

DRAFT PROCEEDINGS REPORT

NACI STAKEHOLDER CONSULTATION WORKSHOP

**FRAMEWORK FOR THE DEVELOPMENT OF AN INNOVATION SCORECARD
FOR SOUTH AFRICA**

21 October 2016; Innovation Hub Conference Centre, Pretoria

1. Welcome and Introduction

Dr Azar Jammie welcomed stakeholders to the workshop. The purpose of the workshop was to solicit stakeholder inputs and to obtain consensus on a framework for an Innovation Scorecard for South Africa; both in terms of the indicators and proxies that need to be included for each selected component and their linkages.

The NACI mandate as per Section 3 of the NACI Act (Act 55 of 1997) is to advise the Minister for Science and Technology, and through the Minister, the Minister's Committee and Cabinet on the role and contribution of science, mathematics, innovation and technology, including indigenous technologies, in promoting and achieving national objectives. The overall national objective is to boost economic growth and employment. Innovation must be tracked in order to achieve the objective.

Upon request of the Minister, NACI may advise on strategies for promotion of public understanding of science and technology (S&T) and their supportive role in innovation for development and progress; as well as the monitoring and evaluation (M&E) of the overall management and functioning of the S&T system and the National System of Innovation (NSI). The institutional landscape for S&T is currently being assessed to ensure that it is appropriate for obtaining inputs to assist in meeting the needs of the country and in encouraging innovation. Innovation is not only reliant on S&T and an

increasing recognition exists of the need to consider certain social factors for the promotion of innovation.

The National Development Plan (NDP) refers to the establishment of the NSI to assist in promoting economic growth. S&T indicators are a core and important component of evidence-based policy-making and policy evaluation which allow performance analysis of the NSI. Indicators are a means of measuring and assessing progress and the use of international standards allows comparison of South Africa relative to other countries. International benchmarks and data collection practices support the relevance of the comparison and are fundamental to the development of the White Paper on S&T and the science, technology and innovation (STI) Decadal Plan.

Benchmarking is based on international standards such as the Frascati Manual, the Oslo Manual and the System of National Accounts by Stats SA. Gaps do exist in the available data used as previously identified when NACI commissioned the Academy of Science South Africa (ASSAf) to undertake a study to assess the STI data and leading STI indicators that can determine the health of the NSI. The study investigated the weaknesses in the collection of data and identified gaps in the available data and this included an assessment of measures used internationally. The results indicated that most of these indicators focused on the supply side such as the number of people in the educational system, the number of doctoral graduates and the number of publications that they produce; with insufficient analysis and measurement of the results emanating from educating people in STI.

It was recommended that the indicators should be split into categories to reflect knowledge demand, knowledge mobilisation, knowledge application, knowledge flows and social impact. On the output side *knowledge demand* should reflect the manner in which innovation assists in the manufacturing of goods and how that in turn impacts on the ability of the country to produce more than it consumes. Consideration has to be given to the foreign student population in higher education as a source of generating more innovation. The lack of appropriate employment for tertiary-level graduates is a structural weakness in the economy. Although the number of black doctoral graduates has overtaken the number of white graduates, only 17% are employed in the private sector. This is indicative of a mismatch between the talent and ability being produced and what is needed by the private sector. School leavers and university graduates have

to be made more employable. *Knowledge mobilisation* weaknesses also need to be improved and this includes access to communication technology. *Knowledge application* requires more patents, entrepreneurship and innovation to assist economic growth. This will lead to more direct foreign investment. Immigration of people with ability and ideas will assist with economic growth. The impact can be evidenced throughout the society which has high levels of inequality. It must be ensured that innovation impacts on the poor and measurement of the *social impact is needed* to show the effect of innovation trends on society.

1.1 Science Technology and Innovation indicators booklet

NACI publishes a report known as the South African Science Technology and Innovation indicators booklet. The report contributes to the building of a monitoring, evaluation and learning capability for assessing state of the NSI and is also a platform to share insights on the performance of the NSI. The ultimate goal is to enable STI policy learning necessary to bolster performance of the country's innovation system.

The indicators used in developing the booklet are structured around the 2002 National Research and Development Strategy (NRDS) 'indicators logic model framework'. The logic of the indicators is that by considering certain aspects for future development, the current capacity of R&D and human capital resources in S&T can be assessed. Together with imported knowhow, these encourage technological progress and boost business performance and wealth creation as well as improving the quality of life.

