



A newsletter from The Da Vinci Institute, an international centre of excellence in the Management of Technology, Innovation and People (MOTIP) and from Technology Top 100, for people seeking to improve business performance through a greater understanding of technology management.

AUGUST 2008

tips

Tips is a news journal for people eager to know more about the management of technology, innovation and people.

It is intended to offer new insights to the fundamentals of managing technology and the human-technology interface.

It also seeks to share the lessons learned by enterprises who have benefited from managing technology innovatively and successfully.

Contributions and comments are therefore welcomed.

Please email them to the Tips production editor, Neville Barber, at nabarber@mweb.co.za.

The Tips editorial board comprises: Dr Bok Marais, Prof. Bennie Anderson and Prof. Roy Marcus.

To aid the second economy, we have to re-think innovation systems

[READ MORE](#)

International platform for PhD student

[READ MORE](#)

Forging a good idea into a tangible product

[READ MORE](#)

The electricity question: powerful ideas

[READ MORE](#)

Dissertation research: Da Vinci shows the way

[READ MORE](#)

The State's rights to intellectual property

[READ MORE](#)

Secrets of success among the TT100

[READ MORE](#)

Insite will spotlight DST's focus areas

[READ MORE](#)

Biotechnology can ease the food shortages

[READ MORE](#)

Why it's time for non-IT managers to learn about IT

[READ MORE](#)



The Da Vinci Institute for Technology Management (Pty) Ltd
Registered with the Department of Education
as a private higher education institution under
the Higher Education Act, 1997.
Registration Certificate No. 2004/HE07/003



To aid the second economy, we have to re-think innovation systems

Innovation is essential to addressing the wide range of problems besetting South Africa in general and its 'second economy' in particular.

But if it's to make a significant impact on the second economy, we will have to change our standard thinking about innovation systems.

These were two of the messages in a presentation given by Professor Susan Cozzens, an international, leading figure in research on public policy, at a Da Vinci Forum seminar recently.

What follows is a selective overview, compiled by Dr Bok Marais (Research Executive: The Da Vinci Institute for Technology Management) of what she said.

An innovation strategy based on the knowledge economy and narrowly focused on turning inventions into new businesses, tends to increase inequality between (in South Africa's case) the first and second economies, says Professor Susan Cozzens, director of the Technology Policy and Assessment Centre, School of Public Policy at Georgia Institute of Technology.

(This is typically the model pursued in highly industrialised countries).

Redistributive social policies on their own will not stem inequalities. If South Africa is to live up to its inclusive political, social and economic ideals, innovation policies themselves will have to be designed in redistributive ways.

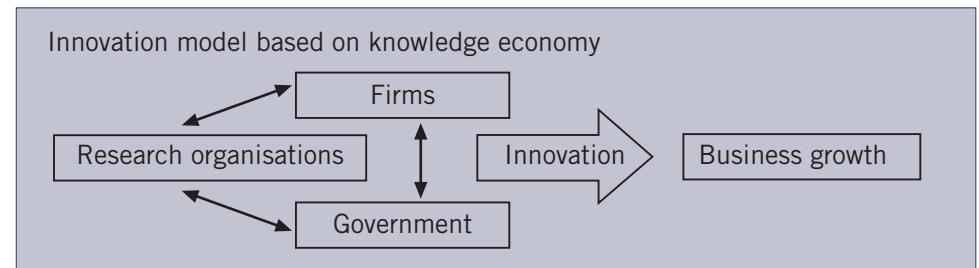
Innovation policies can be classified broadly as those premised on the ideal of a knowledge economy, and those based on the notion of social cohesion.

Knowledge economy

The knowledge economy is market-driven, private sector-oriented and ICT-intensive (including other advanced technologies).

Its context is global competition, which requires excellence in science and engineering.

The innovation system based on the Knowledge Economy is represented here:



In Northern European countries, innovation in the knowledge economy would be exemplified by identifying 'platform technologies' such as biotechnology, nanotechnology and ICT, which stimulate growth of existing enterprises or formation of new ones in R&D, production or sales.

They add high-skill, high-wage jobs to a healthy economy to which many people have access because they're well educated. Wealth is redistributed through taxes.

In a country such as South Africa, applying this model in isolation would be difficult because of limited appropriate high-level skills (the brain drain doesn't help) and the high cost of imported equipment.

Such a model would add a few high-skill,

high-wage jobs that would be inaccessible to most people and associated with

hyper-wages for a few. It would in effect strengthen the first economy and, in the end, generate little wealth to redistribute.

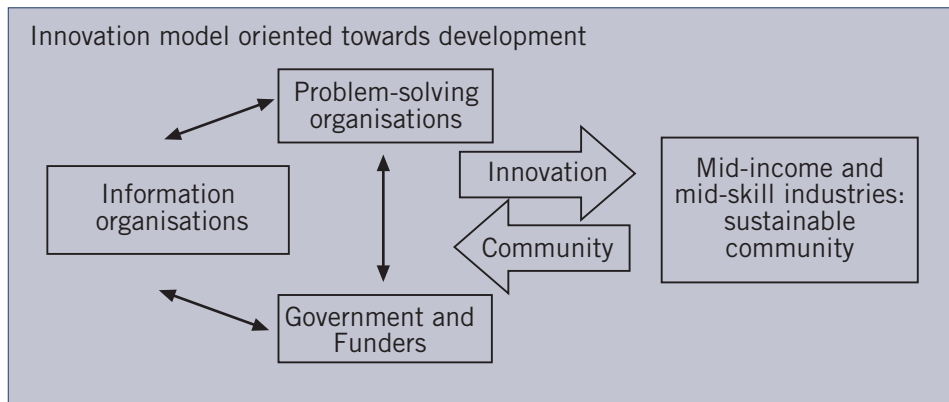
However, given the parallel economies in South Africa, it should be fostered alongside the participatory model.

