INNOVATION MANAGEMENT AT UNIVERSITIES OF TECHNOLOGY IN THE SOUTH AFRICAN CONTEXT

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Abstract

It is an understatement to note that the world has changed radically over the past decade. This is evident in the development of a multitude of new technologies, including new product development and the massive expansion of Information Communication Technology (ICT). Organisations that are innovative in their product and service offerings are the ones' that prosper and grow. Innovation has thus become a major part of organisational success. The notion of innovation and Innovation Management is just as important for universities that need to supply the so called 'knowledge workers' to business and industry. As Universities of Technology (UoT's) in the South African context focus on vocational and professional development they are perhaps more geared towards innovation than classical universities. The aim of this paper is to propose a seven step model to assist UoTs in implementing Innovation Management.

Keywords: Innovation Management, Universities of Technology (UoT's), South Africa

Topic Groups: Technology and Innovation Management

INTRODUCTION

The development of ICT has impacted and changed the way individuals interact with each other in their work environment. ICT enables individuals to communicate irrespective of time and space and impacts the functioning of organisations on a global scale. Organisations compete in a fiercely challenging global environment, where a lot of emphasis is placed on innovation. Innovation gives organisations the edge as consumers are increasingly interested in new and creative products and services. Universities, the so-called 'custodians of knowledge' should also be actively involved in advancing and facilitative innovation in the courses they teach and the research they conduct. The so-called 'ivory tower' approach, where academics are not concerned with what happens in the 'real world, is thus something of the past.

Universities, with their inception in the European context, have traditionally been reserved for the elite - mostly males from wealthy and influential families. The universities they attended were mostly traditional universities that offered highly academic programmes. Although classical universities (like Oxford and Cambridge) have their place in knowledge creation and

dissemination, real-life problems often require inputs from a variety of disciplines (Kokt, Lategan & Orkin, 2012). UoTs focus on vocational and professional development and straddles theoretical knowledge and practical experience in developing individual skills. Research at UoT's is also innovatory as research discoveries needs to be user-oriented and commercially viable. This implies that new knowledge creation through research needs to benefit society at large.

This paper argues that knowledge is the main competitive advantage in the globalized world. Knowledge needs to transform into innovative products and service offerings that need to be managed by universities as a strategic imperative, hence the focus on Innovation Management.

KNOWLEDGE AND INNOVATION MANAGEMENT

Knowledge could be described as 'a person's range of information' or the 'sum of what is known' (The Little Oxford Dictionary, 1988). Knowledge Management is specifically aimed at organising the availability and use of existing knowledge and is a comprehensive term for the full range of processes involved in disseminating knowledge (Moss & Kubacki, 2007). The terms 'data' and 'information' also needs clarification. Data is the raw facts that constitute information. Information enables the configuration of knowledge and once meaning and understanding develops from the processing of information, knowledge could be generated (Şeitan, 2009).

Knowledge can be tacit and explicit. Tacit knowledge could be described as a resource locked in the human mind and involves the 'know how' individuals posses, as well as the information, competencies, experiences, advice and best practices employees bring to an organisation (Kim & Mauborgne, 1998; Chilton & Bloodgood, 2007; Zucker, Darby, Furner, Liu & Ma, 2007:851). Explicit knowledge is rational and could be visualised by means of documents (such as policies) and pictures (such as organisational charts) (Kesti & Syväjärvi, 2009:213).

Knowledge Management enables organisations to accurately ascertain the skills and abilities of employees and to provide training where skills are lacking. Innovation can be explained as the introduction of something new. Innovation can be in the form of a method, idea or device (Merriam Webster Dictionary, 2015: Online). Innovation Management involves managing the implementation of creative ideas and new and existing knowledge. New knowledge creation is an essential component of innovation.

Innovation in the context of a university can include a broad spectrum of aspects from different disciplines, e.g. engineering innovations (like new types of lightweight building materials), scientific innovations (like developing titanium limbs) to social and managerial innovations (like new organisational processes and practices). It is thus important that any university, especially UoTs, entrench a culture of continuous innovation within all its structures. The notion of continuous innovation should not only be an expectation but a reality and all academic staff needs to strife towards enhancing innovation. Academics and students should also be supported in their innovation endeavours and funding and incentives should be available for this to happen.

THE FEATURES OF UNIVERSITIES OF TECHNOLOGY IN THE SOUTH AFRICAN CONTEXT

Three types of public universities could be distinguished in the South African context: traditional universities (that offer a more theoretical or traditional approach to science), UoTs (that have a technology and vocational approach) and comprehensive universities (a combination of traditional universities and UoTs) – totaling 23 universities.

UoTs in the South African context were previously known as Technikons, a term that is uniquely South African. Technikons provided mainly vocational training and could not award degrees. This became a stumbling block which had to be addressed (Du Pré, 2009). In 2003, Technikons were re-designed as UoTs, with the aim of dove-tailing theory and practice in providing business and industry with applicable work place skills (Moraka & Hay, 2009). These types of institutions are not new, in fact, they date back as far as seventeen century London. The Royal Society of London saw the need for centres that focused on applied knowledge in especially art, mechanical processes, machines, inventions and experiments.

