

# ANIS

INDICATOR-BASED ANALYSIS OF  
NATIONAL INNOVATION SYSTEMS



## Namibia

Summarising Report  
of the Determinants of the  
Namibian Innovation System



August 2010



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## Preface

Regional and national competitiveness is not only driven by individual companies but increasingly accelerated by the innovative activities of entire industries and branches and has therefore become a key topic of economic and technology policies worldwide. As innovative firms grow faster than average and are more likely to survive during a recession, a strong innovation support policy may be a promising approach to enable companies to cope with any economic crisis.

However, the assets of innovation are not only limited to the original innovator. The innovation process itself generates knowledge spill-over from which other firms can benefit and thus increase their productivity and innovation capacity. In turn, this can create the conditions for a circular flow of economic growth from which the entire society may benefit.

Nowadays, innovation has become high priority within emerging and especially developing countries. Several innovation policy measures and support schemes have been implemented or are being designed, all of them with a different impact. These measures and schemes reflect the diversity of framework conditions, cultural preferences and political priorities. A smart innovation policy may establish favourable framework conditions for innovation. Thus, policy makers may foster the innovation capabilities of their national innovation system (NIS) by setting up appropriate framework conditions and by investing in infrastructure, education and funding R&D innovation programmes. All these measures and related efforts aim at improving the performance of an NIS.

The indicator-based Analysis of National Innovation Systems (ANIS) includes a comprehensive examination and evaluation of the status of existing national innovation systems. It is mainly intended for emerging and developing countries for which standard innovation benchmarking and monitoring approaches might not be sufficient as often the statistical data is missing or outdated. Policy makers from these countries can benefit from clear advice as regards to overcoming weaknesses of a national innovation system and to identifying those determinants that should receive special attention.

We are convinced that the ANIS approach will serve as a fact-based platform initiating discussions on how to improve innovation capabilities and competitiveness in the analysed countries.

Berlin, August 2010

Gerd Meier zu Köcker

Director Institute for Innovation and Technology (iit), Berlin



# 1 ANIS – Indicator-based Analysis of Namibia’s National Innovation System

Innovation may be considered as one of the main drivers for economic competitiveness, growth and wealth creation. Therefore, innovation policy has become an important part of economic policy. The design of suitable framework conditions for innovation reflected by the maturity level of national innovation system (NIS) has been given high priority worldwide. Although there is no common definition of an NIS, the following comments may be useful:

*Innovation may be defined as new solutions adding value to both customers and firms.<sup>1</sup> One distinguishes between incremental innovations (e.g. further development of existing products and technologies, often realised by SME without involving any R&D institutions) and radical innovations (completely new solutions, technologies or products not yet available on the market, usually involving R&D institutions).*

*A national innovation system may be defined as a network of institutions in public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies.<sup>2</sup> The main elements of an NIS in terms of education and research institutes, firms, industrial parks, incubators, governmental institution, etc. exists, but differs in terms of how they are coordinated or meshed.*

*Innovation policy may be defined as the creation of framework conditions aiming at supporting innovation capabilities of companies and public entities.*

The concept of an NIS relies on the premise that a good understanding of innovation actors’ relationships is crucial to foster technology performance. Innovation and technical progress are indeed outcomes of a complex set of relationships among actors producing, distributing and implementing various kinds of knowledge. The innovative performance of a country broadly depends on the one hand on these actors’ cooperation within a global knowledge creation system and on the other hand on the extent to which they utilise technologies. The actors are mainly private enterprises, universities and public research institutes. Their cooperation ranges from joint research to personnel exchanges, cross patenting, purchase of equipment and a variety of other channels.<sup>3</sup>

The number of theoretical models, reports and analyses of NIS has been increasing since the beginning of the 21<sup>st</sup> century. Because of the various factors impacting national innovation capacities, the assessment of a country’s innovation system remains

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<sup>1</sup> Nordic Innovation Monitor 2009, FORA.

<sup>2</sup> Freeman, C. “The National System of Innovation in Historical Perspective”, Cambridge Journal of Economics, No. 19, 1995.

<sup>3</sup> National Innovation Systems, OCED Report, 2005.



a challenging exercise. For years, economists have tried to identify the reasons leading to the nations' competitiveness and growth, and as a consequence many NIS reports and analyses have been generated. Despite the high quality of these reports which describe the essential features of an NIS and summarise its main strengths and weaknesses, the benefits in terms of usable results were unfortunately limited. This is explained by the fact that the implemented methodologies did not sufficiently consider the way policy makers think and operate. Recommendations are neither prioritised nor ranked according to their complexity when turning into practice.

Policy makers, especially in emerging and developing countries, usually look for well structured descriptions of an NIS and clear recommendations for improving their own NIS's performance. They do not ask for receiving scientific models of the functionality of an NIS or how the single actors are linked. As far as embryonic or not well established NIS were analysed, they were mainly compared with those that are matured. The consequences are plenty of weaknesses found and recommendations made. Often, policy makers are confused, rather than getting a clear guideline on how to start corrective actions. Such reports have often failed to provide clear information or recommendations how to start and how to gain a high leverage effect (especially when public investments were limited). When it comes to concerns of BMBF and Namibia's DRST, it is at that stage of interest to identify areas for improvement of the National Namibian Innovation System.

In addition, potential areas for bilateral cooperation between Namibia and Germany may be identified.

The ANIS approach fits into the new tradition of indicator-based studies relying on quantitative data generated by the evaluation of expert interviews. Such an approach differs from traditional benchmarking studies on innovation performance. The Global Competitiveness Report and the European Scoreboard or the Nordic Innovation Monitor are excellent approaches for measuring or benchmarking innovation-related performance indicators. However, since the statistical base is often insufficient, the latter is rather intended for well-matured economies than for developing or emerging countries' issues. The Global Competitiveness Report uses a mix of statistical data and expert interviews but since it focuses on the competitiveness of nations, the issue of innovation is not sufficiently targeted.

