BEWARE OF THE RED QUEEN

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Abstract

The current constraints on the university sector brought about by competing pressures being placed respectively by governments, through financial restrictions and reductions or flat-lining of support funding, by the belief that the sector may act as a vehicle for economic growth, the expectation from industry to deliver relevant research with limited investment in the sector; and the demand from students to attend universities in increasing numbers with a related reluctance to necessarily pay for increasing tuition fees. To address these tensions, university mangers are looking for innovative solutions to ameliorate these pressures. This paper provides observations on the way higher education institutions are facing up to these challenges, and illustrates the role that the Triple Helix concept can play in the success of associate ventures.

1.0 Introduction

Lewis Carroll, the author of Alice in Wonderland once made the observation in his book 'Through the Looking Glass and what Alice found there' [1], where the Red Queen addresses Alice as "You see, it takes all the running you can do, to keep in the same place" and "If you want to get somewhere else, you must run at least twice as fast as that".

The Red Queen effect was first explored by van Valen [2] an evolutionary biologist. His theories have been extended in the context of business strategy development, where organisations had to be nimble and to move exceedingly fast just to keep pace with change. In the current climate of financial uncertainty, government cut-backs, and the growth in the cost base, universities are increasingly being challenged to work harder just to stay still. Hence the 'Red Queen effect' [3].

This paper explores the alternatives available to the university sector to overcome the Red Queen effect, with particular reference to the higher education sector in the UK. Gone are the days of generous public funding for higher education, with government policy shifts towards an increasing concentration of resources (for research) into a smaller number of universities, seeking wider access, social inclusion, and knowledge transfer. Associated international efforts to address similar issues are also included, and the international role and globalisation effort of universities is highlighted.

2.0 The UK Environment

As a starting point, the UK Government's Higher Education Funding Council for England (HEFCE) had announced on 1 February 2010, a reduction in the Higher Education Budget of £440 Million in 2010-2011, and a further £660 Million in 2011-2012 [4]. This implies a real reduction of 4.6% in the unit of funding, year on year. Similar announcements have been made by the Scottish and Welsh Funding Councils, reflecting real cuts in the budgets for the university sector in the region of 5.0%-6.5%. It is likely that the trend will persist.

The impact of such a reduction in resources calls for a radical rethinking in universities, where the historical model of universities as education providers and knowledge creators is being challenged. The situation offers opportunities for innovation through sharing of approaches and 'redesigning and re-assembling the basic building blocks of higher education' [5, 6], and establishing themselves as 'agents of learning'. In this context, the role of the Triple Helix comes into play where, in addition to the above university re-thinking, Governments need to reassess their policy approaches from directing supply-side policies for higher education to promoting the need for demand-driven policies. It is expected that industry will have a significant role in partnering with universities in support of income diversification. Whether this comes to fruition is a moot point.

The above tensions are being further aggravated by universities being perceived as one of several competing providers; the extensive and pervasive growth and availability of information technology where students are becoming the arbiters for the acquisition of knowledge; deciding where and how to acquire education through full-time, part-time, blended, work-based, distance learning; and the shifts in government policy. The question is whether these trends will impact on the nature of universities, and will other providers move into the space.

To address the above issues university managers are exploring a range of scenarios. These include the following approaches:

(i) Cost containment.
(ii) Increase in revenue through (home and overseas) student fees.
(iii) Spectrum of actions ranging from sharing back office jobs to university mergers.
(iv) New models of universities operations.
(v) Income diversification.

The above are operational issues that can provide some respite, and perhaps an amelioration of a little of the current tension, following the *dictat* of the 'Red Queen'. However, in this paper it is contended that what is required is a radical approach and construct for universities to survive and grow in the current turbulent environment. This can be achieved by a bold venture into different models of higher education provision.

To achieve such a vision, the three elements of the Triple Helix will have to work together and interact in radical ways. Further suggestions on how this can be achieved are provided in the paper through proposals for policy derivatives, restructuring of the teaching programmes, strategic alliances with commercial providers, and are referenced by examples.

2.1 Current Approaches

In a recent survey conducted by PA Consultants, the views of the UK university vice chancellors (rectors/presidents) were sought on their perceptions and plans to address the current turbulent times [7]. It is interesting to note that the survey indicated a positive attitude towards facing the challenges ahead. Most appeared to be well prepared to weather the storm, and had interesting plans to progress matters. However, the responses were somewhat conventional, showing few radical approaches. The responses were primarily concerned with:

- Cost containment through rationalisation of teaching courses.
- Development of international presence through campuses or partnerships and attraction of overseas students.
- Partnering with the private sector to improve service provision.
- Developing research portfolios.