Data is collected from a variety of sources and feeds into a number of broad indicators such as the international Human Development Index (HDI) where South Africa is ranked 116th. The social progress in innovation index and the environment performance index have also recently been added. The main elements of the HDI are per capita GDP, the level of education and the level of health care. South Africa rated poorly in 2014 on health care relative to comparable BRICS countries although the life expectancy has increased subsequently. The South African rating on years of schooling is satisfactory, the problem is the output. South Africa features in the middle of the BRICS ratings on living standards. Indians have a much lower rating whilst Russians are much higher. South Africa is on a par with China and Brazil. South Africa rates poorly on the environment performance index on health care, poor on air quality and satisfactory on

water and sanitation. It is, however, the top rated BRICS country on agriculture and also the top rated country internationally on forestry.

1.2 Innovation scorecard rationale

The Minister asked for the innovation trend to be measured over time. This is the rationale behind the development of the innovation scorecard and/or introduction of a composite scorecard which provides a single number rather than multiple indicators. Most of the international rating agencies now require a single composite indicator. International comparisons are criticised for having missing data or being based on opinions of corporate executives and not on hard facts. South Africa is 54th of 128 countries on the Global Innovation Index (GII). This rating is similar to the World Competitiveness Index where South Africa was recently rated 47th of 138 countries.

The introduction of sub-composite indicators was suggested in order to reflect certain aspects of the Innovation Framework. One is on inputs and the other on outputs. South Africa is doing relatively well on some institutions and certain human capital infrastructure which encourage the development of skills. However, there are no commensurate results in the marketplace and this has to be improved to advance STI. An additional example is that South Africa is ranked 63rd on knowledge and technology outputs and ranked 52nd on knowledge creation. Although much is being put into the creation of the technological and innovation system, the output benefits are not aligned. Valuable insights from the participants would add value and facilitate consensus on a proposed framework for an innovation scorecard for South Africa.

2. Presentation: Proposed Framework for an Innovation Scorecard for South Africa

Professor Anastassios Pouris gave a presentation on the proposed framework for an innovation scorecard for South Africa. The process of developing a framework for the Innovation Scorecard began in 2015 under the leadership of Dr Jammie and a workshop was held in early 2016 as a collaborative effort is necessary to agree on the process. The objective of the scorecard is to enhance the monitoring of the innovation system by developing composite innovation indicators for South Africa. The approach used for drafting the proposed Framework began with a literature review, particularly

looking at international literature on composite indicators. The fields of business and economics as well as the theory were covered in order to find appropriate composite indicators for the South African reality.

Composite indicators are synthetic indices of individual variables which integrate large amounts of information into easily understood formats. The broad fields covered are economics, environment, globalisation, society and innovation or technology. Politicians, journalists and lay people use composite indicators. The main use is to rank countries according to policy domains and performance. The leading composite indicators refer to economics. The United Nations (UN) and the Organisation for Economic Co-operation and Development (OECD) are principal creators of composite indicators which are published. The World Economic Forum publishes environmental indicators such as the Sustainability Index. A number of indicators exist to rank countries on globalisation and social parameters. The latter includes the Human Development Index. Many indices exist for innovation. The European Economic Commission produces many indicators on innovation to monitor innovation of European and developing countries.

The advantages of composite indicators are that they can summarise complex multi-dimensional realities which make them easy to interpret. They allow for the assessment of progress of countries over time as they retain the base information. The visible size of a set of indicators is reduced. Composite indicators allow for the inclusion of more information. They facilitate communication with the general public, assist in underpinning narratives for lay and literate audiences and enable users to compare complex dimensions effectively. The disadvantages are that they may provide misleading policy messages if misinterpreted or poorly constructed. Composite indicators can attract simplistic conclusions on policy and can be misused. They can create political dispute on the selection of indicators and weights assigned to the indicators.

Composite indicators can disguise serious failings in certain dimensions and may increase the difficulty of identifying the correct remedial action that is required if the construction process was not transparent. They may lead to inappropriate policies if the dimensions of performance that are difficult to measure are ignored. In 2002 the

Department of Science and Technology (DST) proposed the formulation of a composite indicator and produced a report which provides indicators for each of the domains; i.e quality of life; wealth creation; science, engineering and technology human capital; technical progress; business performance and key industrial sectors; future research and development capacity; current research and development capacity and imported know-how. The report did not indicate the manner in which the indicators can be combined.

Composite indicators have certain requirements. They must have a theoretical basis and need to be developed in terms of a framework. A normalisation process which unites various indicators into a single unit is required as indicators are measured using different values; e.g. GDP and the number of products produced. Many statistical approaches to normalisation exist. The weights to be used for the indicators are of political interest as they lead to different outcomes. Deciding on what weights to assign each indicator is complex. The normalisation process creates a difficulty in that international indicators aim to rank countries and produce trends but do not provide reasons for the movement of countries. The indicators do not explain whether the movement of a country was because the local situation improved or the ranking of other countries decreased. A certain article stated that the number of publications produced in South Africa had increased annually yet the international ranking had declined. The reason was that other countries produced even more publications. The analogy of running fast but being overtaken by faster runners was used. The aggregation process refers to the manner in which the sub-indicators are combined.