The ANIS approach is based on the assumption that at national level an NIS is mainly influenced by 30 determinants.<sup>4</sup> ANIS takes up this challenge by providing an indicator-based assessment of these determinants, each of which reflects an aspect of the complex reality of the innovation system. The determinants may be grouped according to a three level hierarchy:

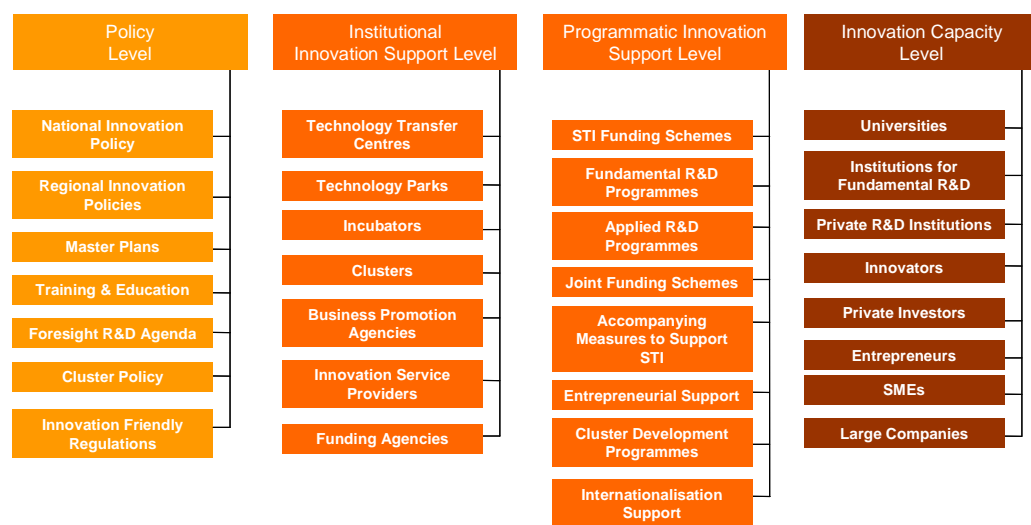
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<sup>4</sup> We are fully aware that NIS are also influenced by determinants outside of a country. However, as they need a different approach of adjustment, they are not regarded within our analysis. The number of determinants varies slightly according to situational contexts.



- **Macro Level: Innovation Policy Level**
- **Meso Level: Institutional Innovation Support Level and Programmatic Innovation Support Level**
- **Micro Level: Innovation Capacity Level**

The 30 determinants' level classification is shown in Figure 1. A comparison between the determinants of these different levels allows the identification of key policy areas requiring a potential intervention to strengthen the NIS. Please note that a further description of the methodology is given at the end of the document.



**Figure 1 Main determinants of a national innovation system**

The comparative portfolio, which is an integrated element of the ANIS approach, against which the determinants of the Namibia innovation system are benchmarked, consists of the corresponding data of Egypt, Honduras and Syria. According to the Global Competitiveness Report (GCR), these are all “factor-driven economies”.<sup>5</sup>

We used the classification based on the Global Competitiveness Report (GCR) of the World Economic Forum. The GCR defines three different stages of economies. These are: factor-driven economy (stage 1), efficiency-driven economy (stage 2), and innovation-driven economy (stage 3). Countries that are situated in between these stages are

<sup>5</sup> Schwab, 2009.



called transition countries, either in transition from stage one to stage two or from stage two to stage three.

According to the GCR, factor-driven economies mainly rely on their facilities and basic competencies which mostly are “unskilled labour and natural resources”.<sup>6</sup> Primarily, simple products and commodities are traded. Workers have very low incomes. The differentiation of the individual companies mainly happens through pricing. Furthermore, economic advancement is achieved through “well-functioning public and private institutions [...], well-developed infrastructure [...], a stable macro-economic framework [...], and a healthy workforce that has received at least basic education [...]”.<sup>7</sup>

It should be noted here already that Namibia is – by the number of inhabitants and by innovation capacity - a comparatively small country. The number of organisations, scientific and economic sectors is limited and with it the number of actors. The leverage of transnational collaboration is higher than in large countries, and the means of coordination may be adapted to a smaller number of actors, allowing to realise simple but effective coordination mechanisms. In distinction to what may be expected according to the determinants scheme on first sight, a rather small number of organisations with a broad scope may be found appropriate to serve the countries’ needs rather than a large number of highly specialised actors.

Besides assessing and benchmarking the determinants, policy makers prove to be much more interested in receiving guidance for action. Therefore, the ANIS report provides comprehensive recommendations for improvement, taking into account the efforts which Namibian policy makers or third party investors are able and willing to provide. At the end of the report, some areas for policy interventions are pointed out. These areas may range from those providing a high impact on the national innovation system to those that do not require much public investments or political intervention for a successful implementation.

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<sup>6</sup> Schwab, 2009.

<sup>7</sup> Ibid.





## 2 Namibia – Brief Description of Economic Situation

The Republic of Namibia is located at the West coast of Africa bordered by South Africa, Angola and the Atlantic Ocean. On 21 March 1990 Namibia became independent from South African mandate.

According to the Global Competitiveness Report Namibia is an efficiency driven country. This means that Namibia has efficient production processes that increase the quality of the products including efficient goods markets, financial markets, and labour markets. Education and training are recognised as competitive factors and the country is able to make use of existing technologies. Furthermore, an increased domestic and foreign market has been developed. At the global competitiveness index (GCI) 2009 / 2010 Namibia is ranked at place 74.

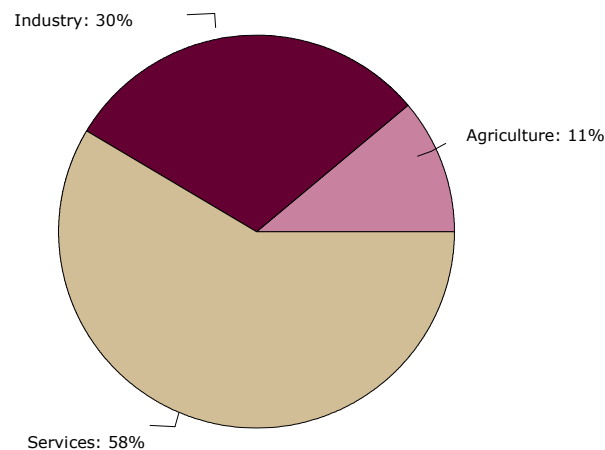
The natural resources of Namibia are diamonds, copper, uranium and gold, silver, tin and lithium. Furthermore, Namibia has resources of salt, hydropower and fish. Only 1 % of the land is arable. The natural fresh water resources are limited, and long periods of drought can worsen the situation. On the other hand floods have damaged parts of the infrastructure in the year 2009. Namibia is the first country in the world that has put the protection of the environment in its constitution. Thus, 14 % of the land is protected.

Namibia's economy is mainly based on the extraction and export of diamonds and other minerals. Of the GDP 8 % derives from mining which is at the same time responsible for 50 % of foreign exchange earnings.<sup>8</sup> Due to the global use of nuclear power Namibia has a high rate of production and export of uranium. Namibia can rely on big sources of diamonds. As regards to the amount of export of non-fuel minerals Namibia is ranked at 4<sup>th</sup> place in the world. Furthermore it is the fifth-largest producer of uranium. However, only 3 % of the population are working in the mining sector. More than 50 % of the population is working in the agriculture sector. However, the agricultural sector makes only 11 % of the GDP. Main agricultural products are millet, sorghum, peanuts and fish. However, 50 % of cereal requirements are imported.

The origin of the GDP in 2009 is allocated as can be seen in Figure 2.

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<sup>8</sup> CIA World Factbook (2010)



**Figure 2 GDP allocation Namibia (Source: The Africa Competitiveness Report 2009)**

As many African countries Namibia has to deal with a high rate of HIV / AIDS infected people. The number of persons between 15 and 49 years old living with HIV / AIDS is estimated with 15.3 %. Namibia's health indicators in general are ranked quite low by the GCR as there are many contagious diseases.