Social cohesion

At the other end of the scale lies the social cohesion model.

It's characterised by the fact that national policies aim to reduce inequalities between culturally defined groups (e.g. race/ethnicity), are pro-poor and aimed at the bottom end of the income distribution.

The policy intends to change the shape of the economy by increasing employment,



reducing unemployment and adding middle-wage, middle-skill jobs, and rests on broad, effective, long-term educational upgrading.

In countries like South Africa, innovation policies based on the cohesion model would focus on using research to address needs of the poor and peripheral sections of the population.

Water and sanitation are generally accepted commodities in the first economy, for example, but significant innovations in communities of the second economy.

However, successful innovation calls for the intended beneficiaries to take part in all phases of decision-making: a factor key to distinguishing this innovation system (see diagram above) from the one based on the knowledge economy. Note the difference between the definition of role players and the importance of beneficiary inputs and feedback.

Participation can be equated with

networking: transferring knowledge among all parties.

Such an innovation policy would focus on stimulating interactions aimed at learning and capacity building: training people in the community in a spirit of accountability, providing them with relevant information and locating decision-making power in the community.

The outcome would upgrade quality of life and strengthen the second economy.

The South African dilemma

The analysis presented by Prof Cozzens showed that the South African science, technology and innovation system faces a dilemma: it has to promote a dual system that would promote the upper end of the scientific, technological and innovation system and international competition, yet stay focused on the second economy.

The ideal, it would seem, would be to have the components of the two systems feed into one another.



Professor Susan Cozzens is Director of the Technology Policy and Assessment Centre, School of Public Policy at Georgia Institute of Technology. She has visited South Africa several times since 2001 and is currently involved in a number of international comparative projects.

The Da Vinci Institute for Technology Management is actively developing a focus on innovation for development.

It is convinced that South Africa's future in part depends on the rate at which innovation can have an effect on the problems typical of rural and peripheral communities.

A policy position was spelled out in TIPS 6 and several students have embarked on projects focused on second economy challenges

International platform for PhD student

A Da Vinci PhD student, Duncan Tungand, has had a research paper accepted for presentation at an important international conference.

The paper - A method of transferring technology and innovation to technology based SMEs in South Africa - has been favourably peer-evaluated by the organiser of the 2008 International Conference on Convergence and Hybrid Information Technology (ICCIT08) to be held in Busan, Korea in November.

Duncan's academic supervisor, Prof. Ben Anderson says Duncan's achievement epitomises Da Vinci's goal of disseminating information on postgraduate projects as widely as possible, preferably internationally.

"Conferences offer one of the most effective immediate ways of spreading the message about research being done by Da Vinci students and are a powerful form of external validation of the quality of our students' research," Prof Anderson says.

Forging a good idea into a tangible product



Many good ideas sparked by braai-side bravado vapourise in the sobering light of dawn. Not the Butte Braai Tongs.

The idea of braai tongs that illuminate food cooking on a braai won a South African Bureau of Standards DISA award for excellence in 2007.

The judges said the tongs were a 'very clever braai tool that involves cunning design' and gave them top honours in the Home and Office Ware category of last year's DISA awards.

The owners of the original idea, Todd Broome Utensils cc, having discussed the concept at many a braai, believed they had an idea that was marketable to sophisticated outdoor entertainers.

They founded Cape Town-based design company with the unconventional name of Dot Dot Dot XYZ, and began the design and development process.

The initial meeting between Todd Broom and XYZ laid the groundwork including the idea, non-disclosure agreements,

budget, timescales and potential market. The companies also arranged a braai - all in the cause of workshopping the idea - and lashed a small torch to a conventional pair of tongs as a prototype.

Early discussions on the market positioning of the tongs covered global trends, market reach, technologies, ergonomics, the user interface and economies of scale.

Then research began in earnest, not only on the tongs, but on the materials the target market would find acceptable.

Having scoured literature worldwide for ideas that could be used and finding little, XYZ evolved and patented the idea of placing the light between the blades of the tongs.

Many ideas were sketched and two-dimensional graphical representations interrogated, so designers could grasp how the product would look and work.

Next step was virtual prototyping, a process XYZ calls a mechanical design de-risking process. It's a computer-aided design analysis to ensure that the mass-produced product conforms to the design intent.

Then a foam prototype was made to get a feel for the ergonomics of the tongs in use. Says Byron Qually, design director of XYZ:





“We cross-pollinated all the desirable points from each concept and came up with a final solution.”

For example, one concept’s form intuitively conveyed information to the user, probably operating in the dark, on how to hold the tongs and where to find the light’s ‘on’ button.

Although the exterior product looked relatively simple, much time was spent on engineering its interior workings and selecting the most appropriate materials for its manufacture.

“This was important,” says Qually, “as the tongs would be used in a demanding environment, probably at night with open flames, high temperature and acidic cooking ingredients which could attack the product.

“We also considered the chance that the user might not be sober and would need a straightforward operation.”

Through various physical mock-ups, XYZ’s engineers evaluated how much force a person could comfortably use to open and close the tongs, and translated the answer into a spring design concealed in the product’s handle. To ensure the production plant could assemble the product easily, the tongs’ stainless steel blades were designed to clip onto the handle from the outside.

