



REPORT ON

Evaluating the decline in THRIP applications between 2006/07 and 2008/09 and scenarios of possible intervention

AP Botha

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“... most R&D is performed in the research field of the engineering sciences, which accounts for 22.5% of the total spend. This was followed by the natural sciences with 20.4%, and the medical and health sciences and ICT, both at 14%.

The contribution from the business sector to R&D has grown from 55.9% to 57.7%, and is still the major performer of R&D in the country. The government, which includes the science councils, performs 21.7% of the total R&D, followed by the higher education sector with 19.4% and the non-profit sector with 1.2%. About 10.7% of SA's R&D is financed internationally.

Skills are still one of the biggest concerns. With a total of 31 352 full-time equivalent R&D personnel, the survey states there “is a marginal growth to an already small quantity”.

Only 62% of personnel are academically qualified people who perform, manage and guide the process of undertaking research. While this number has grown by 4%, from 18 527 in 2006/7, the DST says more still needs to be done to improve the numbers”.

- From iTWeb Financial, “Pandor questions R18bn R&D spend”, by Audra Mahlong, Journalist, Johannesburg, 8 Dec 2009
http://www.itweb.co.za/index.php?option=com_content&view=article&id=28745&catid=118&A=FIN&S=Financial&O=E&E

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Executive Summary

This report contains the outcomes of an investigation done on the decline in THRIP applications between 2006/7 and 2008/9. It searches for reasons for the decline, puts scenarios forward for addressing the reasons and builds a springboard for further strategic contemplation in THRIP.

Methodology

The methodology used to arrive at the outcomes presented here included the following:

- An international scan on “THRIP-like” programmes in the world, with a deeper analysis of three countries: Australia, the USA and South Korea
- A study of existing THRIP data and defining the problem
- A web-based, facilitated survey that collected feedback from 100 respondents in the academic, business and government world
- Analysis of the feedback and synthesis of trends that emerged
- Presenting the trends at two regional THRIP stakeholder workshops, one in Gauteng and one in the Western Cape to discuss and debate the meaning of the trends evident from the survey and data
- Individual interviews with leading THRIP stakeholders to contextualise the discussion of the way forward

Addressing conflicting interests

Following this approach it became clear that there are conflicting interests and opinions on where THRIP should be going. A large percentage of predominantly academics want THRIP to return to its original form and mandate; **the dti** as the main client and sponsor for THRIP wants to see it being dynamic, addressing market and socio-economic issues as the economy evolves.

This report attempts to address all the issues raised and endeavours to put possible solutions forward in the form of three main scenarios that address the following:

- Consequences of maintaining current THRIP focus, strategy and funding ratios
- Consequences of a change in THRIP focus, strategy and funding ratios, with recommendations for new ratios
- Consequences of moving to a different framework of THRIP focus, strategy and funding rules, with recommendations for a new set of funding rules

Benchmarking THRIP

A comparison of the South African THRIP was done with:

- The Linkage Programme of the Australian Research Council in Australia
- The National Science Foundation (NSF) Industry/University Cooperative Research Centres (I/UCRC) programme in the USA
- Programmes of the South Korean National Research Foundation (NRF) including the Korean

Science and Engineering Foundation (KOSEF), Korea Research Foundation (KRF), Korea Foundation for International Cooperation of Science and Technology (KICOS) and the Korea Advance Institute of Science and Technology (KAIST)

The following are notable aspects emerging from the benchmarking:

- The importance of government-industry-university collaboration as an economic catalyst.
- The support of national priorities and challenges via high level human resource development
- The value of self-organising consortia to address human capacity building and joint research and development.
- The spectrum of shared co-funding stretches from rules based (targeting and incentivising) to open (voluntary contribution), where the partners make an offer on how much they contribute. In most cases the voluntary contribution results in higher industry:government contribution ratios.
- Responsible evaluation processes guide all approaches.
- Electronic administration support systems are used.
- A wide spectrum of cost components are covered depending on the requirement.
- Government agencies with similar mandates manage the joint industry-government-university grant programmes.
- Two predominant approaches are used: supporting projects in academic environments and/or creating specialised centres for cooperative research.

Defining the problem

In defining the problem it is noted that there was a decline of about 30% in the number of applications over the period of investigation. The current global economic recession could not be held responsible for this, since the data studied to formulate the problem was collected before the crisis started in October 2008. A major change in THRIP funding rules was introduced in 2007, that of a change in the THRIP:Large company partnership funding ratio from 1:2 to 1:3. Large companies feel that this creates a situation that is restrictive to their ability to invest in THRIP projects. This situation has been complicated by the financial crisis that has hit most business environments in 2009. The investment changes over this period were analysed. Although the absolute number of applications dropped, the investment amount increased, mainly as a result of the ratio change. The number of large companies participating declined, as well as the number of SMMEs. The increased investment mainly benefited the universities, whilst investment in the universities of technology and the comprehensive institutions remained more or less constant. The so-called “big 7” industry sectors where most THRIP investment is made into were identified to be: energy, chemistry and biochemistry, agriculture, metals, ICT, biotechnology and aerospace. Movement in investment per sector was analysed. THRIP outputs were analysed over the period of investigation and the number of publications decreased sharply, although there is a lag in when publications emerge from research and it may not be related directly to trends in the period of investigation.

The Survey

In terms of the characteristics of the survey, a statistical analysis is given on the number, origin,

institution type, activity sector and role in THRIP. Most respondents were researchers, followed by industry partners. The current project status of respondents was split almost equally into current grant holders, previous grant holders and those that considered application but were not grant holders at present. About half of the respondents were exposed to THRIP for less than two years.

The perceived THRIP impact was measured and most respondents felt it had a high impact in the creation of new knowledge, human capacity development and R&D outputs. There was less certainty on the impact THRIP has had on new solutions implemented.

The partnership ratios were interrogated and the average feedback pointed to a desired reversal to the “old” THRIP ratio of 1:2 for THRIP:Large company. In analysing the preferences of the activity sectors on changed ratios, it was surprisingly found that some large companies were content with the 1:3 ratio. Most large companies indicated a 1:1 ratio as being preferable. It is speculated that those in favour of maintaining the 1:3 ratio may have a larger control of intellectual property in mind, given the uncertainty of the application of the new Intellectual Property Rights (IPR) Act.

THRIP is sensitive to external influences. These are, amongst others, likely to be: the economic and financial crisis, government priorities, the Intellectual Property Rights Act and “fad-chasing”.

Critical shifts in relationships between universities and companies took place in the past three to five years. The most prominent of these are: the influence of the ratio change, issues around ownership of intellectual property, short term versus long term R&D focus and enhanced dependability in some cases.

Does THRIP address SMME needs? There was no clear message on the impact THRIP has had on SMMEs. Very few SMMEs responded to this question and the answers were provided by academics and large companies who do not necessarily understand the SMME world well. Some needs that were identified included speed of action, attention to cash flow, enhanced guidance on market trends, longer project duration and a plea for shifting to “in-kind” rather than financial contributions. There was stakeholder comment on the wide diversity, and therefore probable research needs among SMMEs.

Uncertainty also existed on what alignment THRIP has to make with BEE needs. Apart from being very similar to SMMEs in terms of speed of action, duration of projects and better timing, guidance in project management, opportunities that exist and good students was required.

SMMEs are benefiting from participating in THRIP by being involved in shared knowledge creation, access to shared facilities and shared funding and being able to share human resources.

Private companies benefit by access to domain experts, access to R&D and post-graduate training and secondment of university staff.

Business needs for sharing public funding benefits like those offered by THRIP involved opportunities for public-private-partnerships, unique offerings for public good, BEE development and SMME incubation.

Several issues were raised and solutions suggested to align THRIP better with company-specific needs. These included, amongst others: access to matching funding for R&D, enhanced market knowledge, negotiation of business involvement with academia, focusing THRIP at industry level rather than company level, a revision of the rules and finding the right SMME partners.

The state of industry/university partnership formation in South Africa is undecided. As many respondents thought it was good or excellent as those who thought it was poor. Guidance and support on partnership formation is required from THRIP to move to a more positive situation where these partnerships can be formed more easily and with confidence.

Academic benefits derived from participating in THRIP were rated as: the ability to fund research equipment and facilities, opportunities to do relevant R&D, being able to provide student support, the involvement of business people in R&D and working closer to the commercialisation interface.

It was explored whether THRIP addresses gaps in the government funding spectrum. Several perceived gaps were mentioned such as: applied pre-competitive research of an exploratory nature; funding of high risk R&D, moving closer to commercialisation with post-graduate and applied research and problem-solving orientated research, defined by South African industry needs.

To probe the competitive positioning of THRIP, the relevance of THRIP in terms of the market dynamics was investigated. THRIP addresses the changing market dynamics by focusing on making companies more globally competitive, and by being an important driver when there is economic difficulty and industry can contribute less than normally.

The respondents were asked to rate which project clusters THRIP should focus on. The survey-recommended “Big 7” emerged as different from the current funding focus and includes: energy and power, agriculture, biotechnology, manufacturing, chemistry and biochemistry, metals, ICT and aerospace, in order of importance.

In testing whether there was other competitive funding easier to obtain than THRIP, most respondents felt that THRIP funding was not too difficult to obtain.

THRIP grant sizes were indicated to be too low. The THRIP grant size typically varies from R 2 000 to R 5 million. The lower funding bracket reduces the impact of THRIP funding. It will be important in future to narrow the contribution to achieve maximum impact. However this view is balanced with the understanding that smaller new grants encourage entry-level participation in THRIP.

The cost components such as student support, operating costs, salaries, capital equipment, travel, etc., supported by THRIP were perceived to be right and adequate. Some revision of cost components that could be supported in future were suggested, such as: increased student support, researcher fees in science councils, software and changed support concerning salaries of project members.

The majority of respondents felt that THRIP consortia are delivering according to expectation and

that they were addressing their commitments adequately.

There was general agreement that THRIP was effective in handling the application process, panel review process and that good grant management and support were given by THRIP.

The interfaces between THRIP and academia and THRIP and industry were assessed in terms of communication, the understanding of needs, and project alignment with needs from industry and offerings from universities.

Uncertainty exists on the effectiveness of communication and understanding of industry needs over the THRIP/industry interface and intervention is required to improve this. The alignment of projects with industry needs from THRIP was seen as good. The THRIP/university interface was perceived as fairly good when it came to communication, uncertainty exists on the effectiveness of understanding university needs and a good project alignment with university offerings. The state of the THRIP/university interface in terms of meeting student needs was seen as largely adequate.

Should THRIP get involved in soliciting projects? Soliciting projects would include the targeting of projects in certain priority areas as well as THRIP going out and brokering parties to form consortia to address gaps in the project or industry sector environment. A split in opinion emerged, showing that there is a definite need for THRIP to be more pro-active in setting up project environments, probably in areas and among potential partnerships that are less experienced in putting together THRIP project consortia and proposals.

A clear message was given that THRIP should not ring fence any funding whether it is per business type or size of company. THRIP could, however, provide incentives to stimulate participation from certain areas where there is slower development of participation.

Strong support for re-instating “in-kind” contributions was given. In-kind contributions may be particularly attractive for SMME participation. This normally involves time allocated by industry staff to the project, without payment from the project. Sharing of facilities and mentoring or advice could also be considered as in-kind contributions.

In asking what the ideal duration of a THRIP project is, the fact that the main aim of THRIP is the development of highly qualified human resources should be taken into account. In South Africa a master’s degree may take up to 3 years and a PhD up to 5 years. It is thus advisable that the duration of a THRIP project should be either 3 years or 5 years.