Namibia is a member of the Southern Africa Custom Union and the Southern Africa Development Community. It is not member of the Common Market for Eastern and Southern Africa anymore. Furthermore, Namibia has relations to the European Union through an interim Economic Partnership Agreement (EPA).

According to the OECD African Economic Outlook the major problems for Namibia are poverty, inequality and high unemployment (p. 438). Namibia's growth also slowed down by the financial crisis.

6.9 % of the GDP are spent for education. This rate is quite high (rank 26 in the world).

Major export articles are minerals: diamonds, copper, gold. Major import articles are foodstuffs, petroleum products and fuels, machinery and equipments, chemicals.

As regards to agriculture Namibia is highly dependent on weather and natural forces. Long droughts, floods or outbreaks of for example the fruit fly or other natural hazards can cause crop loss or the selling of, for example, maize below the usual price or the decrease of fishery. Other sectors such as textile industry had to deal with market concurrence from China which forced Namibia to shut down their Malaysian-owned



textile factory. However, diamond cutting and polishing companies contribute to a steady growth of the industry part of the GDP.

Namibia has a relatively high per capita GDP (5.127 USD in 2008).<sup>9</sup> However, this number hides the unequal income distribution. In fact, Namibia is said to be a country with one of the most unequal social conditions, among them incomes, in the world.

Between 2001 and 2007 the GDP grew by 5.2 %. According to the GCR Namibia has well developed institutions and well protected property rights and general trust in politicians.

Homeowners are reluctant to pay their mortgages as rising oil prices and interest rates hinder the ability to pay.

Namibia is still relying on fossil energy, but it is hoped that solar energy and wind energy will be of major interest for energy suppliers in the future. Furthermore, a gas-fired power plant from off shore gas fields can provide growth opportunities.

The tertiary sector is characterised by wholesale and retail trade, real estate and business services. Wholesale and retail trade had a growth of 8.4 % in the years 2004 – 2007. From 2008 the growth rate declined due to higher food and oil prices. Furthermore, rising unemployment is expected in this sector.

One of the major income sectors is tourism. In 2007 the number of tourists increased by 7%. This has also positive impact on the construction sector, e. g. new hotels. The transportation and communication sector has grown and will grow in the future. Public investment has increased during the last years especially as regards to infrastructure of roads and railways, and in electricity. The infrastructure in general is rated as excellent as regards to regional standards by the GCR. Goods, labour and financial markets function quite well.

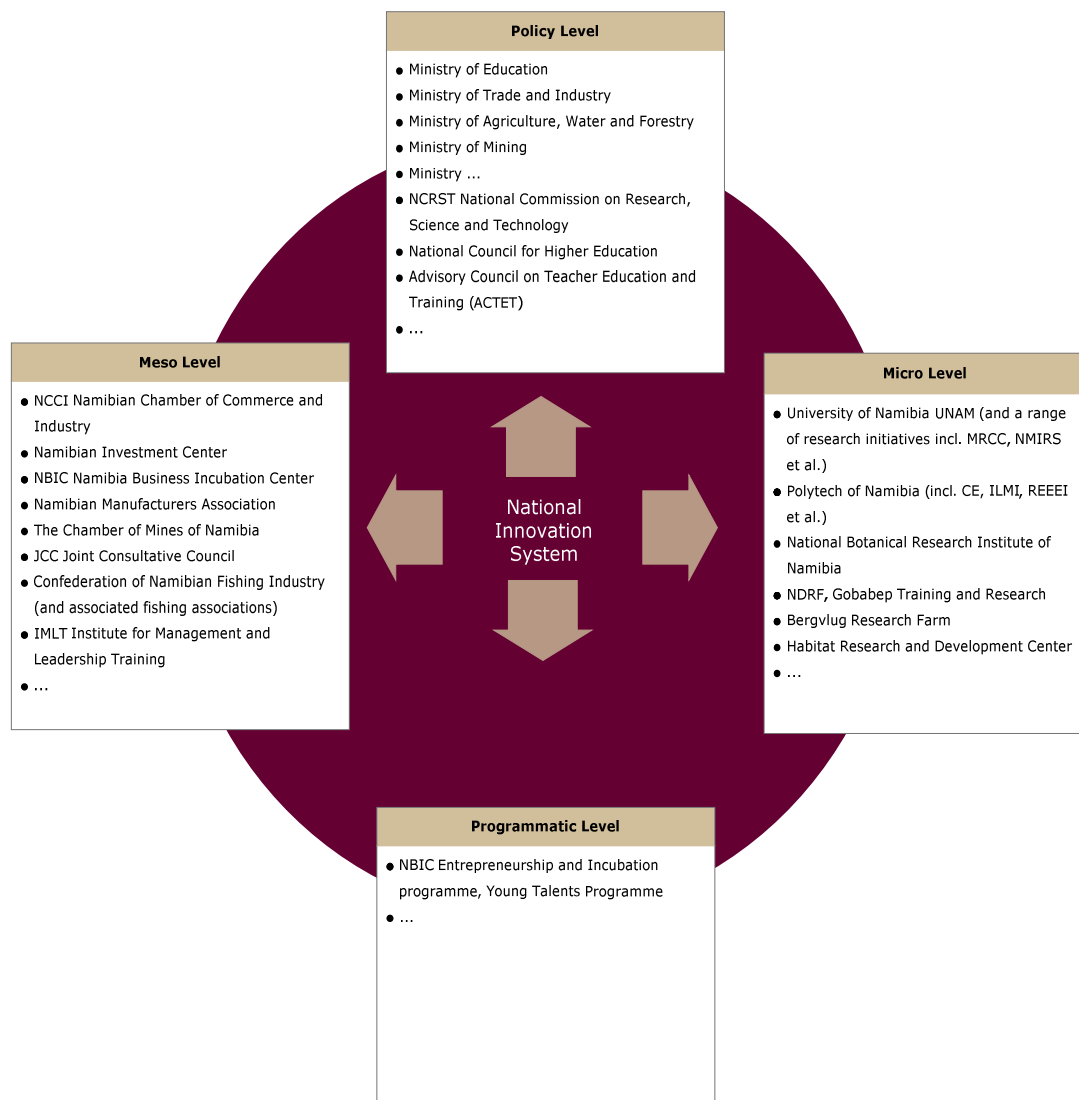
With the Third National Development Plan (NDP3) with the period 2008 – 2012 Namibian governments show its interest in turning Namibia into an industrialised nation until 2030 ("Vision 2030"). According to the Fitch rating Namibia was evaluated as having "prudent macroeconomic policies" (OECD African Economic Outlook, p. 487).