Due to the high-end market at which the product was aimed, mechanical details such as clips, springs and screw points were designed to be invisible to the user,

ensuring a clean almost organic form.

The prototype was evaluated and minor refinements made to the design. Says Qually: “It’s crucial to work through all the ideas at the early stages. The more time spent evaluating the process and techniques, the less rework required later. It would be expensive to remake a metal mould at a later stage, for example.”

XYZ employs product designers alongside electro-mechanical, industrial and mechanical engineers and, through its collective 60 years experience, has in-depth knowledge of product development across industries.

“Our process includes conceptualisation of the product, the use of technology and finally the product itself. We usually start

The Butte Torch Tongs are made of polished stainless steel and incorporate a light to illuminate food being braaied in the dark. The light projects through the centre of two hinged blades and is activated by pressing the tongs against the body or any other surface.

This intelligent light source automatically switches off after 90 seconds. The light can be removed and the tongs washed. The movable parts are shrouded in matt moulded elastomer that produces an ergonomic fit in the user’s hand. Use of on/off LEDs keeps power consumption low.

Richard Perez, operations director at XYZ says that taking an idea from conception through the design, development and manufacturing processes requires a multi-disciplinary approach with in-depth knowledge and a range of experienced skills.

“Some people with good ideas think the process can be handled by a designer, or an engineer, or a toolmaker. None of them can handle the process in isolation. It is important for designers and engineers to work together. Their expertise is complementary.”

from the outside in, and then work from the inside out to make the product work. And throughout the process we need to ensure that the product is both aesthetically pleasing and technologically sound.”

The electricity question: powerful ideas

A new model for pricing electricity promises to make the energy more affordable, more readily available and more secure.

It's simple in structure and operation and valid for various operating conditions, says its developer, Pat Naidoo.



A Senior General Manager at Eskom, Naidoo developed the model in his work for a PhD in the Management of Technology Innovation and People (MOTIP) at the Da Vinci Institute of Technology Management.

He says: "It's an approach that sees the world through the eyes of the customer. Even at this late stage of industry development, we must go back to basics. The customer is the purpose of business.

"It's a notion often overshadowed by supplier-driven monopoly modelling of the industry, politically driven agendas that protect state owned monopolies, and economies-of-scale arguments."

Historically, a state-owned public company has supplied electricity and set tariffs. The monopoly arrangement served the industry for many decades and brought large-scale electrification.

But with increasing demand for electricity from finite primary energy sources, availability, affordability, quality and security of supply have driven a new

debate on the industry's structure, ownership and efficiency.

Calls have been made for a competitive industry structure.

Naidoo says his project seeks to develop a customer-driven sustainable model for pricing electricity.

"A customer-driven model is original," he says, "as traditionally suppliers have developed pricing and strategies from their own perspective not their customers'."

The old approach is only natural. A monopoly needs to recover its costs from a captive customer base. But in an open and continually changing environment, a supplier approach may not be the best one.

For the model, he sought a solution that integrated the strengths and opportunities of the monopoly structure with the strengths and opportunities of open competition.

The solution had to be adaptable to ensure sustainability in a changing marketplace.



“My research to date showed that each proposed pricing system is unique and customised for the local operating environment.”

The project was first to build a generalised model based on fundamental academic principles and then to test it for general acceptance in various operating conditions.

In general, the structure of the electricity supply industry is changing from a vertically-integrated, single-owner, regulated monopoly to an open competitive market for wholesale suppliers and buyers. For retail customers, the choice of supplier is an emerging option.

But all these changes are taking place without any change to the physical power system. That system is constant in structure and operations and remains a regulated monopoly. Yet it must serve existing participants and new market entrants and must accommodate new regulatory rules.

It is simply being stretched, causing large-scale blackouts and widespread disturbances.

In the evolving change several challenges are emerging.

There is uncertainty about accountability for the obligation to supply. Similar uncertainty prevails for power system security and strengthening. Emphasis is on short-term generation investments.

Long-term generation investments are

high risk. Future electricity prices are unpredictable.

Such challenges contribute to anxiety and loss of confidence.

One solution is to scrap the proposed move to an open competitive market for wholesale suppliers and to return to the single-owner, vertically-integrated, regulated monopoly. But expecting customers to bear all costs associated with low or poor productivity builds inefficiency.

The financial burden on customers might also be minimised with incentive-based tariff regulation, but most economists would argue that an open, competitive market is the preferred longer-term sustainable model for both buyers and sellers.

After extensive research on the workings of the traditional monopoly model of supply, delivery and consumption, and the experiences of many countries with competitive market models, Naidoo offered a new approach to market modelling.

The physics of electrical energy, he explains, say that once energy is produced, it has to be consumed.

The electron produced is unique. So is the consumption. So a one-to-one relationship emerges between customer and supplier. The delivery process is begun and driven by the customer.

All customer loads and supplier generation profiles can be broken down into unity load/supply and less than unity load/supply.

When a unity load factor customer is mapped onto a unity supply factor power station (baseload power station), it creates a firm relationship between buyer and seller, independent of time.

Simple bilateral power purchase agreements define the relationship and the two parties work out the details of delivery.

For a less than unity load factor customer, many options are available.

Customers can work together, pool their loads and operations and create a unity bulk load. They can then apply the same bilateral power purchase agreements.

Auction type platforms can be introduced to manage and map less than unity load factor loads with similar pattern supply generators can that have quick start and stop profiles.

The simple new approach fosters continual self-awareness, efficient energy management, savings, and sharing of pooled complexities.

For the direct case of bulk supplies independent of time, it offers the opportunity to use economies of scale and to minimise generation, transmission and distribution costs.