There is not a significant positive response to the question “How well does THRIP management do communication and project management support?” and a divided opinion was revealed by the survey. THRIP management should intervene strongly here and work towards an improved perception on communication and project management support.

There is overwhelming support that projects must be funded for its duration (normally three years). This should be accepted against the fact that **the dti** as the main sponsor of the grant funding only get confirmation from treasury on an annual basis and that no firm guarantee could be given. The

MTEF (Medium Term Expenditure Framework) however provides a three year view of expected expenditure. This kind of agreement will be conditional to very good progress reports on an annual basis. This arrangement will reduce the burden of reapplication on the consortium and the panels that review the applications.

Divided opinion existed on whether the THRIP model should be taken to other government departments. It should be noted that it is not a requirement to clone the THRIP environment exactly if it is succeeded to convince other departments to participate on a joint funding basis with industry. The basic principles of joint funding, human resource development and student support could be followed. In most cases the NRF is seen as the ideal management agency for such collaborative research support. The industry associations that are closely linked to specific departments may benefit largely by such expansion of the THRIP idea.

The response on a direct question as to why a decline in THRIP application was experienced over the period of investigation resulted in the following feedback on the top five reasons:

- The change in THRIP: Large company contributions from 1:2 to 1:3 in 2007
- The administrative burden of applying and reapplying for THRIP
- The difficulty in finding appropriate SMMEs with an interest in, and firm requirement for R&D to partner with
- The fact that universities find it difficult to liaise with industry
- The current world-wide economic recession

Another factor mentioned is that industry associations were not allowed to collate and prepare applications on behalf of universities anymore. The administrative burden this placed on universities has resulted in them losing interest to apply.

Scenarios

Some issues that were raised in the survey, during the regional workshop debates and in personal interviews are reviewed and commented upon as a preamble to the development of scenarios. These are all important considerations for drawing up the scenarios and include:

- **the dti** objectives
- SMMEs and THRIP
- Acquiring R&D vs social responsibility of creating capacity
- THRIP must be managed to achieve key objectives of **the dti**
- Industry associations
- Beneficiaries of THRIP
- THRIP and commercialisation
- THRIP and innovation
- THRIP as a springboard for technology platforms
- Focusing grant support
- Leadership in shaping THRIP
- Simplifying THRIP

- Mentors in THRIP
- Equity and redress in THRIP
- THRIP and the National Intellectual Property Registration Act (IPR Act)

Scenario 1: Maintaining current THRIP focus, strategy and funding ratios

Scenario one is about maintaining the status quo. In this scenario the current focus of THRIP on highly skilled human resources and technology for industry is retained. (Note that this is already a deviation from the understanding of the “original” THRIP which was only focused on “technological human resources for industry”). The strategy is guided by the need to have more SMMEs and more BEE companies included in the partnerships with academia and to incentivise such inclusion by the current set of funding ratios.

The THRIP partnership funding ratios are shown below:

INDUSTRY PARTNER (S)	THRIP CONTRIBUTION (R)	LARGE INDUSTRY CONTRIBUTION (R)	SMALL & MEDIUM ENTERPRISE CONTRIBUTION
Large company(ies) only	1	3	N/A
Large company(ies) plus minimum of 25% by number of SMMEs (e.g. consortium with 1, 2 or 3 large companies must have at least 1 SMME partner)	1	2	5 % of highest contribution
All SMMEs	1	N/A	1
All SMMEs and all BEE	2	N/A	1

Impact of following Scenario 1

The growth path for THRIP in this scenario is limited in the sense that there is a strong perception by large companies that THRIP is disincentivising them in favour of SMMEs. The feedback received in the survey and during workshop and individual discussions point to the fact that the decline in the number of applications was strongly influenced by the change in funding ratio in 2007 of THRIP:Large Company to 1:3 from the 1:2 it was before.

The fact that several large companies did not disagree in the survey with keeping the ratio at 3:1, may be explained by the interpretation of the IPR Act that the more a company invests, the more claim it could make on owning the IP.

In this scenario, the universities will remain the main beneficiaries; they will use the money largely for acquiring research infrastructure according to the survey feedback on the benefits of the academic sector and focus on doing relevant R&D and student support. Old partnerships will remain and new ones will depend on the funding available in the companies. Low participation from SMMEs

will be the norm as the perception becomes entrenched that SMMEs do not need high level research.

The scenario is thus not aligned with the need to increasingly involve SMMEs in R&D which is strongly expressed by **the dti**. The academic fraternity over-emphasises the one output, being high level human resources, not addressing the needs of the sponsor (**the dti**) to look at other aspects as well. If the situation is left unchanged the misalignment between academia and **the dti** views may cause THRIP to be a failure. The importance of the programme is recognised in the light of the declining grant funding opportunities in other funding environments such as the NRF.

Following through on this scenario, the funding available from industry may stay constant at the increased (1:3 from 1:2) level, but the number of participants and thus the number of projects may stagnate or even decline further.

The unhappiness with the ratios may be offset slightly by the decision by THRIP management to change the scheduling of the announcements and making the budget available from January at the beginning of the academic year.

More of the same will not be inspiring to make THRIP the vibrant environment it is supposed to be and this scenario may not be the preferred one to continue on.

Scenario 2: A change in THRIP focus, strategy and funding ratios, with recommendations for new ratios

In Scenario 2 the academic-industry associations remain the same, with a change in the funding ratios and the introduction of a stronger competitive edge and commercialisation drive and a differentiated focus on SMMEs. The importance of high level skilled human capacity in technology fields remains the high level focus. A change in THRIP focus in line with the expectations of **the dti** as the main sponsor and custodian includes moving closer towards commercialising outcomes of THRIP projects while still placing more emphasis on SMMEs and equity and redress. In addition to the need for including SMMEs, the movement of THRIP activity closer to the market with the aim of commercialising THRIP project outcomes is added. Technology platforms relate to a special type of consortium where universities, large companies and SMMEs work together with the specific aim to generate students with the skills and capabilities to commercialise R&D. Such a technology platform contains all the components in the innovation value chain that are required to take the idea through to the market in the fastest possible time. It is thus supported not only by technological innovation, but also by service, market, economic and social innovation and forms a holistic approach to making business success from knowledge and research. It is a domain where universities cannot play alone based on their mandates and may include a certain level of R&D in industry as well.

The suggested ratios for this scenario are shown below:

INDUSTRY PARTNER (S)	THRIP CONTRIBUTION	LARGE INDUSTRY CONTRIBUTION	SMALL & MEDIUM ENTERPRISE CONTRIBUTION	INDUSTRY ASSOCIATION	TECHNOLOGY PLATFORM
	(R)	(R)			
Large company(ies) only	1	2	N/A	N/A	N/A
Large company(ies) plus SMME(s)	1	1	5 % of large company contribution	N/A	N/A
All SMMEs	1	N/A	1	N/A	N/A
All SMMEs and all BEE	2	N/A	1	N/A	N/A
Industry associations	1	N/A	N/A	1	N/A
Technology platforms					
(Year 1)	2	Negotiated	Negotiated	Negotiated	1
(Year 2)	1	Negotiated	Negotiated	Negotiated	1
(Year 3)	1	Negotiated	Negotiated	Negotiated	2

Impact of following Scenario 2

The negativity expressed in the survey about how THRIP addresses SMMEs and their need for research and the standard complaints that previously disadvantaged individuals (PDIs) are not available, may be offset with an incentive in changing the funding ratios to encourage large companies to continue with THRIP and by incentivising them more to find and include SMMEs in their consortia.

Dealing with large companies

Here the approach is to return to the THRIP:Large Company ratio as it was before 2007, and changing that back to 1:2 from 1:3. More favourable ratios are also introduced for involving SMMEs than the current situation. The difference is that large companies who cannot find SMME partners do not perceive the programme as discriminatory anymore.

Dealing with SMMEs

A different dispensation for drawing in SMMEs is devised. An opportunity must be created to make it attractive to large companies to team up with SMMEs. In specifically targeting technology-based SMMEs, the larger companies will see the seriousness of joint venturing with SMMEs. Intervention will be required, since large companies will not readily collaborate with SMMEs just as universities will not easily collaborate with universities of technology. An incentive is suggested to make the THRIP:Large Company/SMME 1:1 with no minimum condition for number of SMMEs. The SMME will have to be evaluated for its R&D synergies and the benefits it could derive from the association with

the large company. The SMME will still be expected to contribute 5% of the large company contribution.

In a separate approach, SMMEs will have to be mobilised to form partnerships with universities on their own. The level of interaction must strictly be managed at research collaboration. Technology transfer could be an outcome, but should not be overlapping with what Tshumisano is already doing through the universities of technology.

There should also be a programme to identify different categories of SMMEs and to elicit the range of research support needed.

Focusing on student benefits

Another change in focus is to increase the benefits of students. Here larger contributions of student support will have to be allowed to bring the student support on par with other programmes where bursaries may be more attractive and lure students away from THRIP.

Dealing with equity and redress

Specific incentives for projects presenting good plans to address the equity and redress situation should be made available. A key incentive could be that posts for black and female researchers on THRIP projects would be paid for in full as part of the grant.

Increase impact of industry associations

Industry associations should be encouraged to be formed and to take leadership in putting together THRIP applications on behalf of and in close liaison with their academic partners. Industry associations should be given a default funding ratio of 1:1 to encourage their investments which are derived from member levies. Their efforts in deciding on the right research for the industry sector, providing guidance to universities to do relevant research and in evaluating and screening THRIP applications, as well as providing management support and ensuring adequate and timeous reporting should be awarded in this way.

Introducing technology platforms

The identification of technology platforms that will fast track commercialisation of THRIP activity should be added as a funding category. (It would be anticipated these projects would be in the implementation phase of the research, see “Generic improvements to THRIP”.) Here careful planning and strong motivation by consortia consisting of large and small/medium enterprises, universities, government and student representation should identify technology platforms that are close to commercialisation. An incentive should be given to encourage these projects and a kick-off funding ratio of THRIP:Industry Partnership of 2:1 should be given for a minimum of one year. As the products or services emanating from the THRIP project enter the market, this subsidy can be reduced over a period of three years from 2:1 to 1: 1 to 1:2. After that the products should be commercially independent.

Scenario 3: Moving to a different framework of THRIP focus, strategy and funding rules

In this scenario, academic based research is funded as in scenario 2, but **the dti** starts a radical

programme via THRIP to establish a research culture in industry by directly investing in industry to set up R&D initiatives that will make them more competitive. The development of high level human capacity remains the main focus. The difference is that here a component of such human capacity development is done directly in industry and not only in the academic world. The inability of university-trained human capacity to close the “Innovation Chasm” which means that locally generated knowledge and research products are not deployed in the local market is now addressed by empowering industry in parallel to develop their own human resources with specialisation in commercialisation. The university subsidy system is preventing fast enough development of such skills and the focus on publishing research rather than following through to a commercial product is not addressing the declared need for crossing the “Innovation Chasm.”