This laid the foundation for the creation of UoTs and similar universities on a global scale - also termed 'Universities of Applied Science', 'Institutes of Technology', 'Universities of Cooperative Education' or 'Polytechnic Institutions'. UoTs can be described as institutions that interweave technology with the nature of a university, meaning technology is engaged from the viewpoint of various fields. Technology could be described as 'the human arrangement of nature with the help of tools for human purposes' (CHE, 2010; Teichler, 1999).

UoTs have a different focus compared to other types of universities – namely to prepare individuals for the world of work, which is crucial not only for business and industry, but also for the communities they operate in. The focus is thus on training so called 'knowledge workers'. Knowledge workers take responsibility for their work – they are innovative, creative and search for answers, where others might think there are none (Steyn & du Toit, 2009). Knowledge workers need to create, apply, transmit and acquire knowledge, implying they should have the have the work-related knowledge and a sound operational knowledge of the various forms of ICT (like the Internet) to do so.

The 2010 report from the South African Council on Higher Education (CHE) details the higher education challenges South Africa face, as well as the position and place of UoTs. The report confirms that higher education faces a diverse demographic profile in terms of the students they teach – this includes diversity in terms of background, cultural orientation, language, age and the like. This coincides with the co called 'massification' of higher education meaning that large amounts of potential students want to enter higher education as they view the attainment of a diploma or degree as a way of bettering their lives (Du Pre, 2009).

With their distinct aim and focus UoTs need to offer relevant programmes that acquaint and equip students for the world of work. It is thus imperative that UoTs are closely allied to business, industry and society, to better comprehend and address their needs (Moraka & Hay, 2009). In this sense, UoTs have five distinguishing features: 1) they should promote excellence in teaching and learning, 2) focus on applied research, 3) develop leadership in technology, 4) engage in technology transfer and innovation and 5) form partnerships with

business, industry and other universities, both national and international (CHE, 2010). These aspects will be detailed in the next section with an emphasis on the way in which UoTs respond to these challenges.

Excellence in Teaching and Learning

The ways in which students are taught have undergone radical transformation. The emergence of an array of different teaching and learning methods, combined with a mix of different media, like e-learning, has revolutionized teaching and learning. This also extends to concepts like work-integrated learning (WIL) that involves a combination of theoretical and work-directed learning, where students work in business and industry as part of the credits for their course. The different permutations of WIL include work-directed theoretical learning (WDTL), problem-based learning (PBL) project-based learning (PJBL) and workplace learning (WPL) all of which are aimed at providing relevant practical exposure to students.

This in itself is a different approach compared to traditional universities that focus more on highly academic programmes. It is further imperative that quality mechanisms be employed to ensure that students receive skills and training that adheres to acceptable standards, both nationally and internationally. This calls for effective leadership and management in higher education institutions. Having effective leadership and management at university-level is crucial in presenting programmes that are relevant and up to scratch with what business and industry requires.

Applied Research

UoTs are characterized by their focus on applied research (Du Pré, 2009). Applied research implies finding solutions to real-world problems which are encountered by business, industry and society. Applied research involves a multidisciplinary approach, requiring inputs from various disciplines and programmes (CHE, 2010). Real-world problems are seldom contained within the confinements of a single discipline, but almost always complex and cutting across a range of disciplines (Du Pré, 2009). A focus on applied research should become part of the research culture of UoTs. This is a major challenge, as Technikons in the previous dispensation were not research inclined, meaning staff were not required to be research and innovation oriented. It is encouraging that UoTs are moving towards having strategies (like assisting novice, mid-career and established researchers) in place to promote the development of a research culture and to support post-graduate students and staff with their research activities (CHE, 2010).

Developing leadership in technology

As mentioned before, UoTs engage themselves with an interwoven approach between technology and the nature of a university. A narrow focus to problem solving is thus not an option and students need to be equipped with technological competencies and practical skills to deal with real-world problems (CHE, 2010). For this to happen leadership in technology needs to be developed – this could come from academics or leading figures in business and industry or a combination of the two.

Technology transfer and innovation

The knowledge created through technology application should be transformed into new products, processes and services. This is the ultimate aim of technology transfer – it has to

benefit the various stakeholders (individuals, government, business, industry and society). This also represents the commercialization of knowledge that could stimulate entrepreneurship and small business development (CHE, 2010).

Partnerships with business, industry and other universities

Partnerships, cooperation and joint ventures are a key feature of UoTs and the knowledge and insight gained from these interactions should continuously inform teaching and learning and research within the university context. An excellent example of this is the phenomenal success of Silicon Valley, where extensive links were created with four major universities benefitting new knowledge creation (CHE, 2010). Another important consideration for UoTs is to incessantly benchmark with similar organisations around the world. This is essential if UoTs want to remain relevant, as well as reputable in the international sphere.