Market power and gaming issues are avoided. A longer-term sustainable model is independent of structure, ownership and market type.

When variability is removed from the obligation to supply, output from a

power system structure and operations is constant.

“My study has shown that up to 80% of the power system is constant and it should be managed accordingly. The key fundamentals here are affordability, continuity of supply and security of supply.

“For the variable parts of the business, appropriate variable models and custom-designed plant and equipment should be made available. This 20% market component can also be designed and operated appropriately.

“Then finally, when external environmental effects disturb the set market operations, contingencies can be anticipated.

“Normal spinning and stand-by reserves can be procured for the ‘what if’ condition. Customer load interpretability can also be planned.

“The smart outcome is not rough and widespread bang-bang control for customer load shedding, but defined outcomes for mapped customers to come off when an allocated generator has faulted or is unavailable.

“The options are endless and customer and supplier joint workings can table more creative solutions.”



Dissertation research: Da Vinci shows the way



Da Vinci is well aligned with the latest national and international policy directions in postgraduate research, a recent study by its Research Office has shown.

The study illustrated that the current extended R&D mandate guiding postgraduate research at higher education institutions offers innovative opportunities for postgraduate research, and it can be managed productively within the framework of professional master's and doctoral programmes, both conceptually and empirically.

The past two decades have heard intensive debates - locally and internationally - on what should be expected of postgraduate dissertations and theses: Where on the research-innovation continuum, should the emphasis fall?

Emphasis in the higher education system increasingly settles on the 'extended research and innovation mandate': transforming the mission, policy, strategy, management and focus of research in the higher education system from 'knowledge for knowledge's sake' to 'production and use of knowledge to create wealth and health'.

The continuum stretches from research to innovation and beyond, e.g. to spin-off companies.

The emerging emphasis on research-for-innovation was inspired by a range of developments: competing government priorities, political calls for accountability in the research community, the introduction of performance auditing and influential

publications such as Gibbons's book on Mode 2 knowledge production.

In June, the annual conference of the South African Research and Innovation Management Association (SARIMA) focused on the higher education institutions' responses to this new mandate.

The Da Vinci Research Office presented a paper taking two lines of analysis: Da Vinci's dissertation policy and strategy, and an empirical analysis of the perceptions and experiences of Da Vinci graduates.

Da Vinci policy and strategy

For master's and doctoral programmes, Da Vinci has adopted the professional model characterised in Lester's words by '...research (that) is informed by real world problems in professional practice'.

The professional dissertation would use work experience as its source, rather than literature and various theoretical models.

Research would seldom be fundamental,



but mostly research-for-utilisation.

Normally the final chapter of a dissertation or thesis would offer recommendations and implementation proposals rather than suggestions for 'further research'.

An analysis of Da Vinci's dissertation policy, strategies and guidelines convincingly shows that our professional master's and doctoral dissertations comply with ideals set by the new mandate.

It reveals that research themes and topics relate to work situations. An academic and field/industrial supervisor guides the student. The field supervisor, who is normally employed in the relevant field, is expected to facilitate the interface between work and the academic content, and the implementation of the findings.

The rules for the examination of the dissertation also comply with the above policies, as can be inferred from the weights allocated for the different components of the dissertation:

- 10% for explicit accounting for technology, innovation, people and systems in the dissertation;
- 30% for practical relevance/application of the findings; and
- 60% for research methodology.

In addition, the examination procedure also requires an oral defence of the dissertation, in which supervisors, academics and delegates from the

student's work place participate, and application of the research findings is assessed.

In short, Da Vinci's dissertation policy is very well aligned with the requirements set by the new research mandate for universities. Indeed, it may even be a model for other higher education institutions.

Empirical study

To ascertain whether we at Da Vinci Institute practise what we preach, an empirical study was conducted on the perception and experience of graduates of 2007 and 2008.

An e-mail questionnaire was sent to 72 graduates and 22 (Masters 17, Doctorates 5) responded.

The questionnaire focused on perceptions of the outcomes of dissertations so far, and covered background and nature of the dissertation, extent and mode of implementation of recommendations, feedback from employer, and attitude of the student towards the research-work interface.

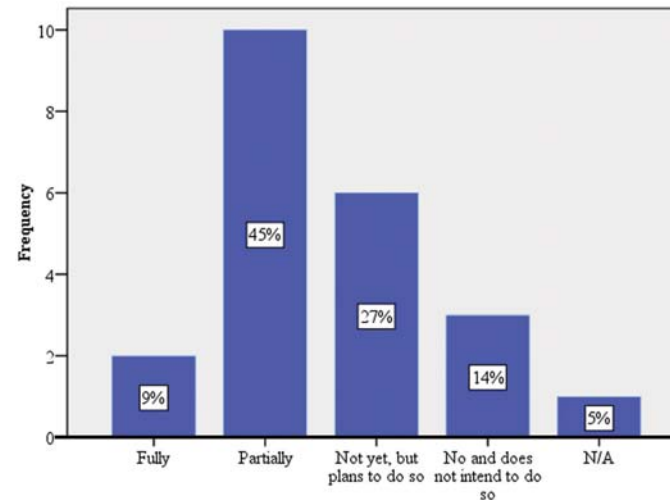
Some of the findings were that:

- all the dissertations/theses topics focused directly or indirectly on work-related problems;
- 95% percent of the dissertation/theses contained work-related recommendations, 45% extensively and 55% in part;

- implementation of the findings and recommendations was positive.

The study found that dissemination of the findings was somewhat restricted, but this may be attributed to the confidentiality clause imposed by some employers.