Cost Containment

Cost containment could be achieved through reductions in course offerings, staff retrenchment, and an increase in staff-student ratios. In 2010, the courses that have suffered are related to Modern Languages, reflecting a lack of interest in school leavers taking up these courses, perhaps as a consequence of retrenchment in the secondary school teaching of the subject. In earlier years,

courses in science subjects had suffered, e.g. over a ten year period some 30 academic departments of chemistry have been closed with around 40 remaining.

Another approach to cost containment has been the offering of Early Retirement Voluntary Severance (ERVS) or Voluntary Early Release (VERS) schemes, where staff are invited to apply for retirement packages with attractive financial inducements, comprising lump sum payments and a top-up of pension payments. The applications are accepted at the discretion of university managers, with the proviso that once an employee leaves, the job is eliminated and no replacement is sought. The Schemes have been reasonably successful, e.g. the University of Strathclyde in Glasgow in their latest ERVS round completing in September 2010 will have saved some £6.2 Million from its salaries budget. In Scotland, of the fifteen universities, the Universities of Aberdeen, Stirling, Glasgow Caledonian, Heriot-Watt, Dundee, Napier, Queen Margaret, West of Scotland, in addition to Strathclyde are offering the ERVS scheme to their staff [Times 29 August 2010].

A detailed example of the approach taken by the University system of Georgia (US) for the fiscal year 2011 is given in a 150-page report recent produced for the Board of Regents [8].

Student Numbers and Attracting Overseas Students

Interestingly the most recent data on 2010-2011 admissions for UK universities indicates that where there is increasing demand from home students to take up courses, there are limited places available. On the other hand there is no such restriction on the recruitment of overseas students.

This year, as of 20 August 2010, 660,953 people have applied for full-time undergraduate courses in UK institutions of higher education. This is 40,000 more than last year [9]. Therefore, on the basis of available places, around 170,000 aspiring students will miss out on a place at university this year, due to the record number of applications - up by 11.6 per cent this year. The number of university places available remains the same as last year, after the UK Government put a cap on placements to curb budget spending. If universities exceed this cap, they will be fined £3700 per extra student. Universities are facing government funding cuts of at least £1.13bn over the next three years.

On the other hand, there is no such cap on recruiting overseas or international students, leading to a dichotomy for universities admitting overseas students, in some cases, having lower grades than currently being imposed on home students being admitted to the same courses. The attraction of overseas students is two-fold, there is no Government cap on their recruitment, and they bring in a significantly larger element of fee - a much needed additional revenue stream in these stringent times.

Earlier this year, the Higher Education Funding Council for England (HEFCE) allocated just 10,000 extra student places to universities across England to meet the soaring demand.

Unlike the positive experience of American universities with campuses abroad [10], not many UK universities have as yet penetrated the overseas market by setting up campuses abroad, an example being the University of Nottingham. However, there has been a rush by Scottish universities to setup campuses abroad this year [11]. Heriot-Watt University in Edinburgh already awards almost half of all Scottish degrees granted to students abroad - most delivered through partner institutions. It is now trebling its student numbers in the Middle East, from 1,500 to 4,500 next year, while facing a tight cap on numbers at home.

Currently universities in England charge a tuition fee from all undergraduate students which has been capped at £3000. It is recognised that this charge, in most cases, falls considerable short of the true cost of education, and a Government sponsored study is being conducted under the leadership of Lord Browne, President of The Royal Academy of Engineering, to offer alternate models for charging students [12]. It is expected that Lord Browne's study may lead to a lifting of the cap, and thus provide additional revenue to the universities in the form of an increased fee. In Scotland, a similar study is being conducted under the aegis of Universities Scotland – the representative body of Scotland's 21 universities and higher education colleges - chaired by Professor Steven Chapman, Principal of the University of Heriot-Watt, with the objective of looking at innovative ways of introducing a graduate tax, as the Scottish Government is opposed to the outright charging of a tuition fee to students.

Service Provision

While the private sector has been successfully partnering with universities in the provision of student accommodation, service level agreements for computer maintenance, and internet service provision, there is a move towards greater partnership on the basis of back office jobs, and an interest in universities sharing such services with a view to cost containment and staff reductions. The Higher Education Funding Council of England (HEFCE), in its Circular letter No 07/2010, had announced in July 2010 that it is allocating £20M (24 M€), to support universities in achieving greater efficiency and value for money through the development of shared services, collaborative procurement, and including core IT systems, to effect cost savings.