The main strategic driver is the development of high level human resources in an industry-placed R&D environment where commercialisation for competitive advantage is the main objective. This is achieved by:

- Encouraging in-house R&D in industry
- Enabling SMMEs to become involved in industry and in-house R&D
- Making it attractive for international companies to do Foreign Direct Investment (FDI) in South African R&D
- Incentivising the formation of international consortia

The ratios for this scenario are shown below:

INDUSTRY PARTNER (S)	THRIP CONTRIBUTION	LARGE INDUSTRY CONTRIBUTION	SMALL & MEDIUM ENTERPRISE CONTRIBUTION	MULTINATIONAL CONTRIBUTION	CONSORTIUM
	(R)	(R)			
Large company setting up in-house R&D	1	5	N/A	N/A	N/A
Large company attracting FDI for R&D	1	1	N/A	5	N/A
SMME attracting FDI for R&D	1	N/A	0.5	5	N/A
SMMEs/BEEs setting up in-house R&D	1	N/A	1	N/A	N/A
SMME/Large company setting up joint in-house R&D	1	Negotiated	Negotiated	N/A	2
SMME/Large company/Multinational collaborative research initiatives	1	Negotiated	Negotiated	Negotiated	3

Impact of following Scenario 3

The industry/university interface has been adequately serviced by THRIP over its existence. South Africa is lacking research in industry at the scale its international competitors are doing. It is clear that supporting only the university/industry interface to generate more skilled human resources and R&D has not been successful in establishing such an industry R&D base. A radical change in approach, which may challenge the Public Finance Management Act (PFMA) is suggested here where government co-invests with companies to strengthen their own internal R&D base.

This intervention will also prepare industry to co-invest with government in the academic sector as outlined in Scenario 2 in the “classical” THRIP approach. It will remove the standard academic concern that “industry does not understand R&D” and provide an impetus towards collaboration among large companies and SMMEs. Commercialisation will become the driver for developing high level human resources, and not university mandates alone anymore. In the end, though this approach may be controversial, it will close the gap between academia and industry and provide a smooth, continuous innovation value chain.

The following outcomes will be achieved through following this scenario:

- Development of the skilled R&D human resource base in industry
- Competitive products and services that are fast tracked to market entry
- The establishment of in-house R&D facilities and processes
- Multinational participation in R&D in the South African industry
- Foreign direct co-investment in R&D

The objective of building an SMME base that will drive the economy will be addressed in this way. SMMEs that do not have adequate funding to establish their own research activities will be given an opportunity to do this. This intervention will result in sustainable and continued development and rounding off of high level human resources that emerge from the existing THRIP environment (Scenario 2) to pursue a career in R&D in industry.

Various levels of additional support could be supplied by this new paradigm in THRIP:

Large companies:

- More will be invested by the company in in-house R&D with a resultant larger R&D investment tax benefit
- In a revised TIPTOP scheme, companies will receive a grant to appoint expert researchers from universities, science councils or international laboratories to work on agreed projects
- Companies will have to invest in in-house research infrastructure and equipment which will be available to THRIP projects they may conduct with the academic sector
- Government will fund liaison with multinationals to set up collaborative R&D initiatives that may be funded via NIPP (National Participation Programme) or similar offset schemes
- If a company is prepared to host an advanced laboratory that could be a national facility, subsidies for such facilities may be offered.

SMMES:

- SMMEs may apply for competitive grant funding to set up their own R&D initiatives. A part of this grant funding may be used to partner with universities to set up industry/academic THRIP projects and is a direct subsidy to encourage SMMEs to become involved in THRIP
- SMMEs can be subsidised to venture into collaborative R&D with large companies and multinationals.
- SMMEs will benefit from increased investment in R&D and resultant tax benefits
- An SMME hosting an advanced laboratory that could be a national facility could be subsidised for such facilities.

Generic improvements to THRIP

Regardless of the scenario followed, certain improvements in the management of THRIP are desirable. These deficiencies emerged from the knowledge of the management team, the survey and workshop discussions and individual interviews. These include:

Ratios (adjustment and strategic incentives- size, stage, sector)

Ratio adjustments can be made according to merit or the choice made from the scenarios presented. Strategic incentives, based on size of the project or participating industry partners, stage of development and sector prioritisation can be made, guided by the scenarios.

Timing of funding

The misalignment of the government financial year (April – March) and the academic year (January – December) has caused concern about the announcement of grants, the financial risk and the ability to appoint students at the right time. This has already been addressed by THRIP management in liaison with the NRF Corporate Management and the dti. From 2009 the projects will be announced before the end of the following year and funding will be released by January of the year of approval.

Research phases

A system should be developed for grant applicants to identify which of three research phases their project falls into: Initiating, Developing or Implementing. It would be expected that projects in the early stages should collaborate with THRIP until the implementation phase is reached – even if that phase is funded through a different funding instrument (for example TIA or the Innovation Fund).

SMMES

The scenarios deal in great depth with the objective of including SMMEs in research and human capacity development. It addresses incentives to attract more SMMEs to work with universities and large companies as well as proposes a radical approach where SMMEs may be funded directly to establish a research culture that could lead to large participation in THRIP consortia in future. It is recognised that SMMEs are not representing a homogeneous group, but vary in technology dependence, size and operation. Interventions guided by the scenario suggestions are to be developed to balance diversity and simplicity in dealing with SMMEs.

IPR Act



Confidential



an initiative of the dti

The IPR Act has a major influence on how business perceive joint ventures with public funded institutions. The impact of the IPR Act on THRIP and R&D in general is not widely understood, because of its newness. THRIP management will undertake to communicate the impact of the act on THRIP consortia and implications it may have for certain projects. As such THRIP should familiarise itself with the act and be in a position to advise prospect grant holders in the proposal phase of a project.

Proactive project development

Where required, THRIP management should do brokering among parties to join into consortia to apply for THRIP funding, as well as providing assistance with relationship building.

THRIP Guide

THRIP management has declared that it wants to revise the THRIP Guide. Strategic decisions following from these scenarios will shape the new THRIP Guide. The Guide should include information on the tax incentives available for THRIP industry partners.

Student support and engagement

Student support has been identified as an area that requires a new approach. Students should be elevated as the main beneficiaries of THRIP and not researchers or consortia. In the end, students are the “trained human capacity” which is the main objective of THRIP. THRIP is investigating other means of student support. It is accepted that bursaries are the domain of the National Department of Higher Education and that **the dti** cannot position itself as a main supplier of bursaries. Yet, student support via studentships and internships and subvention of bursaries should be expanded. Other departments providing bursary schemes should be channelled towards THRIP to co-support high level human resource development.

Reapplication for existing projects

THRIP has expressed the intention to revise the current system where a grant holder has to reapply on an annual basis. Grants should be awarded for fixed periods (3 or 5 years are preferable) and grant holders should report on progress and financial movement on an annual basis. Based on this annual project report, the project should proceed if progress was satisfactory. This will eliminate the burden of re-assessing projects formally on an annual basis. This simplification of procedure will only succeed once grant holders report responsibly.

THRIP Administration

The THRIP management team is committed to continuously improve THRIP administration. To do this internal evaluation systems should be investigated. A large part of successful administration has to do with effective communication with stakeholders.

Recommendation and conclusion

This investigation was initially only aimed at understanding the decline in THRIP applications over a demarcated period. This remains the primary focus, but it also developed into a broad based overview of how THRIP can be improved as a programme. It is therefore poised to be used as a strategic springboard for optimising THRIP in terms of its impact and influence in the research and

development community. It is a programme of critical importance, in line with international trends to bring academia and industry closer to each other. Left alone, the so-called “triple-helix” (government-academia-industry) is not a natural collaboration space. The need for successful economic growth, new industry creation and the creation of wealth that would benefit the nation as a whole should be the driver instead of short term financial gains. THRIP should not be seen as a “gap-filler” where other finances are not available, like is the case to some extent currently, but as a programme where participation forms part of a national pride. As such it should be elevated above ordinary funding schemes by being flexible, accommodating and well-aligned to meet national goals. It is a unique opportunity where the supply and demand of high level human resources with a high potential to address economic growth could be in touch with each other and create a platform where economic growth does not remain a strategic vision, but becomes a reality.

Introduction

This document constitutes a report by TechnoScene (Pty) Ltd to the National Research Foundation (NRF) on: **Evaluating the decline in THRIP (Technology and Human Resources for Industry Programme) applications between 2006/07 and 2008/09.**

The results are presented from the following interactions with the THRIP stakeholder community:

- A desk research based study and international visit to inform benchmarking of THRIP with similar international programmes
- A web-based survey to solicit input and opinion from THRIP stakeholders in the form of researchers, industry partners, industry association leaders, students and research administrators.
- Testing of the trends emerging from an analysis of this input to the web-based survey with the Review Subcommittee of the THRIP Board, two regional workshops in Gauteng and the Western Cape, as well as individual interviews and discussions with THRIP stakeholders.
- Inputs from **the dti** on the future vision for THRIP
- Deliberations with the THRIP management team in the NRF that acts as a managing agency

The report presents scenarios to the THRIP Board that can be considered in order to improve the THRIP grant environment and align and synergise the roles of partners in THRIP to achieve the most effective impact from THRIP as a programme.

Benchmarking THRIP

In benchmarking THRIP, the programmes listed in the mind map in Figure 1 were identified as similar to THRIP in the sense that they represent industry-university partnerships supported by government grants.

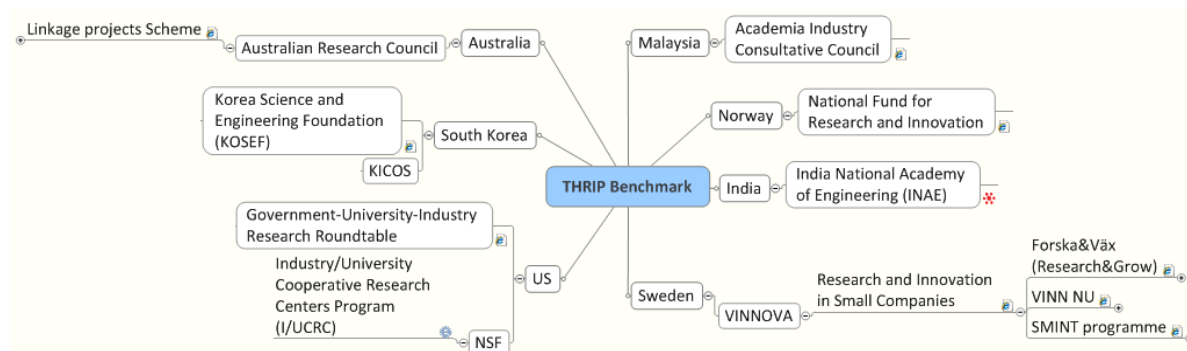


Figure 1: Mind map showing potential benchmarks

A comparison of the South African THRIP was done with:

- The Linkage Programme of the Australian Research Council in Australia
- The National Science Foundation (NSF) Industry/University Cooperative Research Centres (I/UCRC) programme in the USA

- Programmes of the South Korean National Research Foundation (NRF) including the Korean Science and Engineering Foundation (KOSEF), Korea Research Foundation (KRF), Korea Foundation for International Cooperation of Science and Technology (KICOS) and the Korea Advance Institute of Science and Technology (KAIST)

A detailed analysis is shown in Appendix A where the following aspects are compared for the four programmes:

- Objectives
- The purpose for the scheme
- Clusters supported
- Application process
- Selection and approval process
- Funding formulas used
- Types of research supported
- Project costs supported

The following are notable aspects emerging from the benchmarking:

- The importance of government-industry-university collaboration as an economic catalyst.
- The support of national priorities and challenges via high level human resource development
- The value of self-organising consortia to address human capacity building and joint research and development.
- The spectrum of shared co-funding stretches from rules based (targeting and incentivising) to open (voluntary contribution), where the partners make an offer on how much they contribute. In most cases the voluntary contribution results in higher industry:government contribution ratios.
- Responsible evaluation processes guide all approaches.
- Electronic administration support systems are used.
- A wide spectrum of cost components are covered depending on the requirement.
- Government agencies with similar mandates manage the joint industry-government-university grant programmes.
- Two predominant approaches are used: supporting projects in academic environments and/or creating specialised centres for cooperative research.