Finally, students' attitudes towards the impact of their research on themselves and the work place were moderately positive: 54% reported their recommendations had been implemented



fully or partially and another 27% expected them to be implemented in future (see above).

In summary, the findings of the empirical study, modest though it may have been, reflected favourably on Da Vinci dissertation and thesis projects.

State's rights to intellectual property

The Parliamentary Portfolio Committee for Science and Technology and the Select Committee on Education and Recreation have invited the public to comment on the Intellectual Property Rights from Publicly Financed Research and Development Bill.

Public hearings were scheduled for July 29 and 30 at Parliament.

Since the subject matter is potentially relevant to all our students and stakeholders, TIPS offers a selective summary of the proposed legislation.

To the legislators, Intellectual Property Rights (IPR) as defined in the new bill, include 'copyright, aesthetic and functional designs, or marks which form an integral part of a non-patentable invention' and extend to 'the protection of basic scientific research results ... capable of forming the basis for a patentable invention but not yet capable of protection under the Patents Act'.

They also view intellectual property (IP) derived from non-specific funding by a private organisation as publicly-financed research and subject to all the implications of the act.

On the other hand, a private organisation that commissions a specific project with specified results, and covers the full costs, may 'become the owner of the IP emanating from its funded research provided that the funding agreement makes provision for benefit sharing'.

The bill seeks mainly:

- to define the State's rights to IP derived from research by institutions using government funds;
- to establish a dedicated fund to pay for IPR; and
- to create a uniform system of managing IP, by establishing a National Intellectual Property Management Office.

Intellectual Property Management Office

The bill requires all higher education institutions and statutory science councils to establish an Intellectual Property Management Office (IPMO).

Its functions range from receiving disclosures or notifications of possible intellectual property development from employees and components of the particular institution, through analysing the disclosures or notifications, to ensuring that researchers report, within 30 days of identifying it, all possible IP arising from research done at the institution.

The IPMOs would have to screen all publications from the institution for potential IP that, through publication, may lose protection of the Patents Act.

National Intellectual Property Management Office

The second management level, a National Intellectual Property Management Office (NIPMO), will promote the objects of the act and protect IP that institutions identify but do not wish themselves to protect.

NIPMO is also mandated to incentivise institutions for proactively securing IP and commercialising it, and inventors 'to ensure full participation in the innovation cycle'.

NIPMO will manage a Patent Fund to support financially the institutions for statutory IP protection.

The bill is clear that IP rights flowing from employees' work will vest in the institutions. Each employee will need to report any potential IP (discovery, invention, etc.) to the institution. Failure to do so would be managed as a breach of contract. The bill also allows the person or

people who generated the IP to share in net revenues or royalties throughout the IP's life cycle.

Government march-in rights

The bill also allows so-called march-in rights, to 're-assign' a patent to the State, or to have an exclusive licence revoked, if it is convinced that the patent or exclusive licence is being used non-optimally in South Africa, and that doing so would be in the interest of the country's health, security and other needs. This right also applies to cases of non-adherence to licence conditions.

Finally, the bill says preference shall be given to BBBEE entities and SMMEs in granting any licence to IP under the act.

Secrets of success among the TT100

Customer relations and technology management have been found to be the biggest contributors to innovation value in established companies seeking TT100 Awards in 2007.

Technology management, employment equity and supplier relationships contributed most to it among emerging TT100 companies.

Confirmation is to be found in analysis of the adjudication process of the TT100 Awards, a system evolved over the past 15 years.

Knowledge of an established company's performance on five dimensions - customer relations, technology management, environmental issues, collaboration and design - allows a 79% prediction of its likely performance in the TT100 Awards.

Knowledge of an emerging company's technology management, BEE and employment equity, supplier relationships, social responsibility and environmental issues, allows a 75% prediction of its performance in the competition.

PAGE 11

Customer relations contributed $\pm 23\%$ and technology management $\pm 19\%$ to innovation value in established companies, while technology management ($\pm 34\%$) was the strongest predictor of the TT100 performance of emerging companies.

The TT100 Awards are the oldest and arguably the most prestigious of their kind in the country.

Lessons

Seeking lessons from the information participants provided, the Da Vinci Research Office explored the quantitative information yielded by the adjudications of the 2007 TT100 entrants.

Quantitative data were available for technology strategy, technology management, business environment, human resources, the people-technology interface, business outcomes and contextual issues.

(Unfortunately, some issues dealing with innovation were qualitative and could not be included in the analyses).

The analyses determined the underlying relationship among adjudication

dimensions, and set a base for revising the adjudication instrument for 2008.

Future analyses will enable the plotting of participating companies.

A factor analysis - a statistical data reduction tool to identify common dimensions among a large set of (adjudication) items - was done on the quantifiable responses of established and emerging companies separately.

Important dimensions

The table of predictors elsewhere on this page summarises the five most important dimensions on which the adjudicators rated established and emerging companies. Information on the

methodology and statistics are available from the Research Office.

It is important to bear in mind that the adjudication instruments were essentially the same for established and emerging companies.

The differences between established and emerging companies are shown graphically in the bar chart.

It is clear from the information reflected in the table that established companies scored higher than emerging ones on all the components.

Adjudicators generally thought established companies did better on all the components than the emerging ones.