Research Concentration and Diversification

In recent years research funding in the UK has been increasingly concentrated, ostensibly awarding research excellence [13] which has led to funding being focussed onto a smaller number of universities, comprising of the 'golden triangle' (Oxford, Cambridge and London), and the Russell Group of universities [14]. This has led to other universities seeking strategic alliances with industry - a case in point being the Rolls-Royce University Technology Centres [15]. Note, however, a recent authoritative report has indicated that such a concentration of resources has not necessarily led to a concentration of high quality research output [16].

2.2 State of Preparedness

As mentioned earlier, having recognised the impending maelstrom of cuts, financial constraints, and external pressures, university leaders and managers have indicated varying states of preparedness [7]. Most seem to indicate that their institutions are well led and well managed, a not surprising response given the individuals whose opinions were being sought.

They also indicated that their institutions were well supported by their governing bodies (in the UK all universities have governing bodies and are similar to the Board of Regents in the US sector - called Councils or Courts - comprised of lay members from local industry, commerce or government sectors, with expertise in specific areas such as accounting and finance, real estate, the legal professions, local authorities and Government, who provide guidance to the university executive and bring an external perspective to the workings of the universities. The governing bodies approve the strategic plan of the university as well as provide oversight of the finances and approve staffing policies.

Interestingly, an area of weakness identified by several leaders was the relatively conservative attitude of staff to change that acted as a barrier to innovation and new developments, and some deficiencies in the availability of effective management tools and reliable data [7]. While the shortcomings in management tools and the accuracy of data collection are very much local issues which can be addressed either individually or collectively with support from the Funding Councils, the issue of staff engagement, moral, and attitude to change, is a much more vexed problem, which has been successfully overcome by a number of institutions, primarily by committing to staff development and, in a number of cases, committing to achieving the 'Investor in People' (IiP) status [17].

The IiP framework is 'a flexible and easy to use standard which helps organisations transform their business performance'. As long ago as 1995 the University of Strathclyde achieved the 'Investor in People' status and has maintained it since. The impact of the IiP status has been that in a more collegiate environment, individual staff members recognise their responsibility in contributing to the success of the University's mission, while at the same time fulfilling their own potential and ambitions. This has been particularly reflected in continuing high scores in the assessment of teaching quality by external organisations, and high satisfaction ratings by students.

A number of universities are looking towards recognition of their institutions under the banner of EFQM - formerly the European Framework for Quality Management [18]. EFQM believes staff development to be an important ingredient to achieveing excellence in a changed climate of operations. A key element of both the IiP Programme and the EFQM Excellence Model is alignment between the institutional strategy and the aims and aspiration of individuals within the organisation. Such a tool can be highly effective, and has much to recommend itself to organisations struggling in the current difficult times.

3. International Perspective and Globalisation through Triple Helix Interactions

The tensions identified earlier are being faced by the higher education sector almost worldwide. A number of keynote studies have sought to identify the problems and proposed solutions. Some of these include the recent report from the Sixth Glion Colloquium [19]. Dr Duderstadt, President Emeritus, University of Michigan at Ann Arbor, has asserted that higher education could be among the next economic sectors to "undergo massive restructuring' as recently undergone by the banking industry. The factors driving this change include "the globalization of industry and commerce, the accessibility of information and communications technologies, and the demographic shift in developed countries that will result in the need to educate greater numbers of working adults".

At a recent panel brought together by the Woodrow Wilson International Center [19] there was recognition that "universities of the future may bear no resemblance to those of today", in part due to the influence of globalization and the emergence of knowledge-based societies. To meet these challenges it is imperative that the Triple Helix components come into play, with national policies driving change, and the university sector in partnership with industry responding to policy changes to meet emerging demands.

It is now being recognised that universities of the future will have to become more entrepreneurial to meet the needs of young people with new learning styles, where they are used to gaining more and instant information from the Internet and sharing information, data, facts, and sources, through social media interventions.

The success of the for-profit University of Phoenix in Arizona is often stated as a possible model of academia and commerce coming together to provide education in packaged form, where the University does not have a campus or real estate, rather it uses the Internet and ICT to deliver modular programmes. Note, however, that the Open University in the UK preceded the University of Phoenix by some decades to provide similar education. It is worth stating that as a result of the cap on numbers being admitted into UK universities this year, there has been an increasing demand by 18-25 year olds who could not be admitted into convention UK universities, to apply for and obtain admission into the Open University, while pursuing a full-time career elsewhere. However, this recent success of the OU is not a manifestation of the Triple Helix interaction.