A number of international indicators which covered South Africa were identified, the top indices being the Global Innovation Index (GII), the Innovation Union Scoreboard, the Abu Dhabi Innovation Index and the Bloomberg Innovation Index. One aspect of the South African innovation system to focus on is the development of partial composite indicators such as the Global Talent Index and Knowledge Transfer which cover a single aspect. The Global Innovation Index has inputs with five pillars and outputs with two pillars; with each pillar having three variables which define it. The South African GI ranking in 2014 was 53 with a score of 38.2. In 2013 the ranking was 58 with a score of 37.6. The movement of South Africa was less than one point but translated into a difference of five ranks. This indicates that score alone does not provide much

information. The indices provide information that is useful when comparisons are made with other countries or for one country over time. Time is complex as the comparison alone does not tell the reasons for changes. In 2009 South Africa was ranked 43 on the GII and 54 in 2015. The index does not describe whether the system improved or other countries were doing more and better than South Africa.

2.1 Knowledge economies

The knowledge-based economy is a partial indicator. It is defined as “An economy that uses information resources (technologies, skills and processes) to achieve and accelerate economic growth potential.” Sustainable economic growth must be based on knowledge and/or technology. Australia, the United States of America, the European Union and the Asian Development Bank are among the organisations and countries that have relevant knowledge economy policies and monitoring mechanisms in place. Measurement of the knowledge economy can take place by industry which is an output-based measure or by occupation which is an input-based measure. The third option is using composite indicators.

The size of a knowledge economy takes account of knowledge-intensive services and high-technology manufacturing industries. The former includes education, health, business, financial and communications services. The latter includes aerospace, communications and semiconductors, computers and office machinery, pharmaceuticals as well as scientific instruments and measuring equipment. The South African knowledge economy has moved from 16% of GDP in 1997 to 19% in 2012. In comparison the United States of America has a knowledge economy which comprised 40% of the GDP. Turkey is at 23% and South Korea 29% of GDP. China, which is at 20% of GDP, has announced that it aims to achieve 30% by 2025. This demonstrates that a composite indicator can be used on a political level and can affect the structure of the economy.

2.2 The South African composite knowledge index structure

A structure was developed for the South African composite knowledge index and it consists of the three variables and pillars. The pillars are: innovation and technological adoption, education and training as well as information and communication technologies infrastructure. Indicators show that South Africa was better in ICT than

education in 2014. The indices indicate growth or shrinkage of pillars over the period from 2010. The index showed 28.5% growth over the four years. The ICT pillar showed just under 50% growth for the period which could be due to the growth of access and use of the internet which grew faster than the composite knowledge index.

2.3 The South African Innovation Index

The South African Innovation Index is based on the European Commission instrument which is used to monitor all European countries and additional countries such as South Africa. The instrument is based on three pillars namely: enablers, firm activities and outputs. The shortcoming of the instrument is that the reason for movement in the ranking cannot be provided. The European Commission has an innovation index which informs the countries being ranked of their performance over time. The same indicator (with a different normalisation process) was used by South Africa to illustrate its performance over time.

The three pillars namely; enables, firm activities and outputs when applied to South Africa indicated the following results of growth or decline over the period 2010-2014:

- Most enablers showed positive growth except for venture capital as a percentage of GDP which declined. New doctorates increased by 43% and scientific publications among the top 10% of the most cited publications worldwide as a percentage of the total scientific publications in the country increased by 16%.
- Firm activities were mainly negative except for public private co-publications per million of the population which grew by 27%. Research and development expenditure in the business sector declined by 108%. This figure has to be seen in the light of the 2008 economic situation.
- Outputs were mainly positive except for the contribution of exports in commercial services to total exports which declined by 3.8%. Licence and patent revenues from abroad as percentage of GDP grew by 51%.

The South African Innovation index 2010-2014 indicates 0,11 positive growth in total. The outputs were higher than the enablers as the enabler variables were effectively translated into outputs. Firm activities, however, were negative.