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<sup>9</sup> OECD African Economic Outlook (2009)



### 3 Namibian Innovation System Organisations



**Figure 3 The main players in the Namibian innovation system (except industrial micro level actors)**

Some of the main actors of the Namibian NIS are mentioned in Figure 3. In the following, the main findings based on the assessed 27 determinants are displayed. Many initiatives and organisations are projects or small organisational units. The grade of their activity is not validated in single cases.



## 4 Assessment Results for Namibia

### 4.1 Scope, Data Generation and Self-Assessment of Namibian Innovation System Representatives

This report was drawn up based on information gathered between May and August 2010. The following sources were used:

- Questionnaires on the determinants, distributed through the MoE, and the NBIC.
- Desk Top research (Web, Existing Studies and Indicator reports)
- Expertise from DRST experts

The information compilation was accompanied by a workshop, organised by the Ministry of Education. Approximately 30 practitioners and experts discussed issues and potentials of the Namibian innovation system.

Results and assessments are derived from the questionnaires and the workshop carried out. Results and assessments derived from other sources are cited.

The primary objective on behalf of Namibia was to take stock of the Namibian innovation system and the view of its actors on potentials for improvement.

### 4.2 Results

The National Vision 2030 is still the major national coordination document, guiding the way for specific policies.<sup>10</sup> It names several objectives and strategic aims that influence innovation related policies and programmes:

- 1) "...a diversified, competent and highly productive human resources and institutions, fully utilising human potential, and achieving efficient and effective delivery of customer-focused services which are competitive not only nationally, but also regionally and internationally..."
- 2) "... the transformation of Namibia into a knowledge-based, highly competitive, industrialised and eco-friendly nation, with sustainable economic growth and a high quality of life..."
- 3) "... leveraging knowledge and technology for the benefit of the people..."
- 4) "... achieving full and gainful employment..."

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<sup>10</sup> Namibia Vision 2030. (2004)



At the time of writing, Namibia's Ministry of Education started an initiative to elaborate a dedicated innovation policy. Approaches to coordinate with the Ministry for Trade and Industry, the Ministry for Agriculture, Water and Forestry have been started. Due to the cross cutting nature of innovation, helpful policies are on their way e. g. with regard to the modernisation of the private sector and the banking system.

#### **4.2.1 Macro Level: Innovation Policy Level**

Within an NIS, the policy level very much influences the framework conditions for innovation as well as for the actors operating in the NIS. The status of maturity is described by six determinants. Figure 4 shows the pattern of the values across the six determinants of the policy level.

A Research Science and Technology Act has been approved in 2004. It foresees interministerial committees, regular foresight processes to determine foci of the research policy, and a new research funding programme every three years.

According to the discussion during the workshop, backed by the results of the questionnaire, this policy is not known to many relevant stakeholders, and foresight processes as well as funding programmes have not been realised yet.

A coordinated multi-stakeholder approach to integrate existing policies with each other and to design a joint umbrella innovation policy would serve the coordination of the different ministries, associations, industry, education and research organisations. According to the Namibian Business and Investment Climate Survey (NamBIC)<sup>11</sup>, the industrial clients would appreciate a formalised public private dialogue.

Cluster Policies as an approach to enhance a focussed sectoral and regional approach were not found in their pure form. Nevertheless, objectives, programmes and measures undertaken e. g. by the Ministry of Agriculture, Water and Forestry, or the Ministry for Mining and Energy, may be interpreted to represent it. The "draft minerals policy of Namibia"<sup>12</sup> particularly addresses many aspects of an innovation policy for the sector: technology, research and research funding, collaborations between public and private research, tax incentives etc. It culminates in the motivation to promote the generation of a Namibian innovation system.

Like in many other countries, it is reported difficultly to promote innovation across different ministries if the responsible unit is a department attached to a ministry with partial responsibility for innovation only. It is a major challenge for DRST to be accepted owner of the processes to moderate the policy generation process and coordinate implementation across the various ministries involved. Regional innovation policies are not known.

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<sup>11</sup> NCCI (2010)

<sup>12</sup> Ministry of Mines and Energy



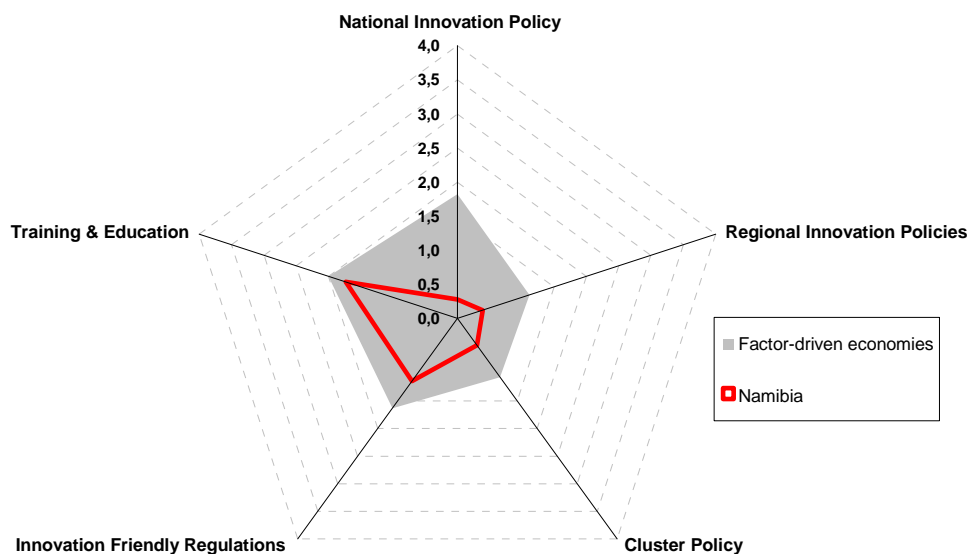
Skilled labour appears to be a pressing item. The World Economic Forum ranks Namibia very low with regard to secondary and tertiary school enrolment, and with regard to the quality of education. An above average rank has been achieved for staff training. According to the NamBIC Survey<sup>13</sup>, the skill levels of staff after leaving public school are mostly considered satisfactory or good.

The questionnaire responses do record a poor quality of training and education schemes. Coordination in between the national education institutions themselves and with regard to national priorities is considered poor. The curricula are hardly giving impulses to innovation in Namibia. Specific curricula with regard to innovation are few.

A rigid immigration policy is considered to be an obstacle to obtaining sufficiently qualified personnel.

Framework conditions for innovation are considered to have high potentials, as well. Namely IPR policy and patent registration strongly depend on the Republic of South Africa. Namibia does not have a proprietary patent register, yet.