Highlights from benchmarking

The following are notable aspects emerging from the benchmarking:

- The importance of government-industry-university collaboration as an economic catalyst.
- The support of national priorities and challenges via high level human resource development
- The value of self-organising consortia to address human capacity building and joint research and development.

- The spectrum of shared co-funding stretches from rules based (targeting and incentivising) to open (voluntary contribution), where the partners make an offer on how much they contribute. In most cases the voluntary contribution results in higher industry:government contribution ratios.
- Responsible evaluation processes guide all approaches.
- Electronic administration support systems are used.
- A wide spectrum of cost components are covered depending on the requirement.
- Government agencies with similar mandates manage the joint industry-government-university grant programmes
- Two predominant approaches are used: supporting projects in academic environments and creating specialised centres for cooperative research

The Problem

In understanding the scope of the problem, the analysis that follows was done on existing THRIP management data.

The scope of the decline in applications

The terms of reference stated that the study should focus on the two years of application: 2006/07 to 2008/09 financial years.

The number of applications declined as shown in Figure 2.

Between 2006 and 2007 there was a 12.3% decline in total number of applications. The number of applications dropped from 2007 to 2008 by 9.6% and from 2008 to 2009 with 12.4%. This underpins the overall decline of 30.5%. The total number of applications is made up from new applications and applications that represent a continuation of existing projects (continuing projects are reapplied for every year).

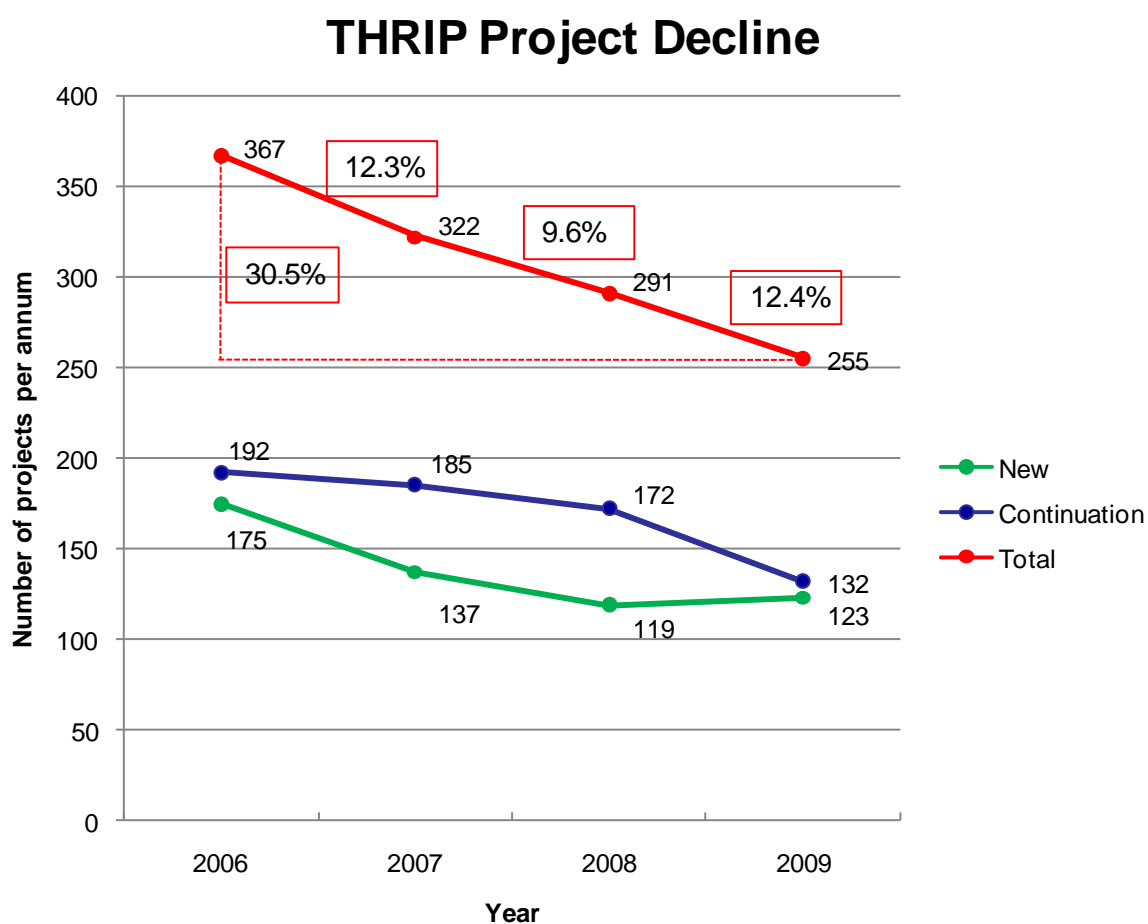


Figure 2: Decline in number of THRIP applications for 2006 to 2009

The changes in investment patterns

Figure 3 shows the changes in investment patterns over the period of investigation.

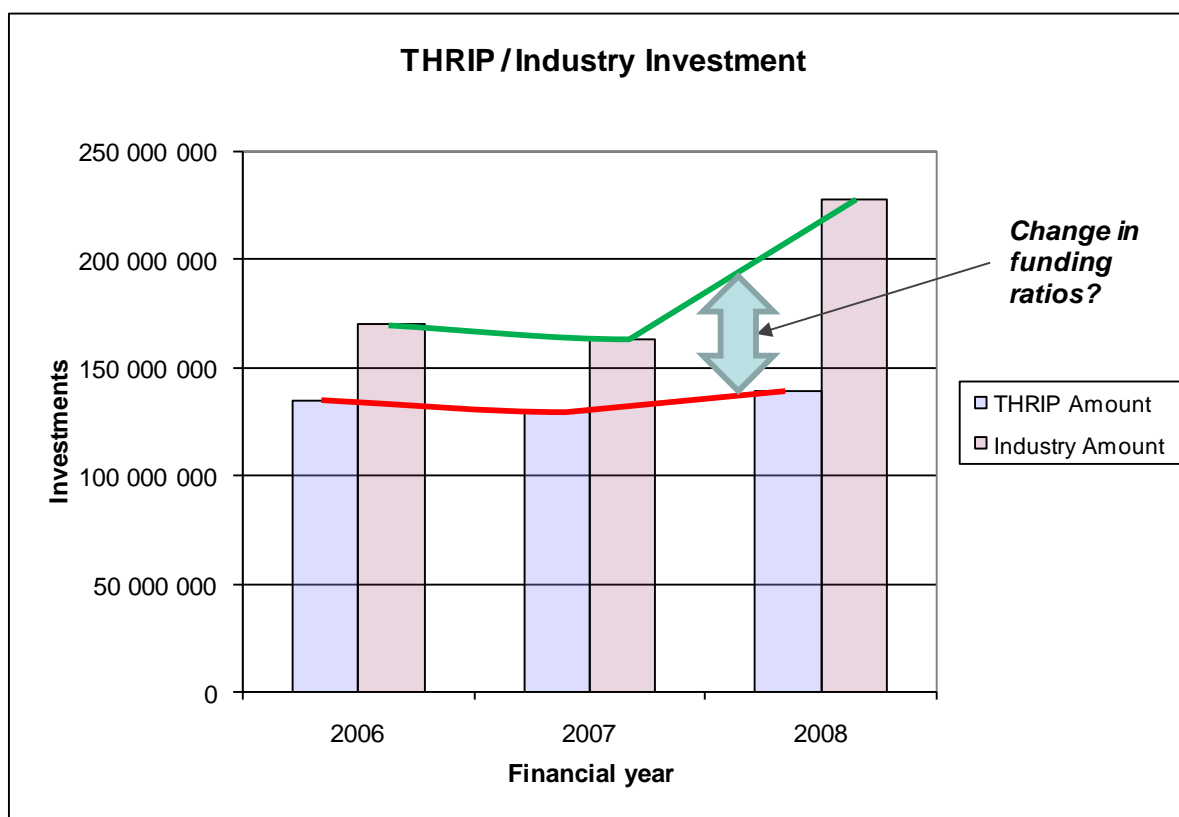


Figure 3: Changes in THRIP and Industry investments for the period 2006 to 2008

The large increase in industry contribution between 2007 and 2008 can be attributed to the change where THRIP:Large company partnership funding ratio changed from 1:2 to 1:3 in 2007.

Trends in business participation

The number of business entities involved in THRIP as partners (large companies and SMMEs) and their investments, were analysed to see the trend over the period 2006 to 2008. In Figure 4 it is clear that there is steady decline in numbers of large companies participating, and that there was first an increase in number of SMMEs participating and then a decline. The investment from SMMEs follows the pattern of participation, but the large company investment experienced a sudden increase after 2007. This could be attributed to the change in ratio of THRIP:Large Company from 1:2 to 1:3. Even though there were fewer large companies participating, the net investment from large companies increased. This relates to fewer projects funded by increased business contribution.

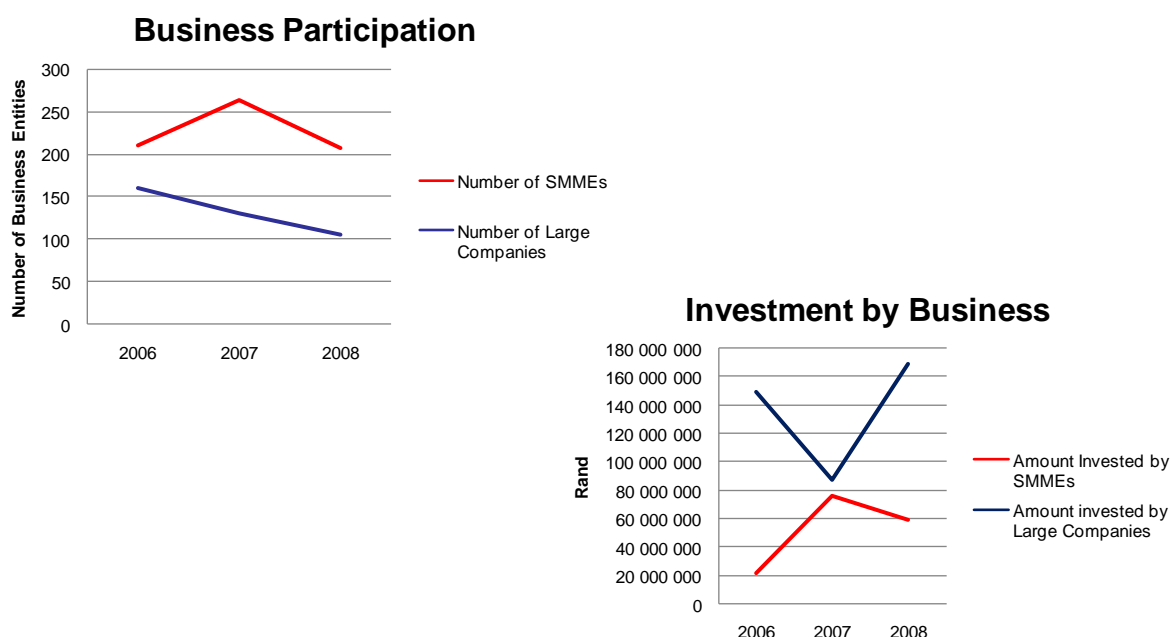


Figure 4: Investment patterns for large companies and SMMEs over the period of investigation