A view expressed by Dr Duderstadt on the universities of tomorrow is that of two possible models: the global institution, and the 'meta' university. It is conjectured that there will be an increasing number of universities or groups of universities that compete on a worldwide basis for students and faculty. Here quality, brand, international campuses, synergistic alliances with other institutions, and support from government will play a catalytic role.

Also, in the early stages of globalization, both through the increasing mobility of students and faculty and the rapid growth in international partnerships among universities, some even speculate that soon we will see the emergence of truly global universities, which not only intend to compete in the global marketplace for students, faculty and resources, but also are increasingly willing to define their public purpose in terms of global needs such as public health, environmental sustainability, and international development.

Examples are emerging, and Carnegie Mellon University (CMU) in Pittsburgh, for instance has an interesting international strategy that is a remarkable manifestation of a successful implementation of the Triple Helix principles, which has led to significant success for the institution and enormous benefits to the host countries. Carnegie Mellon [20] has established major research and education programmes in Portugal, Greece, and Japan, with support from the ministry of education in the respective countries and, in partnership with, or sponsorship by a number of industrial organisations, thereby including the three elements of the Triple Helix relationship. To cover activities in the different countries would be too detailed, however, as an illustrative case study, background information on the CMU-Portugal programme is given below.

The collaborative venture started over three years ago, when the Portuguese Government, recognising the need to develop and extend capacity in the information communications technologies, invited Carnegie Mellon University to work with Portuguese universities to enhance the quality of education and research in the area.

The approach taken was to establish collaborative instructional programmes - Professional Masters Programmes on Human Computer Interfacing (at the University of Madeira), Software Engineering (at Coimbra University), Information Networks (at University of Aveiro), and Information Communications Technologies (at the University of Lisbon). Students were stringently selected and sent to Carnegie Mellon for one semester to attend cognate classes and then returned to Portugal to complete the second semester where instructions were provided both by Portuguese lecturers and academic staff from Carnegie Mellon, who either came to Portugal to carry out these duties, or else delivered courses remotely in real time, using video wall technology. Portuguese instructors on the programmes also received training at Carnegie Mellon to ensure that quality standards were met. The students in the main were employees of partnering companies, and they were expected to conduct their MSc Projects in research areas of direct relevance to their employers; thus fulfilling the tenets of the Triple Helix.

In addition to the Professional Masters Programmes, several research projects are funded by the Portuguese Government through the Foundation for Higher Education in Science and Technology, where academics from Carnegie Mellon work with academic partners in Portugal on topics identified by the industrial partners. The industrial partners also make a significant financial contribution to the programme.

A recent review of the Programme by a Committee of international experts has identified the following major benefits and outcomes: an increase in highly qualified, motivated, and young engineers who have benefitted from the Professional Masters Programmes, and are now working at the sponsoring organizations, thus contributing their knowledge of advanced IST gained from their stay at Carnegie Mellon in Pittsburgh, and from the advanced level of training received. A further outcome is that the research programmes have led to high quality research, with renewed confidence in the partner academics, as well as useful practical outcomes and increased expertise in their staff, in conducting research and solving state-of-the-art issues. Several of the trained researchers are now attracting EU funding for their research. In at least two cases the research conducted in Portugal is of world class standard, so much so that there is a possibility of establishing an International Centre of expertise in Human Computer Interfaces in Madeira, while capacity building in software engineering at the University of Coimbra is such that it is now in a position to become a hub of knowledge for SMEs in the area, with the prospect of establishing a regional centre of excellence. Other centres in related areas are likely to follow.

The above is a concrete example of how a Government, through policy instruments and funding, has ensured a significant leap in terms of trained manpower, and through close research ties with academics at CMU, and in partnership with industry sponsors, has catalysed success and growth in the ICT area - a practical manifestation of the benefits of the Triple Helix concept.

4. The Entrepreneurial University and Role of Technology

An important trend emerging is that of the entrepreneurial university, which in addition to playing a globalised role, is defining its public purpose as aimed at addressing global needs such as energy and renewables, public health, environmental sustainability, and more. It is recognised in the foreseeable future that demands for energy resources, global warming, and the environment, will form the key drivers for societal and governmental concern and change. The solutions would require complex interactions between the three elements of the Triple Helix. Subject/discipline based academic departments will simply not be in a position to address these issues, rather the value chain extending from inter- and cross-disciplinary activity (combining research, knowledge exchange, and education) to partnering with multiple industries, catalysed by government policies, would lead to new structures that go beyond traditional university models of governance, and departmental configurations.