In comparison to Namibia's peers, the assessment shows the following results:

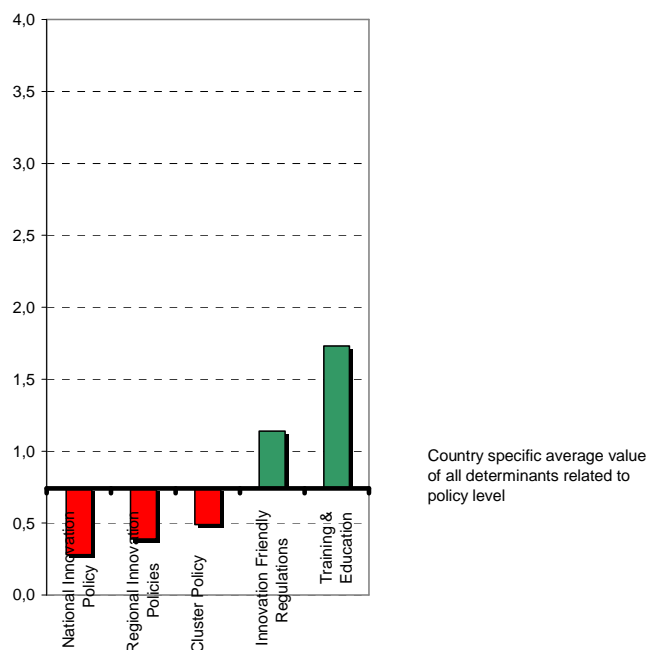


**Figure 4** Pattern of the determinants on policy level – Namibia, compared to the average of factor driven economies

<sup>13</sup> NCCI (2010)



On the Policy level, Namibia is described as hardly developed at all with regard to innovation policy in all respects.



**Figure 5 The five determinants compared to the Innovation Policy Level average**

Consequently, the policy rating for Namibia shows a fairly balanced, but very low average rating. Given this very low overall level, the positive scores on training and education and innovation friendly regulations should not be misinterpreted as good results. Some of the aspects – like regional innovation policies – may be neglected due to the small size of Namibia’s Economies.

#### **4.2.2 Meso Level: Institutional Innovation Support**

Namibia has only a small number of dedicated intermediary organisations .Due to this lack, also organisations run as departments of ministries are mentioned, as well as intermediary functions carried out by departments of universities.

The Directorate of Industrial Development inside the Ministry for Trade and Industry (MTI) is responsible for evaluating and appraising industrial projects. It renders support and advice to potential developers and investors.

In the area of agriculture, funds are spent by the relevant ministry, but the selection and funding of projects is felt to be interrupted and intransparent

The Namibian Investment Centre, also run by the MTI attracts foreign investors and has commercial counsellors stationed at half a dozen locations around the world. They promote Namibia as a viable investment destination by organising investment promo-





tion events and participating in trade fairs and exhibitions in their respective areas of jurisdiction.

MTIs Small Business Credit Guarantee Trust principal objective had been to support SMEs which are otherwise credit worthy, but cannot offer adequate collateral to access loans from commercial financial institutions through guarantees.

Most “programmes” are rather constant service offers than competitively organised multi organisation schemes. They are usually initiatives of the Polytechnic of Namibia or the University of Namibia. Specific funding agencies do not exist in the narrow sense of the term.

The Centre for Entrepreneurial Development offers consulting and technical services by coordinating programmes by addressing all project management aspects, including financial accounting and reporting, financed by various international and national donors. SMEs are supported through assessment, consulting and training.

The Namibia Business Innovation Centre (NBIC) executes a variety of measures to develop entrepreneurial culture, invention, innovation and skills. Workshops, technology and product competitions, business plan competitions and trainings are performed. A mentor network and alumni circle are the framework for coaching young entrepreneurs and their companies. An incubation facility is in the process of realisation. Technology transfer centres shall play a major role in the implementation of innovation policy in the future.

Most of these organisations are based in Windhoek. Due to the NamBIC Survey, contact points for government support would be appreciated in the regions.<sup>14</sup>

Technology parks do not explicitly exist at the moment. However, export promotion zones exist, supported with tax benefits and liberal currency regulations.

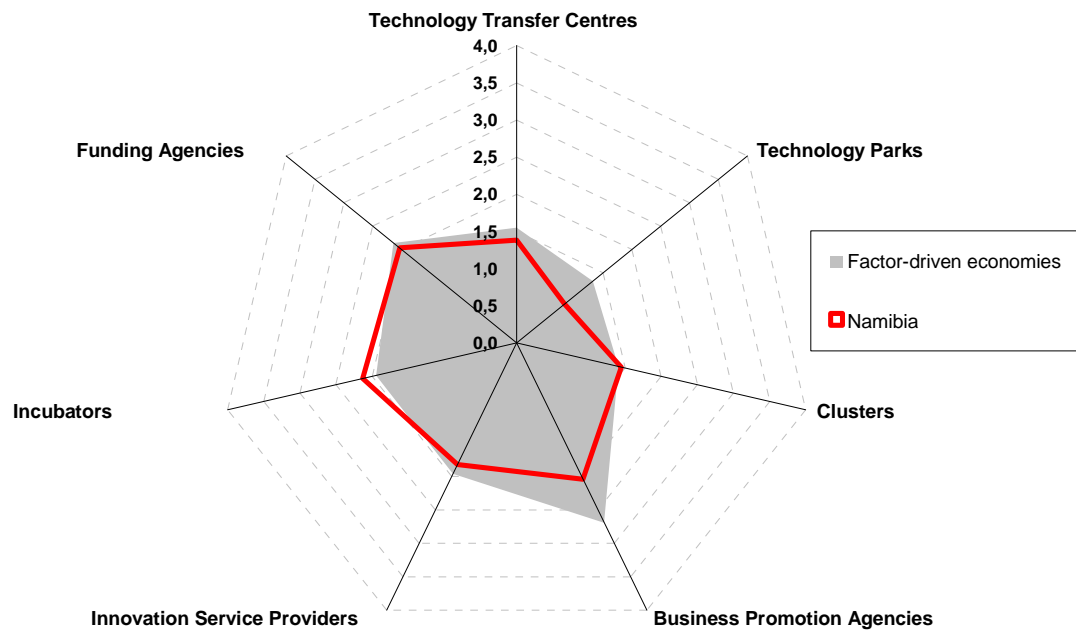
Clusters, networked sectoral and regional industries, are existing based on the natural agglomeration of Namibia’s industries in centres: Mining in the mining areas, fishing and fish industry clusters at the shore and tourism clusters e. g. around Etosha. These are loosely associated in business sector associations (e. g. for fishing) and may partly substitute the innovation support expected from public programmes to that regard.

The Namibian Chamber of Commerce and Industry (NCCI) provides a platform for the SMEs and large enterprises. It carries out the NamBIC Survey, a yearly SME conference and offers trainings.