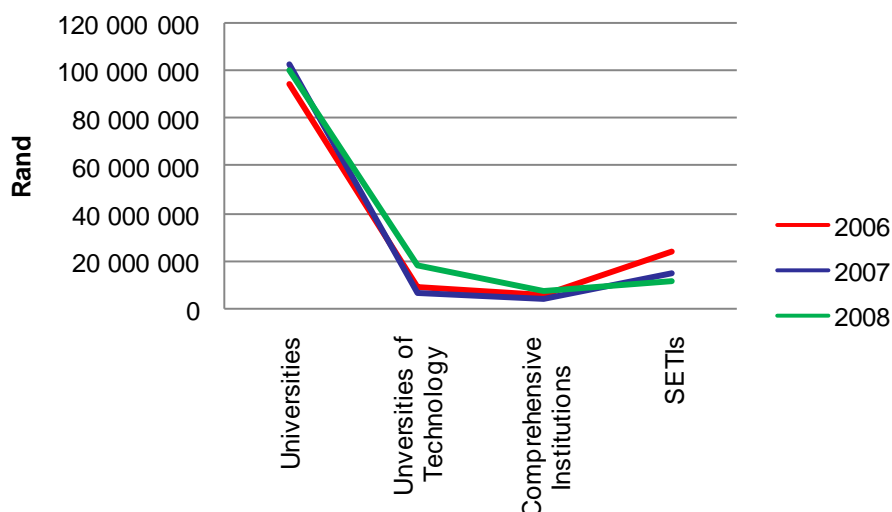
Investment environments

Figure 5 indicates the environment (universities, universities of technology, comprehensive institutions and SETIs – Science and Technology Institutions) where the investment has been made over the study period of 2006 to 2008 for the THRIP and business components respectively.

It is clear that the bulk of the investment was made in universities. This was followed by SETIs with about equal investments made at universities of technology and comprehensive institutions. If the increase in investment in 2008 is studied, the business component increased drastically for projects at universities which may be attributed to the change in ratio introduced in 2007. THRIP invested notably more at universities of technology in 2008.

Universities are thus the largest beneficiaries from the increased ratio, albeit that the number of THRIP projects have dropped.

THRIP investment Trends for Beneficiary Institutions



Business Investment Trends for Beneficiary Institutions

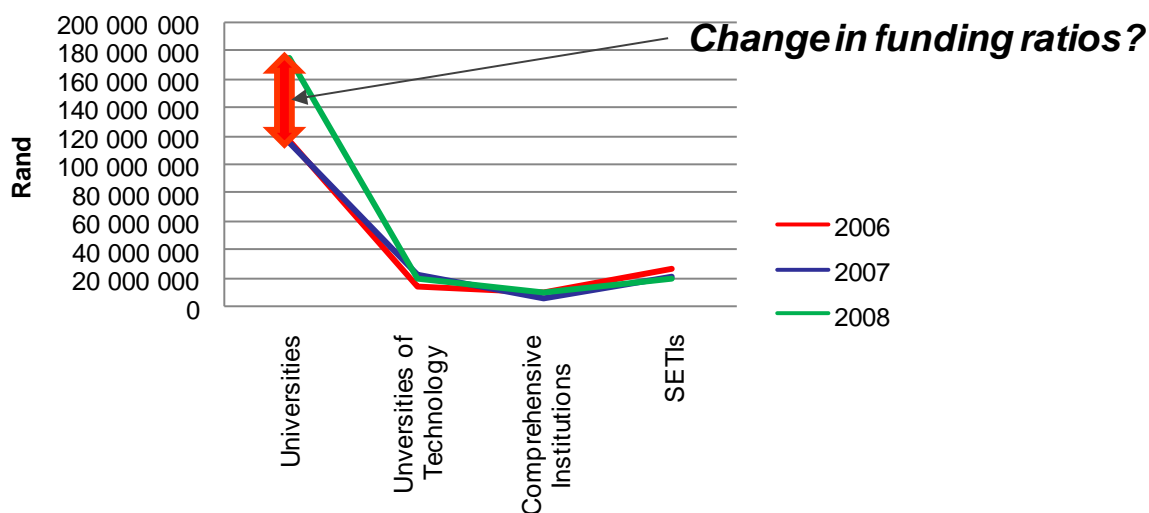


Figure 5: Investment environment over the study period for THRIP and Business investment

Leading THRIP industry sectors

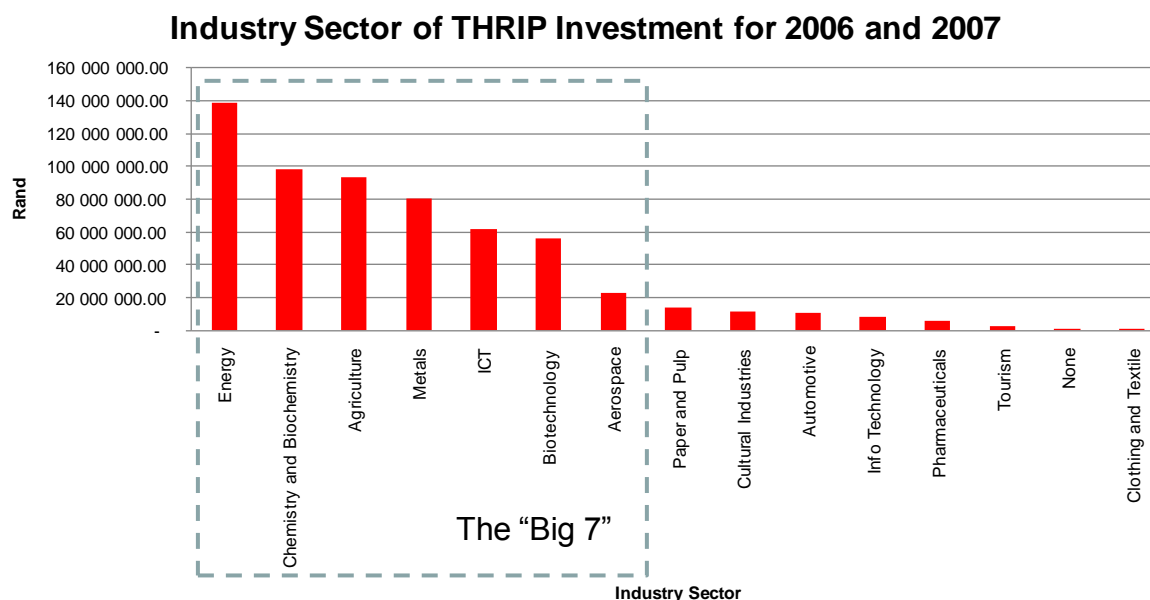


Figure 6: The industry sectors investing in THRIP

The industry sectors investing in THRIP as industrial partners are shown in Figure 6. The top seven or “Big 7” are shown in the box. This view is later compared with the view survey respondents had on where THRIP activity would be most beneficial in industry.

Note: The data used is from past annual reports. Some projects do not fall in any of the dti categories (shown by sector indicated “none” in the figure). The selection of the dti growth sector was different in 2006 and 2007, and that is the reason why “Information Technology” and ICT both appear in the figure. Information Technology existed as a choice in 2006 but only ICT existed in 2007.

If the investments for 2006 and 2007 are split over the sectoral analysis, the view as shown in Figure 7 emerges. Investments declined in energy, agriculture and aerospace, whilst they increased in metals and ICT and remained the same in chemistry and biochemistry and biotechnology (considering only the “Big 7”).

Declines were also noticed in the cultural industries and automotive sectors.

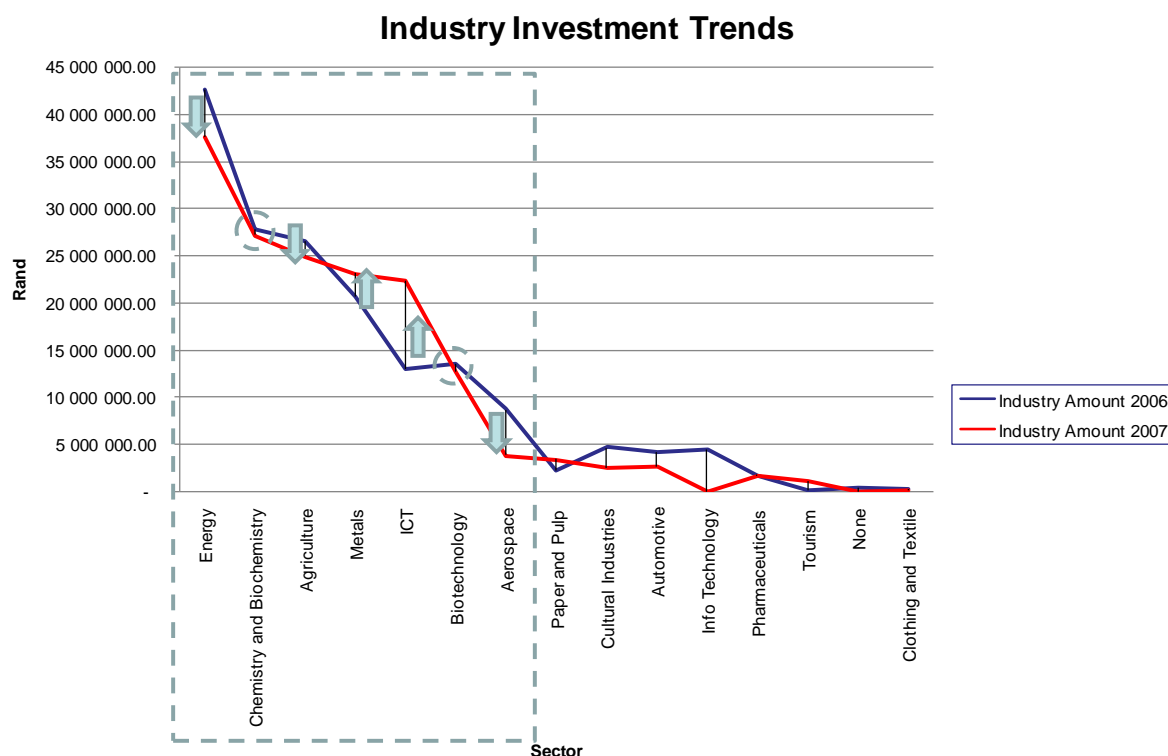


Figure 7: Industry investment behaviour in the sectors for 2006 and 2007

THRIP outputs

The THRIP outputs were analysed in terms of publications, products and artefacts and patents for the period under investigation.

In viewing this data, one has to take note of the fact that there is often a lag in outputs from a specific year of investment. Industry partners often feel the publication of results must be held back until the knowledge has been exploited internally or a patent has been registered.

Figure 8 shows the output behaviour for publications, products and artefacts and patents as reported by grant holders. The large difference in numbers between publications and patents and products/artefacts shows that the academic sector is still driven by the need to publish. This is strongly influenced by the subsidy system in universities. Very little attention is given to patenting and product/solution development.