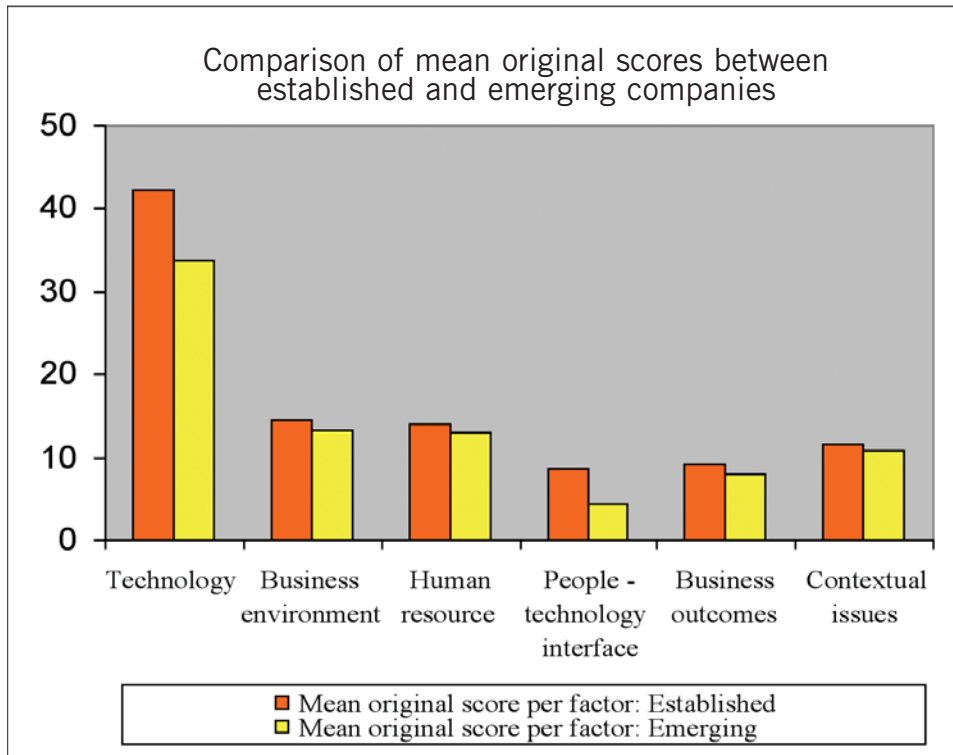
Predictors of TT100 performance

Established Companies

- 1st Customer relations
- 2nd Technology Management
- 3rd Environmental issues
- 4th Collaboration
- 5th Design

Emerging Companies

- 1st Technology Management
- 2nd BEE & Employment Equity
- 3rd Supplier Relationship
- 4th Social Responsibility
- 5th Environmental Issues



Results

The results of the factor analyses and other descriptive statistics, especially measures of dispersion, were used to revise the adjudication instrument in important respects.

This process resulted in a considerably shorter instrument welcomed by adjudicators in the 2008 TT100.

The exploratory analyses showed that:

- the adjudicators approached established and emerging companies with different mindsets and clearly differentiated between the criteria applicable to the two types of companies;
- the adjudication dimensions, identified

in the statistical analyses, proved to be relatively strong predictors of TT100 performance;

- the structure of dimensions produced by the factor analyses seemed to be well aligned to the Da Vinci MoTIPS Model;
- a fully-fledged analysis could now be done on the adjudication ratings of the 2008 competition; and
- the results of analyses such as the ones reported here, would allow plotting of the position of individual companies relative to all the other companies of that type.


Insite will spotlight DST's focus areas

INSITE 2008, the biennial International, Science, Innovation and Technology Exhibition, undertaken by The Department of Science and Technology (DST), will take place from September 15 to 17 at the Sandton Convention Centre, and will run concurrently with the International Association of Science Parks' (IASP) XXV World Conference on Science and Technology Parks.

The IASP World Conference theme - The role of Science and Technology Parks in accelerating knowledge economy growth - will contrast emerging and more developed economies in line with INSITE 2008, which will highlight the role of science, technology and innovation as key drivers of economic growth and development.

DST Director General Dr Phil Mjwara, says: "By staging INSITE 2008 alongside such a prominent global conference, we believe we will go some way to bridging the gap between developing and emerging economies, through the sharing of best practices. And, it is only through a competitive economic strategy that we can ensure the relevance of South Africa in the African and international community."

Three of the DST's interrelated thematic focal areas - youth and the imperative to address the critical skills shortages in science, mathematics and engineering; strategic economic interventions; and sustainable development - will come under the spotlight at INSITE.



Biotechnology can ease the food shortages

“It is touching every country in the world. We have seen not only riots and people dying, but a government toppled [in Haiti], and we know that many countries...could tilt to one way or the other depending on the discontent or satisfaction of their population,” Jacques Diouf, Director of United Nations’ Food and Agriculture Organisation (FAO) said of the explosion of food prices as the June Conference on World Food Security began in Rome.

With these words, Diouf expressed the growing concern of governments and opinion leaders internationally over the potentially revolutionary implications of the upward spiral of prices for basic food staples.

South Africa is among 23 countries in which 12-million farmers have planted more than 283-million acres of biotech crops.

“Biotechnology, including genetically modified organisms (GMOs), could help produce more food by improving the yield a hectare planted and produce crops resistant to drought, insects, pests and disease; that use water and soil nutrients more efficiently; and that are modified to increase their nutritional qualities and content,” says the Department of Science and Technology’s GM of biotechnology and health, Dr Theresa Smit.

“Biotechnology, in its many forms, has the potential to make a significant contribution to sustainable growth and development, through delivering a more resilient, more sustainable and bio-based economy.”

South Africa, India, China and Brazil are currently seen as the countries leading development of biotechnology innovation.

South Africa is the only country on the continent with a developed biotechnology strategy, which is currently being revised and updated.