In comparison to Namibia’s peers, the assessment shows the following results:

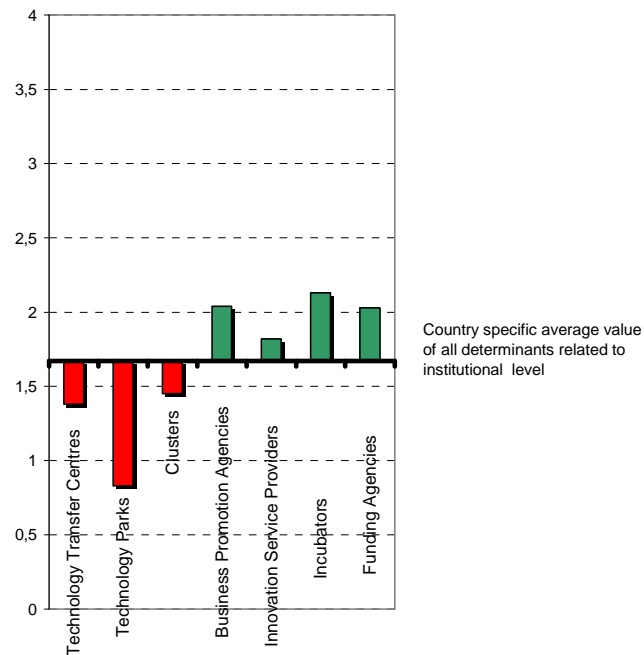
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<sup>14</sup> NCCI (2010)



**Figure 6 Pattern of the determinants on organisational innovation support on the meso level – Namibia, compared to other factor driven economies**

In the self-assessment, it becomes evident that technology parks and Business Promotion Agencies are comparatively few in the peer group. The comparatively low self-assessment of Namibia, in the eyes of the author, shows considerable potential for further development.



**Figure 7 The six determinants compared to the Institutional Innovation Support Level average**

Consequently, the rating for the “balance“ of meso level support in Namibia shows a result with comparative highs in business promotion and incubators. Dedicated technology transfer centres, technology parks and innovation support providers are understood to be *currently* comparatively less well developed.

### 4.2.3 Meso Level: Programmatic Innovation Support

There are very few examples of programme approaches to science, technology and innovation funding in Namibia. A programme in the ANIS sense indicates a targeted, time bound set of funds to support research or innovation in order to implement the national science and technology policy - through projects that result from several competitive calls, a practice that is quite common in matured science and technology administrations. However, the specific situation of Namibia – as a small country with a limited set of innovation actors – makes this approach at least partially a questionable one. While common thematic or sectoral targets are necessary for the coordination and alignment of the resources, competitive bidding in a community with monopolistic research structures may rightfully be considered redundant. In that sense, the non-existence of programmatic approaches is not equal to development potential.

The absence of collaborative schemes reveals a specific lack of SME involvement with research institutions. This is remarkable, since the comparatively high level of staff training may be interpreted as a hint that not only skilled personnel, but also knowledge and technology driven services may be demanded by the industrial sectors. The potential of sector specific initiatives to develop the national portion of the value chain is considered high. This may be ideally done in conjunction with the large actors



in the relevant sector (mining, tourism and tourism infrastructure, fishing and food industries)

Support programmes for inventors and entrepreneurs are carried out as part of the activities of the centres like CED and NBIC, named in the previous chapters.

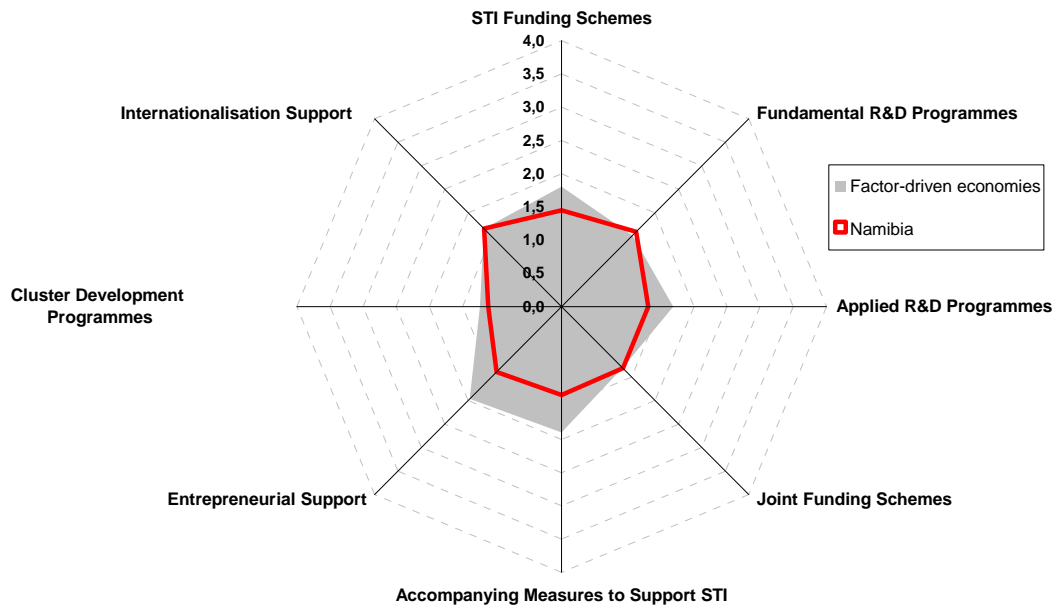
Specific financing organisations which actively engage in the role to develop medium enterprises do not exist. Approaches to microfinancing for the informal sectors are promoted in cooperation with international donors.

Typical Namibian informal occupation in informal sectors could be subject to modernisation through additional training programmes (agriculture, tourism related, mining related).

Internationalisation support schemes do exist to promote export of manufactured goods, they consist of tax incentives and other benefits attached to export promotion zones. With regard to R&D, an international approach is reported to be under planning for the research topic of indigenous knowledge and practise, together with the neighbouring countries.



In comparison to Namibia's peers, the assessment shows the following results:



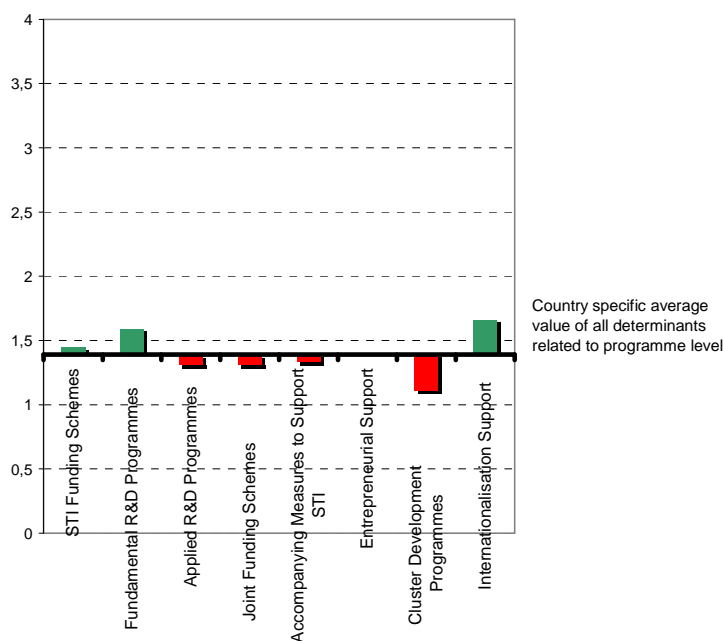
**Figure 8** Pattern of the determinants on programmatic innovation support level - Namibia, compared to other factor-driven economies

Namibia is rated very low with regard to the programmatic approaches. This is in line with the peer group. Minimal comparative advantages of one determinant in comparison to the other should not be considered as a significant advantage or disadvantage.