INNOVATION MANAGEMENT IN A UOT CONTEXT

With the above as background the question could be posed: what will innovation look like in a UoT context? Innovation starts with Knowledge Management which means that the knowledge resources of the university need to be ascertained. This could be done by performing a knowledge audit to establish the knowledge assets and resources of a university. Organisations, with greater knowledge management capabilities, are more likely to experience a learning effect that stimulates innovation. It also reduces redundancy, assists the organisation in responding to change and generates creative and innovative ideas. As innovation is critical for UoTs in their quest for new knowledge creation, the proposed seven step model (Figure 1) provides some guideline for UoTs to implement sustainable Innovation Management.

**Figure 1**: Seven step model to implement Innovation Management in UoTs

1. Map available knowledge (both tacit and explicit knowledge, new and existing knowledge)

| Tacit Knowledge | ⟷ | Explicit Knowledge |

2. ICT infrastructure to capture, store and retrieve information and knowledge.

| Capturing information | ⟹ | Storing information | ⟹ | Retrieving information |

3. Knowledge and information is shared via social communication and technical communication infrastructure. This enables the passing of knowledge between people or systems.

| Social Communication Infrastructure | ⟷ | Technical Communication Infrastructure |
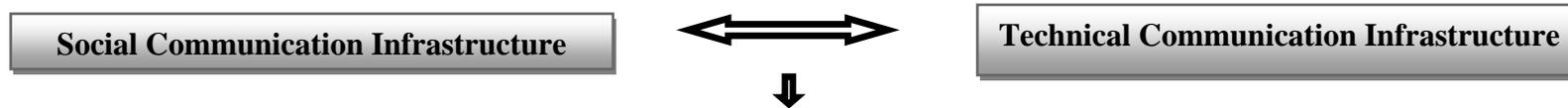
4. Utilise and share knowledge: This can lead to the development of new products, services and processes.

| Products | Services | Processes |
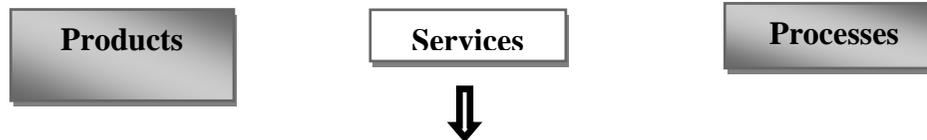
5. Creating a conducive culture for innovation: The organisation need to encourage staff to be flexible, risk takers and tolerant to uncertainty and ambiguity. This can only happen if the culture allows for such behaviour.

6. Stimulating creative ideas for innovation: If organisations place an emphasis on innovation they are likely to appoint the staff with creative and innovative ideas. Training and participation is indispensable in fostering innovative behaviour.

7. Rewarding innovation: The innovation process could be lengthy and because it requires continuous action the Performance Management System should reward innovation.

Adapted from: Andreca & Luan (2002:11) and Mustafa (2006:3)

DISCUSSION

Figure 1 shows that innovation starts with mapping the available knowledge sources of a university. This includes both the tacit and explicit knowledge, as well as the new and existing knowledge a university possess. Available knowledge should be codified, captured and stored to enable knowledge dissemination. This could be done via social communication infrastructure, like informal groups and the grapevine, and technical communication infrastructure that could include the Internet and other electronic means of communication (notably ICT's). Knowledge is then utilised to inform the development of new products, services and processes.

The culture of a university should be conducive to support innovation and Innovation Management. Innovation requires that individuals are flexible, risk takers, tolerant of uncertainty and ambiguity, which implies that a high level of involvement is expected from employees. Management must create the enabling environment for this to happen. If the culture of a university does not embrace these aspects, innovation is not likely to be supported. The culture should also allow a frank appraisal of the knowledge that currently exists, stipulating clearly what the university intends to achieve in the future. Innovation is a lengthy process which could imply that the culture of the university needs to change before innovation becomes a reality. Once innovation becomes part of the culture of a university, it should be reflected and rewarded in the Performance Management System.

CONCLUSIONS AND IMPLICATIONS

This paper highlighted the importance of innovation and Innovation Management for UoTs. UoT's were specifically targeted as they have a distinct focus on Innovation Management. The nature and focus of UoTs' were thus examined and a seven step Innovation Management model proposed. The model emphasised that innovation is dependent on Knowledge Management and new and existing knowledge forms the basis of continuous innovation in universities.

It emanates from the model that the culture of a university should support the implementation of innovation and Innovation Management and there should be a continuous focus on rewarding individuals and teams for being actively involved in innovation. Innovation requires a high level of involvement and participation and by granting employees the opportunity to solve problems they are likely to generate new ideas and exchange knowledge existing problems. The seven step model can be utilised by UoTs to assist them in implementing Innovation Management.

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