Recommendations

The following four recommendations were made:

1. There are a number of international composite innovation indicators, particularly the GII and the Innovation Union Scorecard, that cover South Africa and can be utilised to inform NACI about the country's relevant innovation position internationally. NACI should produce a report every time new findings are published by these organisations to explain the findings and reasons for changes in ranking.
2. Partial indicators are useful for addressing issues of priority in the policy community. Composite indicators can hide information that should be revealed and partial indicators will provide a clearer picture. The proposed partial indicators were related to the knowledge intensive (based) economy and investment. The linked investment was noted as important as it can indicate whether government and the private sector are making the required investments. Technology transfer from universities and research organisations such as the CSIR and MinTech, to industry; including commercialisation, collaboration and trained people was the second proposed partial indicator to highlight the effectiveness of the institutions. The third proposed partial indicator was human talent including the talent environment, the quality of the labour force, higher education and compulsory education and government priorities in innovation. This will monitor progress on skills development, which is something that the country has to date not been able to do. All government priorities related to innovation need to be monitored with partial indicators, e.g a partial indicator could monitor innovation infrastructure.
3. The South African composite indicator should be monitored regularly and the innovation scorecard should be expanded to include the social impact and social innovation. The indicator should be developed to include historical values from 2000 onwards. The composite indicators should be included in the NACI booklet which could then be referred to as the NACI Indicators. The indicators should be developed based on 2000 as the baseline to provide historical values and be able to identify trends over the period.

4. NACI should monitor international composite indicators and offer to provide missing indicators as the South African data is not always available.

3. Panel Discussions

3.1 Ms Christine Yiannakis, Accenture SA

In her introduction, Ms Yiannakis noted that there are different interpretations of innovation. Innovation and invention are different. Innovation has numerous components and can take place in the home. It is a system or process that has been changed and made more efficient to provide the end user with more value.

Over the last three iterations of the Accenture Innovation Index, Accenture found the importance of certain elements within innovation. Internal innovation refers to the systems and processes within a company and is essential for a business to remain competitive. Entrepreneurship is vital for the popularisation of innovations. The Accenture Innovation Index measures the internal innovation such as what is being done and how the employees are involved in the development of an innovation culture as well as whether companies instil an innovation culture. Certain companies or sectors are not innovative. Lawyers for example have paper-based systems due to the nature of the industry. Innovation can be used internally and can be marketed. This is a dimension which is also measured on the Accenture Innovation Index. Innovation, ideation and commercialisation do provide returns which can be measured and do contribute to economic growth. The return on innovation to the companies is also another dimension that is measured.

Accenture conducts on-line research into innovation and compiles an Innovation Index. The web-based assessment tool is self-reporting and is open to all voluntary participants. Accenture does scrutinise the processes of the best innovators and gives them a score. The leaders are invited to present to Accenture. Awards are made for the top innovations and FNB was the first winner. South Africans have many innovative ideas but access to resourcing, capital and talent is problematic. Innovation must be a collaborative effort in organisations.

The following three themes emerged very strongly from the latest Accenture survey:

- a) The first theme was resources in the form of human and venture capital and resources which are leadership driven. Much of this occurs is at the ideation stage. The resources must be available and must be given the opportunity to ideate. Ideation is an essential component of innovation. Open innovation is considered in the survey. It also forms part of the NACI Innovation Scorecard. Innovation does not happen in isolation but with other resources. External input is received if the innovation goes to market. Tesla encourages external input on the electric motor vehicle as it improves the innovation.
- b) The second theme was engagement, which is measured in the survey. People must be engaged and invested in the notion of innovation for innovation to take place. Engagement is a major component of innovation.
- c) The third and major theme is digital. Digital is extremely important globally and in the South African landscape; e.g. Garmin was required five years ago and watches and cell phones now have GPS capabilities. Cloud solutions are part of the changing world. In the South African context, the access to digital technology has to be considered. A farmer on a basic cell phone has more access to more information than Bill Clinton had during his presidency which is an indication of how rapidly innovation is occurring in the digital space. Digital advances take place rapidly and businesses can fall behind very quickly. Businesses will stagnate if they do not innovate. It was suggested that digital should be incorporated into the Scorecard.

3.1.1 Questions and Comments

- It was noted that IT development statistics are difficult to find and they must be incorporated into national statistics. Stats SA splits household consumption expenditure into durable, semi-durable and non-durable goods and services. It is not known into which iPhones' fit and the information is needed to track internet accessibility. It was suggested that the IT information should be included in the NACI indicators. The starting point to this would be internet and cell phone providers. Bloomberg may have the number of customers signed up with each service provider, but not the number of active customers. Digital was pointed out as an important part of innovation which adds value and success.