It should be stated here again that the approach of competitive funding programmes, which are considered a success in many large developed economies, may not be that beneficial for Namibia.

In the industries with formalised structures, very specific sectors with a small number of actors may be addressed more directly, using other approaches than the inflexible, indirect and delayed means of programmes.

Entrepreneurial support schemes seem to be underrepresented. They are - together with the training in basic technical and business skills as well as microfinancing programmes - an important pillar of activities to stabilise and develop informal structures, and to seed growth for activities that may well become formalised in the long term.



**Figure 9 The eight determinants compared to the Programmatic Innovation Support Level average**

Consequently, all determinants score low without much difference. This may not necessarily be an issue due to the size of the country, but the underrepresented internationalisation support for R&D may be one.

#### **4.2.4 Micro Level: Innovation Capacity Level**

The determinants reflect the status of the main actors of the Namibian NIS. Namibia has one public university, the University of Namibia (UNAM) and the Polytechnic of Namibia (PON). A range of very different private training and education organisations complement these. A considerable number of R&D institutes is usually attached to the university or polytechnic, like the Sam Nujoma Marine and Coastal Resources Research Centre which is attached to UNAM, or the MRC, carrying out multidisciplinary research.

Many of them are very small and do rather have the character of projects than long term sustainable structures – e. g. the Renewable Energies Institute.

Education is currently considered the primary mission of UNAM and PON. It was discussed that PhD programmes should support the research orientation. The number of PhD students is low, just as the attraction of international students and the international visibility in terms of joint international publications.



The Desert Research Foundation is actively promoting development, consulting, training and research projects, supporting a small number of PhD students. The Habitat research and Development Centre promotes the (re)use of local, indigenous building materials and designs, and has considerable facilities, but is staffed poorly.

Research organisations in general are considered to currently play a very minor role for innovation in Namibia.

Cooperation with industry is poor in research as well as in the coordination of demand and/or innovation oriented curricula. Reportedly underrepresented in the past, the updating of curricula with regard to innovation and entrepreneurship is being taken up. Some curricula are in the process of being updated with regard to societal needs.

In total, the education quality is considered sufficient as described in the NamBIC Survey<sup>15</sup>, which is in contrast to the assessment of the quality of the education by the World Economic Forum<sup>16</sup>. But the opinion about the quality of the education organisations is quite different according to an opinion survey recently carried out by the Namibian Stock Exchange.<sup>17</sup> While PON is rated good, UNAM and vocational training organisations are rated comparatively poor.

Innovation culture and entrepreneurship are not very well developed, just as SME involvement in R&D. The integration of large companies as stakeholders into the innovation system has been started further efforts to show effects on national employment and standard of living.

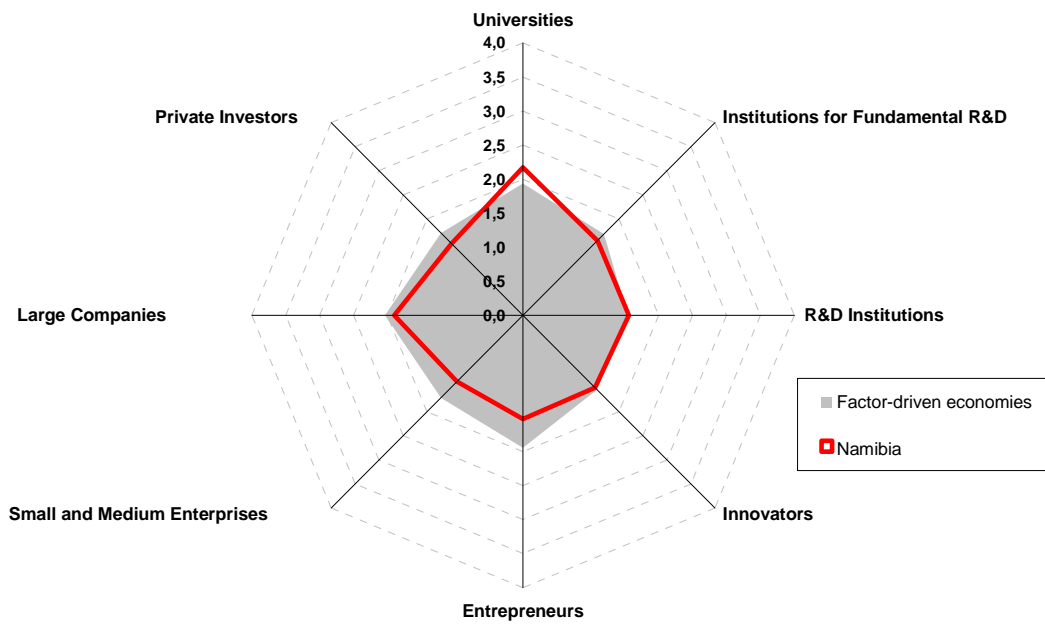
In comparison to Namibia's peers, the assessment shows the following results:

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<sup>15</sup> NCCI (2010)

<sup>16</sup> Schwab (2009)

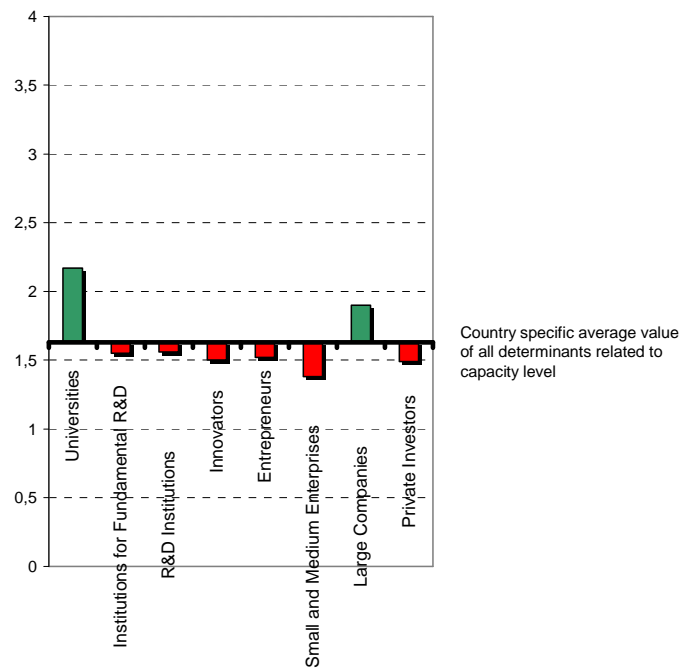
<sup>17</sup> Namibian Stock Exchange Executives Opinion Survey (2010)



**Figure 10** Pattern of the innovation capacity on actor level. Namibia compared to other factor driven economies

During the self assessment, Namibia's innovation actors stated a very low maturity on almost all determinants and in respect of most details. This leads to a picture that shows Namibia lagging behind the peers in almost all aspects.





