasis on developing Ireland as a knowledge based economy and the foundation of AFT. The objective behind the establishment of AFT was to create and use knowledge and human capital for the development of Irish agriculture by creating a leading edge

research and knowledge transfer institution. High quality researchers were recruited into AFT and high standards were applied and expected from their work. By the standards of the time Tom Walsh's decision to encourage key staff members to undertake research in the US and gain research degrees in leading US universities was indeed mould breaking. It is perhaps a measure of his standing that in an organisation which was perhaps unique in Ireland of the 1950s and 1960s in having such a high proportion of PhDs in its staff that he was known simply as "the Doc".

I remember a further example of Tom Walsh's standing from a conversation I had just a few years with Dr Tom O Dwyer, former chairman of Teagasc and at that time Director General for Education and Training in the EU Commission. We were talking about leadership and role models and discussing the views of a management writer who had suggested that one of the characteristics of successful managers was the development of the management styles which consciously emulated the behaviour of one or more role models. I very clearly remember Tom saying that when ever he faced a really difficult challenge he would ask himself "how would the Doc deal with this?" High praise indeed.

Research policy today

The research policy landscape today is very different to situation and views which were current when AFT was established in the late 50s.

During the last 10 years, beginning with the decisions to establish the Programme for Research in Third Level Institutions (PRTLTI) and Science Foundation Ireland (SFI) – and I'm delighted to see Professor Pat Fottrell who chairs both SFI and the Research Committee of Teagasc here today. Pat has been a member of the SFI Board from its foundation and its chair for much of that time. He was also a powerful early supporter of PRTLTI.

Government policy driven principally in the early stages by members of the Government including Michéal Martin, Mary Harney and the present and the past Taoiseach, Brian Cowan and Bertie Ahern has been consistent in investing in R&D and in recognising the policy reality of the need for Government to invest substantially in research and knowledge discovery. This policy priority has also been confirmed by the Tánaiste and by the Minister for Education and Science.

Why do Governments invest in research and why do they need to?

Investment in basic research is an example of what economists call a market failure. Society benefits from this investment but the returns are too long run or too uncertain for the private sector and perhaps more importantly the benefits can often be captured by entities other than the original investors. In this sense investment in research shares many of the characteristics of what economists describe as a public good which will not be supplied in sufficient quantities for the welfare of society if the public sector does not play a major role in providing them. Education and security are often given as the classic examples of public goods. Unless Government invests, society loses.

For too long political and policy thinking in this country tended to take the line that if we were to invest in research it was best that it be applied and/or that the lead investment role be taken by the private sector. Investment in basic research was seen as a luxury – and, worse, an indulgence of academic conceits. These views prevailed for far too long and resulted in levels of investment in research and knowledge capital accumulation which were vulnerably low.

The recognition that this policy stance was wrong was a long time coming. But when it came the change was dramatic. The Government has now committed to substantial investments in R&D and in knowledge transfer in the National Development Programme through the Strategy for Science, Technology and

Innovation (the SSTI). It is also significant that effective cross cutting coordination mechanisms involving Government Departments and agencies have been established and that these are headed up by a Cabinet Committee on Science Technology and Innovation.

As part of our work in the National Competitiveness Council we make it our business to talk to Ministers and Opposition front benchers about policy priorities for enhancing competitiveness. We have been encouraged that the view about the importance of investing in research is widely accepted across most of the political system – or has been up to now.

The challenge now is to maintain this commitment in difficult economic and fiscal circumstances. Professor Gerry Boyle put the case very well in an article in the “Irish Times” last August. His argument is worth repeating.

“It would be a great pity” he wrote about the NDP commitments to investment in the knowledge economy “ if this programme were to be significantly curtailed to ameliorate the current difficulties in the public finances. Just as the potential rates of return to investment in knowledge capital are substantially greater than returns to other forms of capital, any curtailment in investment will incur even greater losses on a euro-per-euro basis.