- It was pointed out that insufficient attention is given to entrepreneurship and that it is needed to build a sustainable economy. Tertiary institutions generate people on assumption that jobs will be available and this is not happening. Entrepreneurship is essential to be able to turn ideas and products into a commercial success. Entrepreneurship has to be accompanied by venture capital to back up the ideas. The lack of finance was identified as a major problem. It was pointed out that Accenture met with Minister Hannekom in the past to discuss what happens to the innovative poor. It was concluded that entrepreneurship and innovation must be job creators rather than job seekers.
- A question was raised on whether creating a culture of innovation is sufficient to improve innovation and the economy. Another question was related to the availability and accessibility of the Accenture innovation index. Delegates were informed that there is a report published through Forbes which contains the key findings, methodology and indicators and that this can be distributed through the Accenture marketing team. It was noted that a hard copy and an on-line version of the report would be useful in this age of technology and that the latest Accenture Innovation Index report will be distributed to all the attendees.
- Another question raised was related to the possibility of incorporating the Accenture data into the NACI booklet (with accreditation). It was agreed that Accenture would work with the DST and NACI to find areas of synergy and possible collaboration.
- The statement that inventions are not innovations was pointed out as being important, whilst the statement that innovations are a key source of economic growth was said to be incorrect. It was pointed out that the economist who created the word 'entrepreneur' (Joseph Schumpeter) said that innovation is the only source of economic growth and that economic growth does not occur without an underlying innovation. Schumpeter divided innovations into five categories: technology, creating a new product, exploiting a new market, exploiting a new resource and reorganising organisational structure. It was suggested that the concept of innovation as it is currently being used by NACI could be broadened.

- Social innovation was identified as being important, noting that rural people can be innovators without access to technology.
- A question was raised on what indicators will show how innovation has changed and can be used to prevent innovation from declining and in terms of how policies can impact the trends of innovation. Innovation is malleable because it is not a single thing such as the number of jobs created. Innovation can be a system, process or product. It can be good but may not lead to growth. It was noted that the purpose of data collection is to create an appropriate framework and propose appropriate policies for economic growth in South Africa and that economists are often accused of not being able to predict. The number of patents was identified as a not so good indicator as innovators do not patent due to the associated cost; they want the innovation to be known and used and to improve it based on feedback they receive.
- The need to forecast was appreciated. It was also acknowledged that it is often difficult for economists to forecast. Even if the innovation is measured post facto, it may not have been successful but the work will contribute to the redesign. Innovating on innovation was therefore identified as being important.
- A comment was made that the Technology and Human Resources for Industry Programme (THRIP) transferred funds from industry to universities and that the Department of Trade and industries has since closed the programme. It was pointed out that an impact of the institutions not having funds will be a reduction in the number of publications and that ways of identifying the impact of particular policies or variables do exist. Scientific research can identify what happens if funding to researchers at universities is cut and quantify the number of publications impacted. It was suggested that NACI should consider developing predictive living indicators of future changes from current events, noting that the impact of potentially not having graduates in the 2016 academic year can be predicted.

3.2 Professor Gerhard Prinsloo, Durban University of Technology

In his introduction, Prof Prinsloo highlighted that the workshop discussions indicated that a tool that people want to use has been developed and that terms such as sensitivity analysis, leading and lagging indicators on an innovation index show that the innovation index has proven itself. He referred to the book, *The Alchemy of Finance*, where the author, George Soros, writes that a stock market-listed company has one important all-encompassing figure that changes over time and can be studied; noting that this is similar to NACI wanting a single composite indicator. The same phenomenon occurs in the Johannesburg Stock Exchange where the all share index provides an overall picture with the detail being contained in the sector indices. The manner in which the composite indicator has been broken into various sections was said to be impressive. The clear input and output indicators provide an understanding of where improvement is required due to too little input or too much output and the effects of these phenomena.

According to the GII South Africa is ranked 54 out of 128 countries. The theoretical base has a mathematics component, so, when the mathematics changes, the indicator might change. An analysis can be done to ascertain whether the mathematical model is good. A single figure that can be studied over time is needed as the South African Innovation Index. The tool will promote long-term policies. Leading and lagging indicators are an important application of the composite indicator. Valuable research has been undertaken in development of the composite indicator. It is anticipated that further interesting academic work will build on what has been completed. IT development data should be able to update the analytics automatically.

It was noted that challenges were experienced in the past, particularly on the correctness or age of data. The DST has very good science indicators which must be published. However, the approval process to allow publishing can take a year. In the interim the data can be used by NACI in the composite indicators.

Innovation and business has been a challenge and the Accenture Innovation Index is a positive development in this regard. At the SMME and street vendor level innovation does take place and does spread slowly within the sector and eventually to the general

economy where it can be measured. Many projects at universities file a trademark in preference to a patent, for a new product or business model.