**Figure 11 The eight determinants compared to the Innovation Capacity Level average**

Universities score high as innovation actors, just like large companies. This is at least partly due to the lack of research organisations, the absence of SMEs in innovation processes and a comparatively little developed entrepreneurial culture.



## 5 Main Challenges and Interventions

The status of maturity of an NIS as well as the performance of its actors can be improved by policy measures and their implementation addressing single determinants or a group of them. The potential impact can be expected on several determinants, also vertically on meso and actor level if policy targets them adequately - and implants them.

In the case of Namibia, the exploration of improvement potentials took place before the results of the assessment were finalised. These are combined with very few obvious findings from the assessment as detailed on the pages before.

The Research, Science and Technology Act of 2004 has envisaged a range of meaningful activities to foster knowledge based innovation. However, it has not been implemented effectively.

On the policy level, a broad range of potentials are manifested. A dedicated innovation policy has not been developed, yet. Inter-ministerial coordination (MEC/DRST, MTI, health, agriculture and forestry, mining, energy and others) needs to be further developed in order to generate an effective framework to foster this process.

Currently, the DRST is in the process of having an innovation policy document drafted. At the same time, MTI is modernising the private sector framework. Different initiatives have been started on the Meso Level and in research and education organisations. Each of these activities are designed in a professional manner through well qualified experts, reflecting Namibian situational context. The policies and initiatives could enhance effectiveness if they were coordinated to serve joint national objectives – e. g economic sectors specified in addition to the Vision 2030. The process of the specification of an innovation policy should be executed in an interactive process between all major stakeholders. The MEC has expressed interest to get access to training and / or qualified personnel to give support in this matter.

In parallel to this process, priority sectors for innovation should be named. Specific master plans for implementation of the innovation policy should be drafted for each of the prioritised sectors.

Possible additional and more detailed policy level improvement proposals should be specified in the process of the innovation policy's joint definition.

It should be discussed in depth if a programmatic approach is necessary to coordinate actors of research or if leaner means of coordination may turn out to be better suited for Namibia.

Given the size of Namibia, international cooperation promises high benefits in many aspects of innovation: sourcing of knowledge, education, research and development, export / import, marketing and sales, IPR, attraction of FDI etc. Liberal and outgoing people are the precondition for such efforts, which are abundant in Namibia. They can be effectively supported through (further) programmes to enhance entrepreneurial culture, international education, exchange and immigration.



Research and Development opportunities could be given to young researchers at intermediary or university / polytech organisations, and should refer to national needs – i. e. the research topics should be elaborated by national priorities and company requests.

Most of the above mentioned aspects are the opinion of the author, mainly backed by only few individual statements, or based on the very few replies to the questionnaires distributed. This is why they should rather be interpreted as hints for discussion than fact based proposals.



## 6 Analytical Design of ANIS – A Brief Introduction

These are the major objectives for the ANIS studies:

- Analysing of existing literature regarding NIS
- Conducting interviews with experts regarding NIS
- Evaluating and measuring of the outcomes
- Identifying determinants having a high impact with little costs
- Formulating recommendations to improve the prioritised determinants

ANIS takes up this challenge by providing an indicator-based assessment of these determinants, each of which reflects an aspect of the complex reality of the innovation system. The determinants can be grouped according to a three-level hierarchy. Table 2 describes the different dimensions and its actors.

	Level	Actors	Functionality within an NIS
<b>Macro</b>	Policy	Public authorities, policy makers	Governing and setting up framework conditions of an NIS
<b>Meso</b>	Institutional innovation support  Programmatic innovation support	Institutional innovation support organisations or public funded initiatives / programmes	Institutions and initiatives are tools to turn innovation policies into practice
<b>Micro</b>	Innovation capacity	Firms, academia, educational institutions, etc.	Main beneficiaries of support measures and main producers of knowledge, innovation, technologies, products

**Table 2 Levels and actors within a national innovation system**

### Macro Level – Innovation Policy Level

In macro-dimension, national and regional innovation policies directly influence the framework conditions of an NIS. Laws, decrees and regulations, etc. at that level may often be path breaking, in a positive or a negative way. Public investment in innovation directly relies on decisions made at a policy level. However such political decisions may only influence the framework conditions for innovation and might not turn innovation into practice.

### Meso Level - Institutional Innovation Support Level

Institutions operating at meso level are typically technology transfer centres, clusters, innovation service providers and funding agencies. They may be considered as the relevant tools to turn any political decision regarding innovation into practice. In emerging countries such institutions are often publicly-owned. They mainly aim at fos-



tering stakeholders' competitiveness and capability to innovate. Rather than own different programmes to support innovation, those institutions usually provide in-kind contributions such as training, consultation, conducting applied R&D or products' improvement. These institutions remain a key instrument for improving and encouraging the innovation capabilities of firms, especially in countries where public investment is limited.

### **Meso Level: Programmatic Innovation Support Level**

Programmatic innovation support includes public funding programmes and initiatives which aim at turning innovation policy into practice. This represents the second pillar in improving the innovation capabilities of stakeholders within an NIS. Such programmes might be managed either by policy makers or by innovation support institutions. Any measures at that level would require significant public investments.

### **Micro Level: Innovation Capacity Level**

The micro level provides an umbrella for the main actors and enablers within an NIS such as SMEs, entrepreneurs, universities, public or private R&D institutions, innovators or financial organisations.

## **Identifying the Determinants of National Innovation Systems**

The different dimensions may be influenced by some determinants. As far as our research analysis is concerned, these determinants require our special attention since they can be improved with appropriate measures. To sum it up, all four levels of the pattern of determinants affect an NIS. Although we use the four levels separately, we acknowledge that there are plenty of interdependencies and links between them. However, it might be appropriate to consider these levels separately during the analytical phase. Besides, each one of the determinants may differently influence an NIS. The ideal way for a country to improve the outcomes of its NIS will not necessarily be the same as for any other country. Furthermore, it is important to point out that an NIS may be influenced by factors coming from outside the country. Within a globalised world all NIS may be affected by external influences. Therefore, in this analysis we will not consider the external factors that may affect NIS, since they cannot be controlled by national policy makers and actors of an NIS.

In total, we identified a core set of 30 determinants grouped into three levels to support this analysis. All of them may directly influence the efficiency of an NIS (Figure 1). By means of different approaches of measuring all determinants may directly be addressed. In the short term, some of them would only require low input whereas others would need longer periods of time for improvement, combined with significant investment. Improving any determinant might generate magnified positive impacts.

A set of three to five questions has been elaborated to characterise the 30 determinants properly and assess their stage of development. In assessment practice, single determinants that are less relevant may be excluded from specific examination, or combined with others.



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