These potential losses, by not proceeding with the full commitment to invest in knowledge capital, may be compounded over time because of the rapid pace of technological change. Even a slowdown in the required investment over a one-to-two-year period can create immense and sometimes insurmountable catch-up difficulties. These difficulties relate to the obsolescence of equipment and skills, apart from the headstart that might be given to our competitors in the knowledge-intensive sectors.

It is important, therefore”, he wrote “that policymakers make a firm resolve to adhere to their commitment to invest in knowledge capital. That commitment will

be rewarded in time though a handsome pay-off in higher productivity and thus living standards”.

I couldn't agree more.

The initial decisions from Government to the new changed economic circumstances are encouraging in regard to the commitment to investment in the knowledge economy.

In the October Budget Statement the Minister for Finance confirmed the Government Commitment to the SSTI and made significant increased allocations to SFI and Enterprise Ireland. Capital investment in the Higher Education Sector (which includes the Programme for Research in Third Level Institutions) was increased from to €265m in 2009, an increase of over €80 million on 2008.

However we are far from being out of the fiscal woods and difficult funding decisions will be required from Government in 2009 and perhaps longer. Without going into the details of recent and current public expenditure controversies we can get a sense of the challenges generated by the need to put the public finances on a sustainable footing, to protect living standards of the less well off and to lay the basis for future economic growth when external economic conditions improve. We have some way to go yet in developing a sufficiently strong public consensus around the policies that are required. This is a time of considerable policy risk. Despite good intentions the long run (which includes investment in the knowledge economy) runs the risk of losing out in the battle for resources against pressing short term demands – unless there is a sufficient public and political understanding and support around the need for investment in building the knowledge economy.

We all have a part to play in developing this understanding.

There are a few unhelpful misunderstandings which we need to dispel enroute.

The first is that we have invested heavily in basic research or knowledge development and it's now time to get the dividend and concentrate on the commercialisation of research results and on technology transfer. This is a seductive idea particularly at a time when the public finances are under pressure - but it is wrong.

We certainly are investing more in basic research than we did in the past – but it is not correct to describe our investment as “heavy”. In 2006, despite the ramping up and step change of expenditure over almost ten years Gross Domestic Expenditure on R&D was just over 1.5% of GNP – and less as a percentage of GDP. The OECD average was just short of 2.5% and countries which we are now competing such as Sweden, Finland and South Korea were spending in the region of 3.5% of GDP – over twice our proportion.

We are late comers to the contest of positioning ourselves as an advanced, high income, knowledge based economy. Some years ago in a lecture in Dublin, Michael Porter commented that we needed to appreciate that investment in becoming a leading edge knowledge based economy “*is a marathon not a sprint*”. If we were now to falter in the “Race to the Top” of the world’s economies we risk in Gerry Boyle’s words of giving a head start to our competitors.

The building up of research capacity is a cumulative process. Knowledge capital accumulates over time, principally in people. Top researchers are mobile. If we neglect investment in research and development we run the risk of losing the leading researchers working here to our competitors.

And, without the accumulation of knowledge and human capital we will not have the stock of these forms of capital to support a vigorous innovation society.

It is not an “*either or*” situation i.e. investment in **knowledge development** versus investment in **knowledge transfer**. A “*both and*” strategy is needed. One component of the strategy is incomplete without the other and this is why the SSTI makes considerable provision for supporting knowledge transfer. As a

friend commented the synergy between knowledge development and knowledge transfer is a bit like the Christian association between sin and confession. Without sin, confession is pointless. And without confession, sin is.....? Maybe I should leave it to you to explore this analogy?!

Another, hazardous illusion is that our investment in basic research and knowledge development will result in ground breaking discoveries which will produce transforming technologies which in turn will give us new opportunities for wealth creation on a grand scale. I remember cringing at one meeting when a scientist who should have known better made this forecast with great certainty in front of an audience which included the then Taoiseach, the then Tánaiste and several political, business and trade union leaders. This happy eventuality may happen but as you will appreciate it is an outside chance. In my view it is irresponsible to promise this to our public – if only because if they believe the promise and it is not fulfilled it puts the whole strategy at risk. Holding and articulating this view is not just naïve. It runs the risk of being irresponsible.