3.2.1 Questions and Discussion

- The subject of trademarks was noted as very relevant to the discussion on innovation. Trademarks are generally ignored by economists. In 1994 South Africa registered 11 trademarks abroad and the current figure is approximately 6800. This indicates innovation. It was emphasised that any innovation scoreboard must include trademarks.
- The importance of registering trademarks for plant cultivars was identified as an area that must be understood; noting that South Africa is currently eighth in the world yet trademarks for plant cultivars are ignored by all the international scoreboards. Information should be disseminated through the World Intellectual Property Organisation (WIPO) and the data is maintained on a plant cultivar register. It was noted as a very good comparative indicator and an example of how innovation is not being appropriately measured. It was suggested that information on other innovations that are by-passing the formal system must be collated and measured.
- The report by Professor Pouris and his team on general practice was said to be a useful one with a subtle mix of hard and many soft indicators.
- The Global Competitiveness Index which feeds into the Global Innovation Index was said to be using a very large opinion survey. There was a suggestion that Leadership SA should take part in the Innovation Scorecard discussions as it compiles data for the Global Competitiveness Index on South Africa. Some portion of the data is factual and another portion of it is opinion and if the economy is in recession or business has a negative perception of government; the opinions expressed will be adverse. Business can 'talk down' the South African index. South Africa is ahead of Qatar and Saudi Arabia. South Africa scores badly on health and education but these countries score exceptionally

badly on certain indicators on which South Africa has higher scores. It must be understood that there are soft indicators behind the numeric.

- It was pointed out that the Accenture Innovation Index relies on self-reported input which is a self-perception and subjective. Accenture cannot conduct audits of the submissions but it does scrutinise company policy before awards are made. FNB as an example, is innovative and the data can be validated, but this is not the situation with all companies which take part in the survey. It was agreed that soft data can provide positive insights and can be misleading.
- A question was raised as to whether scientific literacy can be an indicator and the response was that scientific literacy cannot be an indicator because there are no baseline indices. It was noted that it is expensive to collect the data and that a very large sample will be required. It will be difficult to incorporate the indicator into a composite indicator if there is no assurance that it will be continued into the future. Availability of baseline indicators was identified as an issue.
- A comment was made that much research and many ideas exist on how to use innovation for economic growth. Composite indicators have been available for the last four years but it is necessary to go further back to identify trends. If the history is known, comparisons with other countries can be made as South Africa is a developing country. A question was raised on whether South Africa follows the same path as developed countries followed to attain 'developed' status. It was pointed out that academics can do a vast portion of the necessary research. It was agreed that when the indicators are available the data can be applied and predictions of the future will be possible. It was added that the issue is consistency and that normalisation of data which has changed is required because it could skew the numbers. It was noted that the process should be based on learning over time as the indicators cannot be perfect from the start.
- There was a suggestion that the components of the Innovation Index must link to the globalisation reality and that the value of South Africa in international chains must be understood. A question was raised on whether there is an indicator that examines how the South African economy contributes to the rest

of the world. Motor vehicles which are assembled in South Africa were used as an example because they have components from all over the world. It was noted that the motor industry has evolved in recent years which indicates that the economy is open and relevant.

- It was pointed that indicators of behavioural change, such as task success, are avoided and that many economists understand cognitive and learning theory. It was proposed that behavioural scientists be asked what it takes to become scientifically knowledgeable and that the process must start as soon as possible because the collection of historic baseline information would be problematic. There was a suggestion that behavioural sciences must be included in the development of a national Innovation Scorecard.
- The Mac Centre NGO was identified as one of the organisations providing mathematics and science classes. They collect data on the beneficiaries in rural areas and the information is tracked by the Independent Schools Association of Southern Africa (ISASA). It was noted that the challenge could be the manner in which to incorporate the information into the overall indicators as these are isolated incidents and not generic national coverage. Another initiative identified was the Dinaledi Schools initiative of the DST and the Department of Basic Education; which is a pilot project to see whether learning could be up-scaled with government intervention.
- It was proposed that an Innovation Scoreboard should be commensurate with popular practice. This was acknowledged as a difficult situation with numerous questions to be asked and answered some of which could be: What the Scoreboard would contain, where the STGs fit in and whether the social aspects could be introduced, etc. It was proposed that NACI should decide on what to concentrate on and what it wants to project.
- A comment was raised that many important aspects including schooling, informal and grassroots innovation were discussed and that as part of the preparation phase of the next White Paper on S&T, the manner in which innovation can be

used to impact on the problems currently facing South Africa such as poverty, unemployment, inequality and climate change was being questioned.

- The 1986 White Paper was noted as having had a strong focus on science for development. It was indicated that this was lost and never enacted and that the result was a different emphasis in the system which currently still exists. It was noted that the new White Paper has to address these pressing issues although the manner in which it does so has yet to be decided. The importance of understanding the implications of the introduction of social economic, political economic and environmental economic and other aspects to the Innovation Scorecard was emphasised. An example was made that Qatar moved up in two years on the World Economic Forum ranking system because it changed to an innovation-based economic system and that the results were due to the high increase in registered patents and are dependent on who conducts the survey.
- It was pointed out that room for improvement always exists which has implications for what has been done and what will be done; noting that NACI should be aware of what the NSI has called for and that a broader perspective should be introduced. The direction that NACI takes with the Innovation Scorecard was identified as of importance as the White Paper process is underway. NACI was cautioned on the way in which the NSI is defined in the new White Paper and on the S&T emphasis. It was noted that the notion of an NSI must be correctly defined and that the emphasis on S&T should be retained. It was suggested that although Minister Pandor must sign off the White Paper, ownership and control should go beyond custodianship and rest at a higher level.