South Africa’s status

Through its various instruments, the Department of Science and Technology (DST) supports responsible agricultural biotech research that focuses on improved crop yield and food quality through enhanced crop resistance to harsh environmental conditions or agrochemicals.

“The main issues and concerns in



biotechnology in South Africa are related to limited scientific and entrepreneurial expertise, capacity and critical mass to drive a developing and growing biotechnology industry," says Smit.

"While the biotechnology industry in South Africa is still relatively small and in its early stages of development, the sector offers huge potential as a contributor to national priorities."

Biotech important component of Government's strategy

The DST has developed a Ten-Year Innovation Plan that aims to establish South Africa as a world leader in biotechnology and pharmaceuticals based on the nation's indigenous resources and an expanding knowledge base.

"The DST regards biotechnology as a priority area that has the potential to contribute significantly to national priorities, such as improved quality of life through improved healthcare, food security, job and wealth creation, and environmental protection," Smit says.

Within the plan, a Farmer-to-Pharma challenge is one of five identified and prioritised as a value chain to strengthen the South African bioeconomy: the set of economic activities relating to the invention, development, production and use of biological products and processes.

The plan proposes to transform the base of the South African economy from resource to knowledge, and move science, technology, information and learning to the centre of economic activity.

Worldwide and locally, biotechnology has applications in, among others, human health and care, animal health and production, crop and plant production, forestry, industry, mining and the environment.

The investments in, and economic output of, all of these types of applied biotechnologies form part of the bioeconomy, Smit says.

The DST's Technology Innovation Agency, she adds, is expected to provide a more focused and strategic approach to commercialisation of biotechnology innovation to meet the needs and challenges of South Africa.

Enabling factors include world-class researchers and institutes, rich indigenous plant and animal biodiversity, a sound regulatory environment with policies and strategies relating to biotechnology, strong international links and collaborations, and increased government funding, support and infrastructure development initiatives.

Government initiatives

These initiatives include Biotechnology Innovations Centres, the Research Chairs initiative, Centres of Excellence and the

International Centre for Genetic Engineering and Biotechnology established in Cape Town in 2007.

Since 2001, the DST has established three Biotechnology Regional Innovation Centres (Brics) and three Biotechnology Innovation Centres that operate at a national level.

The Brics are the Biotechnology Partnership and Development in Pretoria, which serves Gauteng, the Free State, Mpumalanga, the North West and Limpopo provinces; Lifelab, serving the Eastern Cape and KwaZulu-Natal region; and Cape Biotech serving the Western and Northern Cape regions.

The three national centres are PlantBio, focusing on plant biotechnology; Public Understanding of Biotechnology, which serves to increase the understanding and awareness of biotechnology of the general public; and the National Bioinformatics Network, which has participated in the establishment of different centres at tertiary and research institutions.

Smit says other issues in biotechnology include public perception and the lack of understanding and acceptance of the role of biotechnology.

Because the industry is research and resource intensive, it requires significant financial investment, facilities and equipment, and technological capabilities and expertise.

"The development stage is too long. Products take a relatively long time to reach the market. The biotech industry is also highly regulated and research

initiatives have not always been well coordinated or needs-based."

However, the DST is constantly evaluating and assessing policies relevant to biotechnology and is currently revising or developing new strategies and policies on biotechnology and health innovation in South Africa.

Local capacity

On the issue of skills in biotechnology, Smit says: "South Africa has a number of world-class researchers and research institutions, numerous world-class training facilities and the necessary capacity and expertise in various areas.

"Several undergraduate university programmes in science and technology, provide good, solid theoretical and, to a large extent, technical training, in various fields and aspects of biotechnology.

"Further practical and theoretical training may be acquired through postgraduate qualifications and relevant short courses and seminars.

"The use of biotechnology is expected to contribute significantly to the improvement in the quality of life and health, poverty alleviation and wealth creation in South Africa and, where the capacity exists, in Africa," says Smit.

This article was originally published in Engineering News. It is republished, slightly amended, with the permission of Engineering News and Dr Smit. Visit www.engineeringnews.co.za

Why it's time for non-IT managers to learn about IT



Businesses need a new understanding of information technology if they're to be sure of effective performance.

IT specialist Tim Brown says it's time for non-IT managers to learn about IT.

Evidence of its value has been confirmed by three seminars he has organised on the subject, the most recent of them in Johannesburg. It's also a subject he has spent several years investigating for a PhD thesis towards a Doctorate in the Management of Technology and Innovation from the Da Vinci Institute of Technology Management. Brown, an MBA, has more than 20 years IT-related experience in executive positions both in general industry and IT.

As technology increasingly pervades the workplace, he is convinced of the need to equip managers with new skill sets designed to manage IT challenges.

Such skills, he says, will improve IT-related decision making, promote a better understanding of IT investment and measurement tools, and help them develop IT strategies and IT-related risk management.

"IT governance makes an important contribution to organisational performance effectiveness," he says. "When it's used diligently, IT governance co-exists with effective organisational performance.

"When it's weak organisational performance will be poor."

In his thesis, Brown explains:

"IT governance is more complex and broader in its application than the locus of control of IT decision-making. When viewed in the framework of organisational design, it's not restricted to the distribution of decision rights.

As information technology becomes more tightly woven into the fabric of an organisation and its environment, the organisation's behaviour and competitive actions are orchestrated more and more by the technology's competency.

The actions or inactions of those who govern it, conceptually bind the organisation their information technology and to the way it's governed.

As the organisation becomes bound by either weak governance or technology, a further phenomenon becomes evident: organisational drag, the slowing clock speed of the firm as it struggles to keep pace with the industry and competitors.