An illustration of this may be seen in recent developments at the University of Strathclyde, which has set itself up as an internationally leading technological university, and has built its portfolio of research on energy into a truly international player with close to ninety researchers involved and working in partnership with the energy industry to solve major problems in renewables, smart grid, and wind energy. The research portfolio on the subject is in the region of £15M.

In addition to this, the University has embarked on an ambitious project to establish a Technology Innovation Centre to bring together in a common R&D environment some 600 engineers from energy companies and academics from the Institute of Energy and Environment. The University has secured funding from the Scottish Funding Council (Government), Scottish Enterprise (economic development agency), and Scottish and Southern Energy Plc (industry), bringing together the three Triple Helix actors to deliver a new entity for addressing large scale problems that could not otherwise have been tackled by industry or by the university on its own.

In Europe a group of eleven universities has emerged as the European Consortium of Innovative Universities (ECIU) of which Strathclyde is a member [21]. Partners include the universities of Aalborg, Autonoma-Barcelona, Aveiro, Compiegne, Dortmund, Hamburg-Harburg, Linkoping, Strathclyde, Talinn, Twente and Lodz.

The vision and mission of the Consortium is:

- *"To be one of the global leaders in higher education through its collective expertise and commitment to innovation in teaching and learning, reinforced by a shared history of fostering economic and social developments in their regions.*
- *To contribute to the further development of a knowledge-based economy, with due consideration to the global nature of higher education market.*
- *To build on existing innovation and enhance quality in areas of international collaboration; teaching and learning; regional development; technology transfer and staff and student development.*
- *To develop high quality collaborative educational programmes, by building on research and teaching strengths within the individual consortium members.*
- *To act as 'an agent of change' by serving as an example of best practice and by influencing debate and policy on the future direction of European higher education with the context of global realities,"*

The vision and mission of the universities are met through a range of collaborative teaching, research, and indeed staff development programmes; the last has been running for over seven years, and is one of the most successful multi-institutional international programmes. The members of the consortium see each other as preferred partners when bidding for EU projects and funding.

The approach to a "Meta-university" has been admirably encapsulated in a visionary article by Charles Vest, President Emeritus, MIT [22], where he posits that the MIT initiative of placing the content of most of its undergraduate courses in a 'Open environment' is the start of a movement, similar to the 'Open source' movement for software. MIT has to date placed course material for some 2000 subjects from 33 academic disciplines [23], which is receiving over one million hits each month, and visitors are downloading on average ten HTML pages at each visit.

The movement has caught on and a large number of universities are now offering open course ware [24]. The reference lists the top ten universities current offering open course ware. Note, however, that while the material is available for free, the courses carry no credits or any staff-student interaction.

An extension of the Vest model is for universities to consider collaborating to succeed by considering [25] a 'global network of higher education' comprising of "course content exchange, course content collaboration, knowledge co-creation, and collaborative learning". An important initiative to address this approach is the work on the 'Connexions' Project [26].

An innovative model has been developed under the 'Connexions' scheme originally developed at Rice University [26], which exploits the social media concept to encourage the development of courseware and "freely sharing and publishing scholarly content on the Web". Originally started in 1999 as an experiment in sharing course material in the area of Signal Processing, the Connexions initiative has rapidly grown to encompass 16840 reusable modules woven into 1019 collections. The material is developed in a standard modular format that allows rapid reuse; while collections refer to subject specific modules organised as a collection. Note the difference between Connexions and the Open Course ware models is that the former relies on the development, and hence the intellectual content from a single institution that is willing to place its courseware on the Web. The Connexions approach relies on a collaboration that is independent of a geographical boundary, existing in cyberspace.

Formalities of style and discipline are enforced through the need for developing material in a common format and style by a “free” ‘connexions licence’.

More radical approaches for reconstructing the modern university are included in [25], where the role of the Internet, knowledge sharing, and knowledge bases and associated data bases of information, are seen as providing ‘just in time’ and ‘just for you’ education, exploiting social media and associated vehicles, available to all at a time and occasion of one’s choice.

5. Final Comments

This paper sets out to review the current tensions being faced by the higher education sector in the UK and internationally, and provides an appreciation of approaches currently being proposed and implemented by university managers; identifies their advantages and short comings, then builds on the thesis that an effective use of the players in the Triple Helix model offer different, and in some cases radical, approaches to address the current financial constraints and the impending maelstrom. Hence this provides recipes against the Red Queen effect.

6. Acknowledgements

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