3.3 Dr Peter Jacobs, Human Sciences Research Council

In his introduction, Dr Jacobs pointed out that he works on different aspects of innovation. He reminded delegates that the Innovation Index and its development, as well as technological innovation and the economy were the focus of the workshop discussion. The scope of the discussion was broadened by introducing attitudes and behavioural aspects. He noted that the complexities of innovation metrics, the gaps

and measurement are all relevant issues and that it is always essential in research to return to the beginning. Delegates were informed that in this instance, the beginning is to agree on what innovation is.

One challenge identified was for NACI to decide whether it should broaden the scope of issues to be included in the Index or stay with technology for economic development. Policy drivers are another challenge. According to the HSRC approach, the empirical aspects would include the behavioural perspective. The HSRC methodology is to deconstruct and rebuild. A set of indicators to measure innovation for inclusive development includes examining the policy imperatives and poverty and learning what is happening in the area of interest. Very little of the international context is applicable to South Africa although certain aspects of what is occurring in Latin America and Asia are relevant. Some of the initiatives include the Rural Innovation Assessment Toolbox which began in 2011 and is currently in the third phase. Seven tools were developed to measure different dimensions and the social dynamics of the innovation chain.

Innovation is regarded as new ways of doing things better for the benefit of society. This definition draws on international approaches such as those at Sussex University. It brings ideas together. Innovation is very complicated, multi-faceted or multi-dimensional. Innovation consists of processes and activities. It is not an invention. Data is being collected at the grass root level so as to understand the solutions in place to basic problems. The work has an important policy component as it feeds into local municipalities. Much information from and activities at municipal level was analysed. The information will feed into discussions with local stakeholders. The data is on the HSRC website. The study has looked at the level readiness at municipal level to apply new ideas as municipal level. This is the first attempt to study innovation in the government sector although innovation and the public sector has been examined internationally. The HSRC has developed a new approach, tested it and devised the framework for its implementation. The Department of Science and Technology is sponsoring new technology to supply water and sanitation in remote rural areas. The HSRC is looking at the processes. It concerns consistency of measurement of the indices which lead to the composite indicator.

He concluded by noting that it is important to return to basics and collect historical data to fill in the gaps and that he had been compelled to do this for both projects. He suggested that NACI may have to do the same as the challenge is the lack of information while wanting historical time series.

3.3.1 Questions and Discussion

- A question was asked whether the DST has worked with the HSRC on the projects of social indicators to date. The response was that the HSRC would like to work with NACI. Delegates were also informed that additional senior researchers are being recruited by the HSRC to develop frameworks.
- It was pointed out that social innovation is always difficult e.g. looking at the different ways in which rural people find solutions. Differentiating innovation from common knowledge generation in a community is complex. The difference between knowledge generation and the innovation value chain may be where the problem lies. It was emphasised that innovation must be discussed with people in rural areas and townships. The initial response when people are asked about innovation refers to technology and it is easy for researchers to become trapped in discussion on failed development projects. It was noted that many huge rural infrastructure developments are taking place and that it is necessary to unpack new ways of delivering services for the benefit of society. The HSRC focus is on the 27 poorest municipalities in the country. These are mainly located in very rural areas yet the people are devising new ways of doing things, e.g. health. Some solutions are a combination of local initiatives and advanced knowledge. Changes are occurring in the appreciation of innovation as well as the understanding and awareness of innovation.
- A comment was raised that the term 'importance of innovation for inclusive development' is at the crux of the issue and that the challenge is to get economists to consider inclusive development. The difficulty identified was how to make the work of economists more inclusive and that one method of becoming more inclusive is linking to rural communities.