In the context of IT governance, understanding and managing the pressures competing for uniformity and differentiation become more complex when governance is conceptualised too narrowly (expressed by centralised or decentralised configuration alone, as an example) or when IT-related absorptive capacity is low.

In an effort to optimise IT governance, businesses lean heavily on uniformity. In doing so, they forego the richer set of properties found in differentiation.

Consequently, the design and implementation of integration strategies



“Technology’s influence on the way the organisation works, and on its performance, requires a broader constituency to govern its contribution”

may become compromised through structural standardisation. And that adds another burden to the opportunity for performance effectiveness.

Brown explains:

Parallel with the deployment of new technology, many companies have reached the point where they need to replace previously deployed technologies, and hold only onto their intellectual asset.

How do companies harvest this intellectual asset base, promoting innovation without destroying past knowledge? How are these intellectual assets included in the decision and authority cycles to initiate, approve, implement and control the new technology, to enable a timeous and maximum return?

As information, and consequently the technology of its management, becomes ubiquitous in the framework of the firm’s products, services and relationships, so the governance of the technology becomes an instrument in the organisation’s performance.

Technology’s influence on the way the organisation works, and on its performance requires a broader constituency to govern its contribution and recognise inherent rights in the decision process.

Our current understanding of IT governance is anchored on the debate of centralisation versus decentralisation, and is largely constrained within the discipline of Information Technology itself.

Within this view the IT transformation process has been used as an instrument from which our view of governance has

developed, in relative isolation, from the dynamics of the developing and changing landscape of the firm. Although various bodies of literature describe contemporary configurations for IT decision-making authority, they have not sufficiently explored the construct from a trans-disciplinary perspective, possibly ignoring conceptual components that can offer a deeper insight into the governance of IT.

From a general systems perspective, the governance of IT has previously concerned itself more with the dimension of technology (that is less about information, knowledge and the meaning and outcome of its use) and inputs to the system.

Organisations in a post-industrial environment need to extend the governance of their information and related technologies across the whole system, and to account for the impact of the technology both through the transformation process and the outputs.

The new role of technology extends its role of an automation agent to a participant

increasingly equal to some of the firm’s human resources (for example as a guardian of information and knowledge and a resource that undertakes work).

It needs deeper interrogation if the firm is to understand its impact on the future governance of the IT framework.

It is not the technology itself that is the lens to be used to understand IT governance, but the changed organisational landscape brought about through its use.

In other words, businesses need to understand the union of the systems of the IT transformation process and of organisational design to understand the governance of information technology in the post-industrial space.

The study was first to explore the governance of IT and its relationship with organisational performance effectiveness from a broader perspective: to reposition IT governance as quintessentially trans-disciplinary in nature.

Through this repositioning, the research

extends and expands the conceptualisation of IT governance.

Exploring the meaning of IT use in the organisation, and how the organisation and its work change through IT use, gives further insight to governance demands.

The study aimed to enhance the understanding of the role of IT governance in organisational design, and its relationship to organisational performance.

The lessons learnt from my research, Brown says, give rise to the following recommendations.

Businesses must re-define IT governance to offer a conceptualisation broader than the present view generally restricted to the distribution of decision rights for information technology alone.

This research has shown that it is necessary to consider equally the changing organisational shape that accompanies information technology, or at least the opportunity for a changed organisational shape, and, with it, the governance likely to be needed.



For example, the introduction of a new information technology platform in two cases investigated, were treated materially differently.

Notwithstanding the ongoing delay in deployment, Case A elected to change neither the structure nor skill requirements of the operators of its new system.

Case B elected to operate through a call centre environment and to ensure that the skill requirements of its operators were in line with call centre technologies, and made full use of the embedded knowledge and process practices which had previously been abstracted into the technology.

So it is necessary that the decision rights on whether, and how, to harvest the opportunities from a changed landscape which may be present with information technology, should co-exist with the rights of the information technology itself, offering a perspective that the governance of information technology and the governance of the organisation as a whole occur collaboratively, initially, and eventually become indistinguishable.

The existence of a shared understanding between corporate IT and business management has shown to be one of the fundamental attributes in effective IT governance.

It is necessary to have clearly articulated goals, governance procedures and a concern with the ways in which governance is applied, and not just with its outcomes.

At least in a low maturity environment, it is necessary to institutionalise IT governance, giving certainty and formality.

“Improved communication is crucial to improved absorptive capacity”

Organisations must seek value from IT beyond what is traditionally attributed to automation.

Many organisations have already wrung out most of the value of internal process automation and electronic storage. They need now to seek value through innovation, change or re-sculpturing temporal and spatial dimensions across the competitive environment or value chain. The importance of seeking this value cannot be left to corporate IT alone. The governance of IT must be fully inclusive.

IT-related absorptive capacity must be improved.

Improved communication — the use of a recognisable language between stakeholders, and use of cross-functional training — is crucial to improved absorptive capacity.

Artefacts must more fully represent a post-industrial environment to give and embed meaning to a trading landscape that is increasingly dematerialised and uses only information technology.

As in the trading environment, it might not be necessary for these artefacts to exist in a material form, but are constructed abstractly as part of a new reality.

The governance of information technology for the organisation is no longer centred either on the technology itself or on the organisation alone. It now extends to the way the organisation and its competitive environment use technology. Importantly, it now spans the organisation’s boundaries.

From a governance perspective, this calls for a deeper understanding of the change and meaning technology brings to the trading environment, and the impact for organisational performance effectiveness.