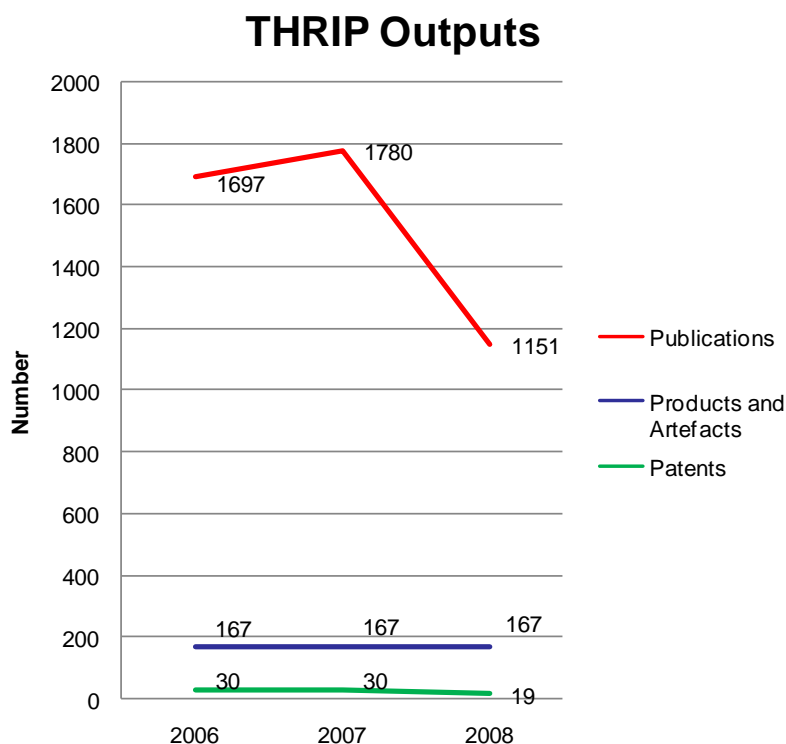


Figure 8: THRIP output behaviour for the period under investigation

The Web Survey

A web survey was conducted among a broad base of THRIP stakeholders. The stakeholders were prompted by email to look at the web page and to respond. It was estimated that there were about 250 active projects. Normally with a web based survey, a response rate of 30% of the targeted population is considered as good. The geographical distribution of people viewing the survey is shown in Figure 9.



⇔ distance in which individuals are clustered

Dot sizes: ● = 1,000+ ● = 100 - 999 ● = 10 - 99 ● = 1 - 9 visits

Figure 9: Geographical distribution of people viewing the THRIP web survey

In total 431 visitors viewed the web site. The database was populated by 100 respondents. This provides a response rate of 40% of the targeted audience.

The questions were presented in the main categories of:

- Personal details
- Sector of activity
- THRIP impact
- THRIP Ratios
- External influences on THRIP
- THRIP and business
- THRIP and academia
- THRIP competitive positioning
- THRIP grant administration
- Specific input around THRIP projects
- Opinion on reason for the decline in number of THRIP applications
- Comments and suggestions

The detailed questionnaire can be viewed in Appendix B.

Concern was expressed in the planning phase of the study about access to the internet and the use of a web-survey as the main vehicle for the study. It was decided to retain the method and to strengthen it through strong telephonic support for the questionnaire – with calls to a wide variety of stakeholders encouraging participation and ensuring access to the web site. Hard copies of the questionnaires were taken to national SMME conferences and to **the dti** awards exhibition so as to widen the spread of access. Grant holders, students and industry partners were also encouraged to participate when THRIP teams visited institutions for, among other things, technical audits. The final participation of 100 respondents was higher than the minimum of 70 that was set as a target.

The detailed feedback was captured in a database and then analysed for trends and statistics. The subsequent discussion reviews the extracted trends from the survey.

Institutions that participated

The institutions that participated and the number of respondents per institution are shown in Figure 10.

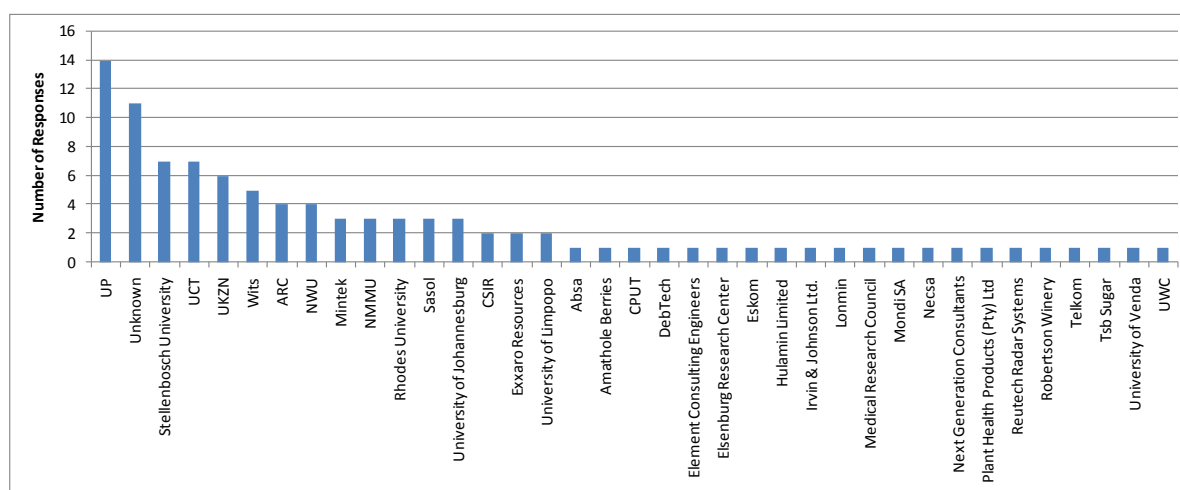


Figure 10: Institutions that participated and number of respondents per institution

The “unknown” category records the views of those respondents that took the option of answering anonymously.

Only one university of technology responded and only one respondent for that university of technology provided input. A high number of industrial partners responded.

Institutional responses

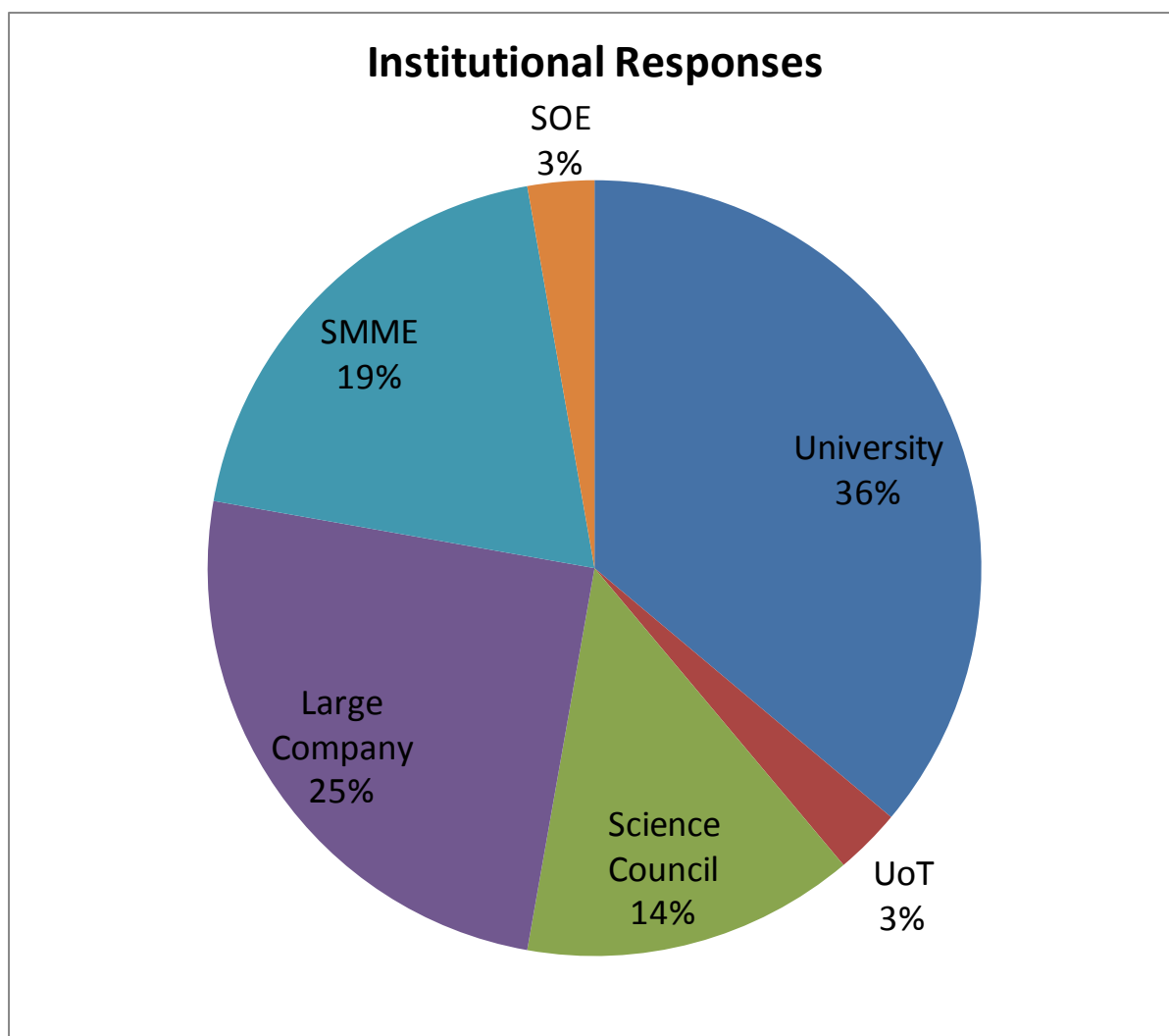


Figure 11: Breakdown of institution types that responded

The respondent institutions were analysed in terms of their type and size, showing the distribution in participation in Figure 11. A balanced distribution between academic and industry responses were received. The spread between large industry and SMMEs is also well balanced. A low number of respondents originated from State-owned Enterprises (SOE) and Universities of Technology (UoT).