- Another point raised related to the fact that a demographic phenomenon is very rapid urbanisation and a question was asked on whether the rural innovation work is an attempt to arrest the phenomenon. The response to this was that the Rural Innovation Assessment Toolbox project will soon have an information-sharing seminar to discuss the incorporation of sustainable innovation development indicators and where innovation fits with the NDP. The NDP focus is on technological aspects and the formal economy. The informal aspects are important in a time massive demographic changes. The Toolbox is flexible and applicable to all applications, not only rural.
- Collection of data was identified as a challenge, e.g. method to be used to measure innovation in the informal sector. Another was said to be in the manner in which to use the information for comparison internationally. A question was asked on whether there are any international examples that can be used for comparison purposes. The response to this was that international protocol is not required for the development of South African indicators and that these can be innovative. It was noted that international agencies have social development micro-level indicators.
- It was noted that clear distinction is required between formal economic innovation and where the composite indicator is and that inclusiveness in innovation does not have to be limited to the formal economy. The construction of the composite index was identified as an opportunity to identify spaces in which to understand inclusiveness of innovation taking into consideration that this will not be reflected in all the indicators. It was agreed that inclusiveness is an innovation measurement and that it cannot be incorporated into the definition of innovation as it is the outcome of an innovation process.
- Innovation was said to be a complex phenomenon that includes the societal aspect, enablers and regulatory context and that international debates on benchmarking and the meaning on inclusiveness are being followed. Both the developed and developing worlds have different views on the matter and measurement changes accordingly in various places. The HSRC is continually studying inclusiveness and no similar studies at municipal level have taken place.

internationally. Innovation and the public sector have only been studied at a macro level. It was acknowledged that the subject of readiness to learn or innovation maturity is new, with much literature about the private sector and that the macro-micro comparison is a slow process. It was noted that although the HSRC project focused at the micro level, comparisons across municipalities can be done. A relative score can be obtained but it has to be remembered that the study has a small sample. However, if broken down into municipal wards the size of the sample does increase. Delegates were informed that the study is constantly being refined and that processes used by both NACI and HSRC are virtually the same.

- The fact that social rather than only economic factors are being considered was noted as being positive and a comment was raised that the inclusion of the social dimension would impact on and influence the statistics and that NACI can be pioneers of this. It was noted that the implication can be the purpose and that it is important to know the reason why the composite indicators are required as indicators must support development. Data infrastructure must support the administrative platform, including the manner in which information is shared.
- It was pointed out that the latest Accenture Innovation Survey was not successful due to the poor response. The survey will be repeated and will include the manufacturing and services sectors. The approach used by Accenture is to incorporate the subjective learnings of innovation into the survey. Accenture questions the relevance and usefulness of the survey and if it is relevant and useful, the correctness of the approach is questioned as the instrument needs to be even more relevant.
- There was recognition that work was being done at rural levels and that this will translate into social innovation indicators and feed into the overall system of indicators. It was agreed that NACI and HSRC would increase their interaction in order to have the innovation input into economic development, noting that data increases awareness. It was concluded that the introduction of a partial composite indicator on social innovation needs to be considered.

4. Wrap-up and closure

Delegates were thanked for their attendance and valuable contributions. It was noted that the workshop was a worthwhile and very useful session which provided guidance on the way forward.

Two new avenues for consideration emerged. The first one is cooperation with Accenture and using or publishing the Accenture data which is a combination of hard and soft information. It was acknowledged that soft data can be perceived as useless or as very useful and that it can lead to incorrect conclusions. The second avenue is social innovation and the work of the HSRC. He wished the HSRC well with the research and appealed to the DST to provide sufficient resources for the research to continue. It was agreed that NACI would work with both the HSRC and Accenture.

In conclusion, delegates were informed that information resulting from the workshop will be incorporated into a composite indicator and that in addition, NACI would welcome further inputs. It was agreed that the report would be distributed to attendees and be placed on the NACI website and that the information needs to be disseminated to a larger audience.

APPENDIX A: PROGRAMME

Chair: Dr Azar Jammine

09:30 – 10:30	Registration
10:30 – 11:00	Welcome and Introduction, Dr Azar Jammine
11:00 – 11:30	Presentation on the Proposed Framework for an Innovation Scorecard for South Africa, Prof Anastassios Pouris
11:30 – 12:00	Tea break
12:00 – 13:20	Focused Panel Discussion: Ms Christine Yiannakis (Accenture SA) Prof Gerhard Prinsloo (DUT) Dr Peter Jacobs (HSRC)
13:20 – 14:00	Lunch
14:00 – 15:00	Open Discussions
15:00 – 15:30	Summary and way forward, Dr Azar Jammine

Appendix B: Attendance List

The stakeholder consultation workshop was attended by a total of 33 delegates. As indicated in the table below, these included representatives from government, government agencies, higher education institutions, private sector and the media.

Institution	Number of Delegates
Accenture SA	2
Africa Strategic Business Capital (ASBC)	1
Department of Science and Technology(DST)	6
Durban University of Technology (DUT)	1
Econometrix (Pty) Ltd	1
Free- Wifi	1
Hydronium Consulting (Pty) Ltd	1
HMSS (Consultant)	1
Human Sciences Research Council (HSRC)	1
Independent Policy Analysts	1
National Advisory Council on Innovation (NACI) Secretariat	9
National Intelligence Co-ordinating Committee (NICOC)	1
National Research Foundation (NRF)	4
University of Pretoria	2
Wildonscience	1