The reason why the Government invests in research is because this is the most effective means of investing in the people with experience of working at the knowledge frontiers who have access to the highest level international knowledge communities. This underpins the whole concept of investing in fourth level education. That is why the Government objective of doubling the number of PhDs is in my view correct. Doubling the numbers of PhDs requires a very considerable expansion in research capacity – increasing the numbers of Principal Investigators and team leaders – and the associated infrastructure and facilities. The increased PhD output in turn enhances our capacity to access and evaluate the tide of new knowledge being generated in all the developed economies and societies and indeed in the rapidly developing ones such as India and China.

In this regard it is interesting that a recent SFI survey of graduating PhDs whose work was funded under SFI programmes found that about two thirds continued their careers in the academic world. My sense is that this will breakdown will not persist and that in a relatively short period of time the proportions will be reversed with probably one third pursuing careers in the academic world and the other two thirds working in business and the public service.

There are a number of reasons why we need to pay particular attention to the education and formation of PhDs.

The first is that both society and today's students are making a considerable investment in their education. For both moral reasons and in order to ensure the benefits of our society we need to prepare them for worthwhile and satisfying careers – not just in research but in business and in the public service. This is also necessary in order to continue to attract high caliber PhD candidates.

The steps now being taken to establish graduate training schools and to include course work in PhD training are very welcome and necessary. The introduction of course work and giving PhDs a broader skills base can be controversial with in the research community. Research Directors who are investing a considerable amount of their own time in training and developing their research students in their own research domain can be forgiven for seeing the time needed for course work as taking the students away from the bench and as an unwelcome distraction from their own research priorities. But it is a question of balance – or more precisely balancing responsibilities. Both parties to the contract have responsibilities. The Research Director to provide knowledge leadership, direction, supervision, training and mentoring and the Research Student to repay this investment in time and commitment.

But the responsibilities also include ones to the wider society. In my view these will be best served by ensuring that PhD graduates are seen and recognised as potential key contributors to our society – in knowledge creation and development and in knowledge transfer. In other words that investment in a PhD education is a good career move and that out of this cadre of students we will develop a future cadre of leaders in our economy and society.

The US National Academy of Sciences has recently recommended increasing the output and investment of holders of professional science masters degrees – PSM degrees for short. The PSM degrees are designed to produce so called **T** – scientists – deep and broad. The course work for these degrees includes not just core science education and research but also areas such as industrial and systems engineering, computer science, economics and other social sciences, organisational change and learning and business and management.

Over the last 10 years in the US, salaries of PSM degree holders have grown faster than salaries of those who hold either bachelor's or doctoral degrees. Banks and financial operations of industrial firms, the biotechnology industry, and defense firms are among those who have testified to a growing need for workers who fit the PSM profile, reports a committee set up by the Academy.

I think there is learning for us here and to take an innovative approach to PhD education. Is it time to set up a stream within the PhD programmes where some PhD students would do courses which would provide them with much of the experience and learning of MBA students? This is not an option which would appeal to all PhD students by any means but it could develop into an extremely prestigious educational option attractive to candidates who want to pursue careers in business and in the public service. Graduates of this stream would be attractive to employers. They would have advanced scientific and engineering knowledge, a familiarity with working at the knowledge frontier but because of

their wider training and learning, they would be equipped to contribute immediately across a range of business functions. This could become an extremely attractive educational career option which would enhance the attractiveness of taking science in school and in college and in pursuing careers in science and technology. This new generation of business managers would be leaders in knowledge transfer and the exploitation of knowledge generated in Ireland and across the world for business, economic and social gain. They could be key agents in delivering the objectives of the Strategy for Science Technology and Innovation.