Responses per activity sector

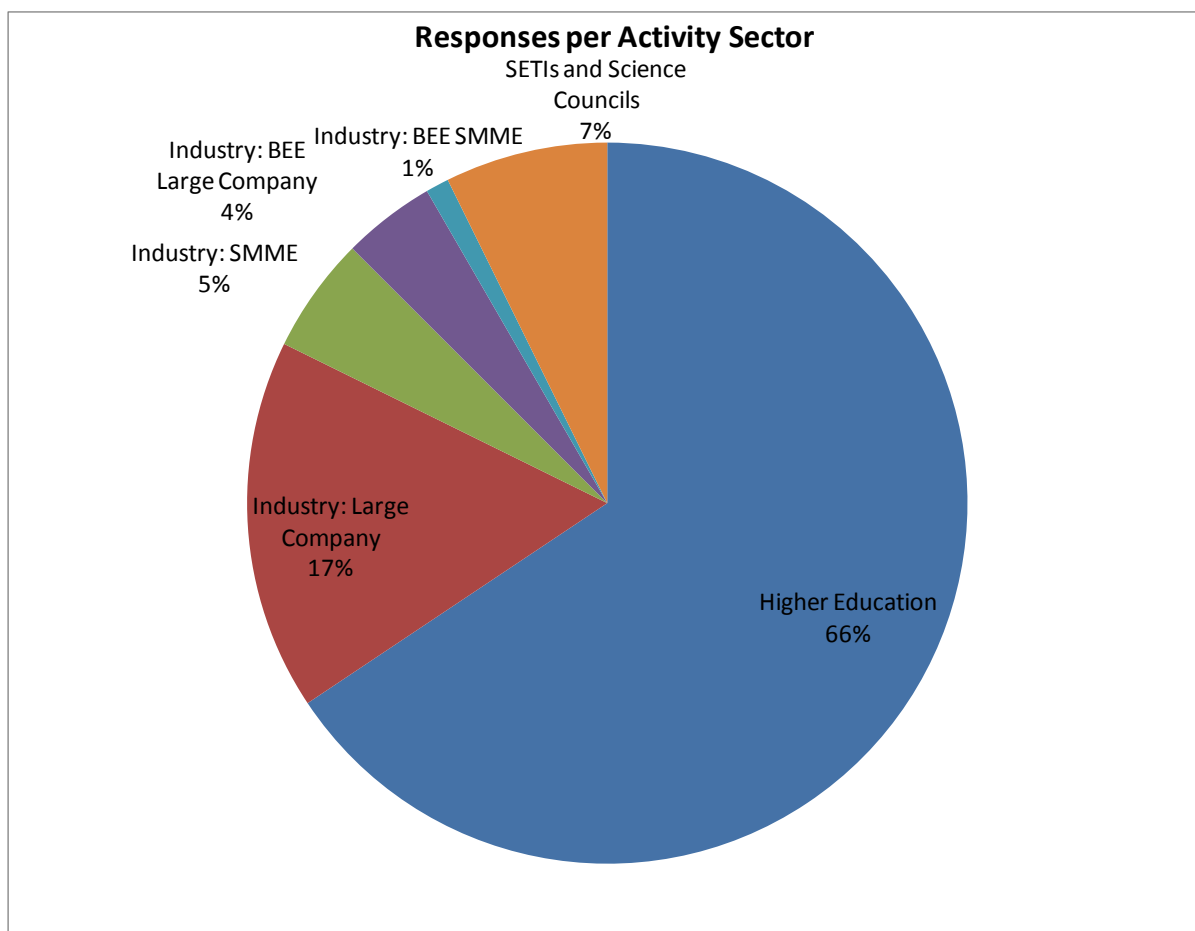


Figure 12: Respondent activity sector

The distribution per activity sector for individual respondents as indicated by respondents is shown in Figure 12 (SETIs are Science, Engineering and Technology Institutions).

By far the most individual responses came from the academic sector, followed by large companies.

Role in THRIP

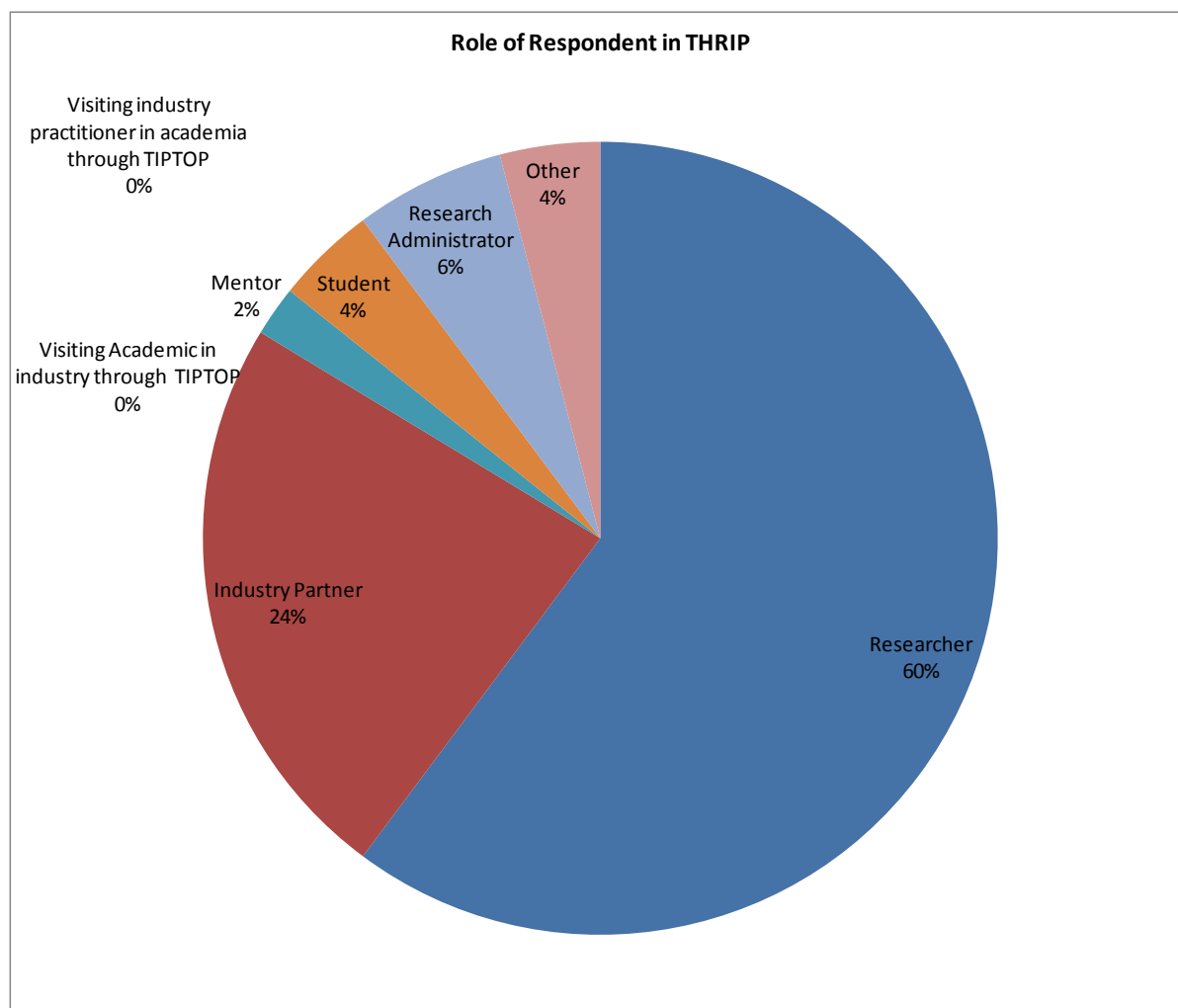


Figure 13: *The role of the respondent in THRIP*

Most of the respondents were researchers on THRIP projects, followed by industry partners as indicated in Figure 13. Very few students responded. A small group of research administrators responded.

Project status of respondents

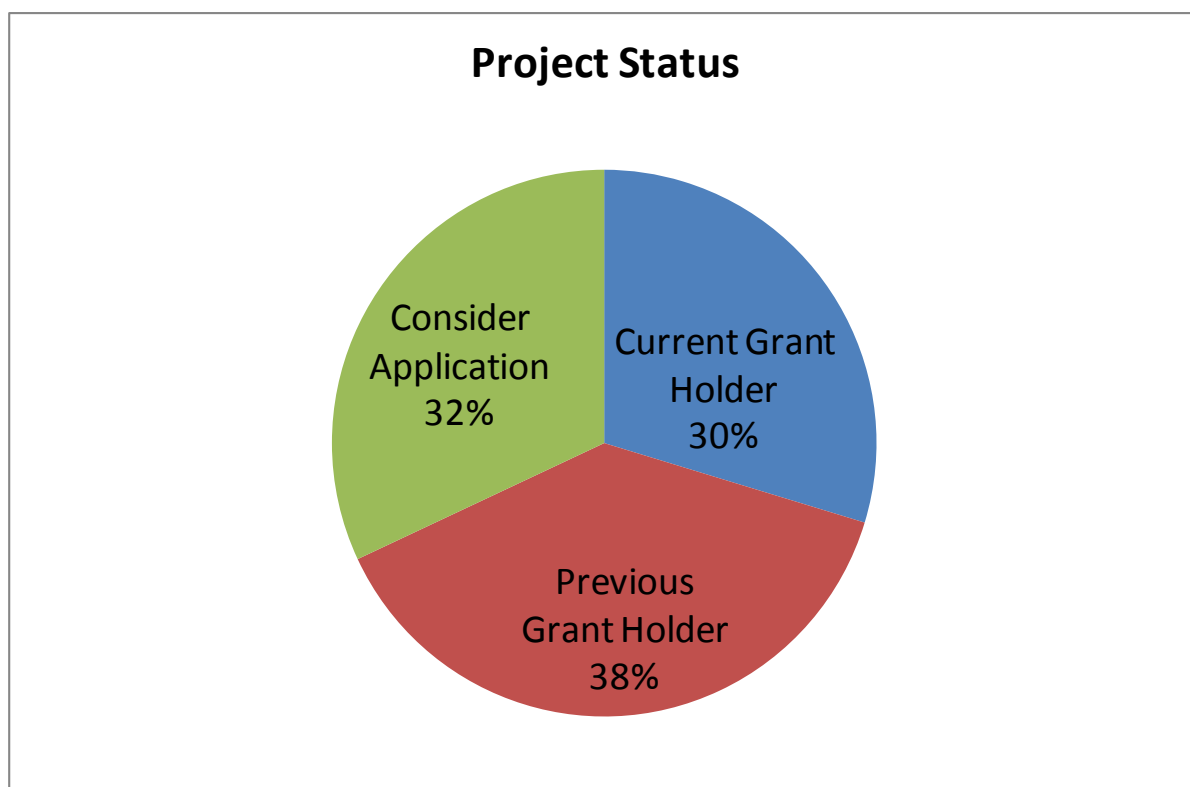


Figure 14: *Project status of respondent base*

Figure 14 indicates that there was an almost equal division in those respondents that were previous grant holders, those that are current grant holders and those that consider application for a THRIP grant.

Feedback on the project status was further refined as shown in Figure 15.

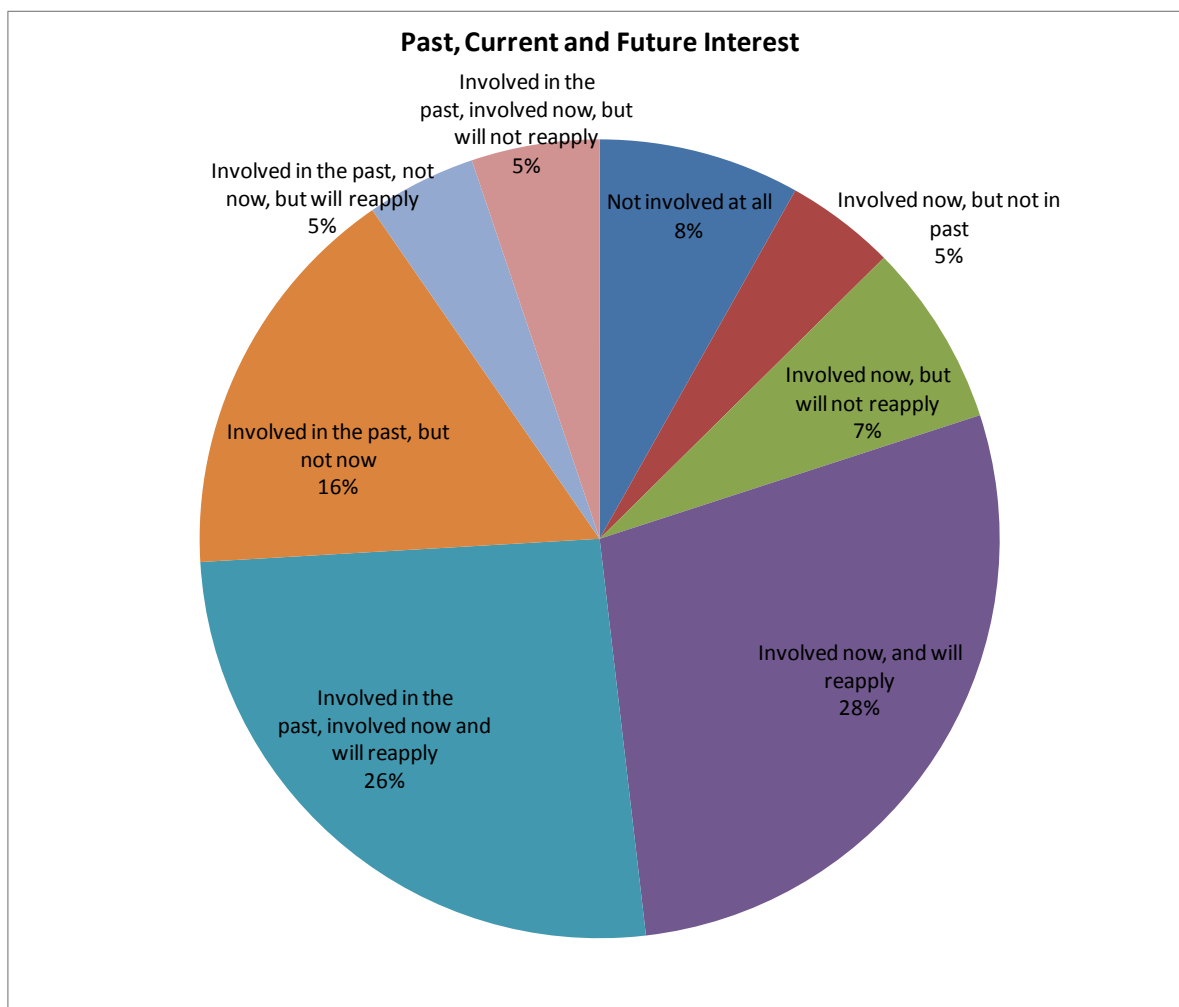


Figure 15: Refinement of project status

In Figure 15 it is shown that most respondents are involved in THRIP currently and will apply again. Second is the group that were involved in the past, that are still involved now and that have an interest in reapplying. These two sections make up 54% of the respondents. Only 16% were involved in the past, but not currently. Those that indicated that they will not reapply for THRIP projects make up 12% of the respondent base.

Exposure to THRIP

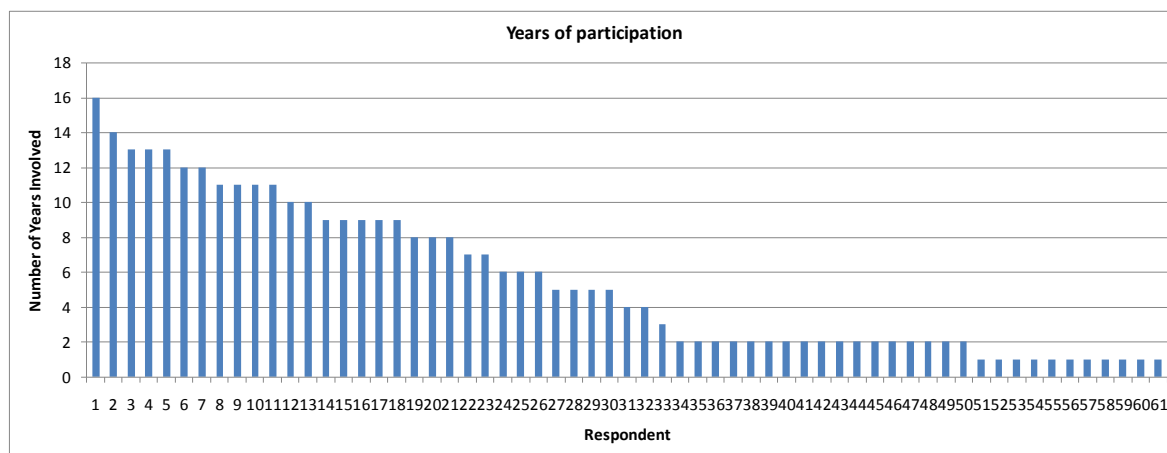


Figure 16: Number of years respondents were involved in THRIP

The number of years that respondents were involved with THRIP was measured and is shown in Figure 16. About half of the respondents were involved for two years or less. The average is 5.5 years.

The rest varies from 16 years (the longest) to 3 years. The number of respondents per involvement period is shown in Figure 17. Most were involved for 2 years or 1 year.

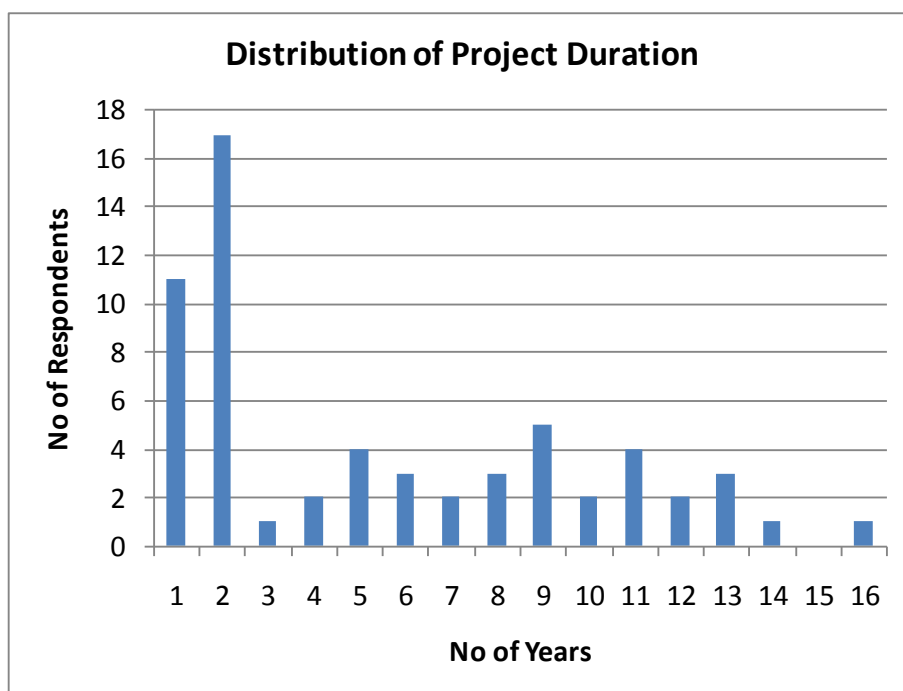


Figure 17: The number of respondents per involvement period

THRIP Impact

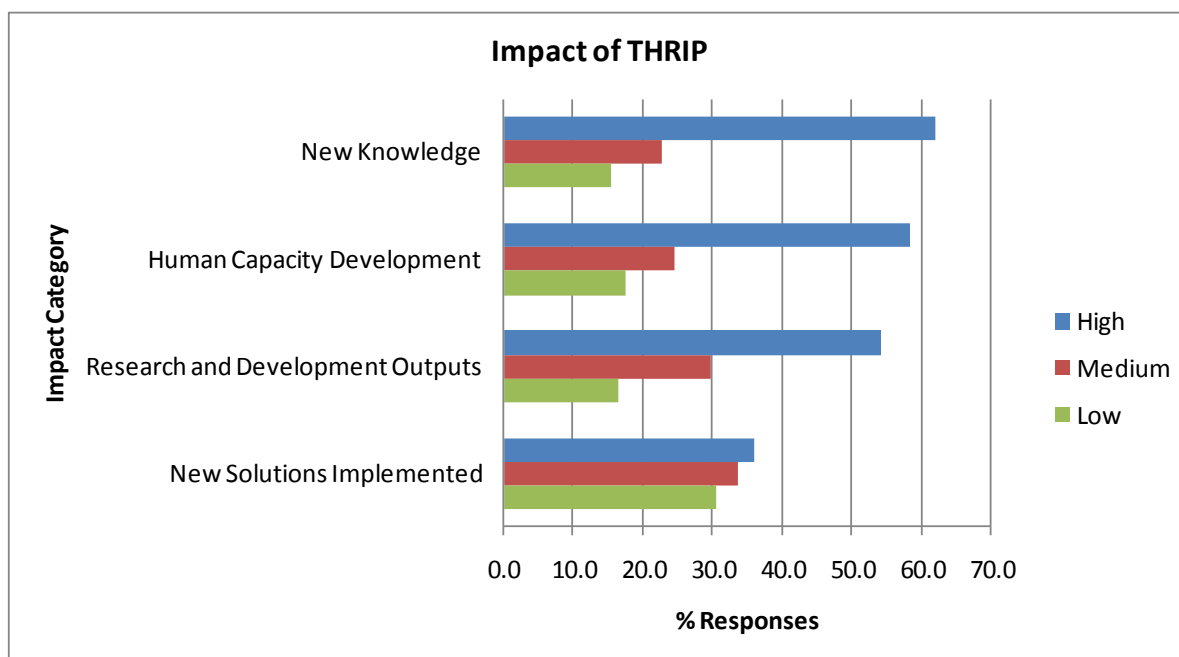


Figure 18: Impact of THRIP in terms of its contribution

Figure 18 shows the responses to the question on what level of impact THRIP has had on the respondent's own environment in terms of new knowledge, human capacity development, R&D outputs and new solutions implemented.

New knowledge and human capacity development are seen as the main impact spheres of THRIP. This is consistent with the mandate of THRIP. Research and development outputs are much stronger than new solutions that were implemented. The level of impact is seen as predominantly high for the first three areas, but there was less certainty on the strength of impact regarding new solutions.

THRIP is not a solution or artefact output programme and the emerging view presented in Figure 18 is in line with the mandate and meaning of the existing programme.

Partnership ratios

The changing of the THRIP:Large company investment ratio in 2007 caused controversy and the preferred ratio by the THRIP stakeholder community was tested. In the web survey a table was presented with the current official ratios and the respondents were asked to toggle the ratios to their preferred state.

Table 1: Current and preferred THRIP:Industry Partner Investment Ratios

INDUSTRY PARTNER (S)	THRIP CONTRIBUTION		LARGE INDUSTRY CONTRIBUTION		SMALL & MEDIUM ENTERPRISE CONTRIBUTION	
	Now	Preferred	Now	Preferred	Now	Preferred
	(R)	(R)	(R)	(R)		
Large company(ies) only	1	1	3	2	N/A	
Large company(ies) plus minimum of 25% by number of SMMEs (e.g. consortium with 1, 2 or 3 large companies must have at least 1 SMME partner)	1	1	2	2	5 % of highest contribution	4
All SMMEs	1	1	N/A		1	1
All SMMEs and all BEE	2	2	N/A		1	1

Table 1 provides a view of the outcome of the investigations. Based on the average opinion, the only major change is to bring the THRIP:Large Company investment ration back to 1:2.

An analysis of the activity sector choices for specific ratios for the THRIP:Large Company investment is represented in Table 2.

Table 2: Preference for specific ratios per activity sector

Ratio Selected	Higher Education	Industry: Large Company	Industry: SMME	Industry: BEE Large Company	Industry: BEE SMME	SETIs and Science Councils
1:1	29	7	0	2	0	2
1:2	13	4	1	1	1	4
1:3	20	4	4	1	0	1
1:4	0	0	0	0	0	0
1:5	1	1	0	0	0	0

This preference spread is shown graphically from Figure 19 to Figure 24.

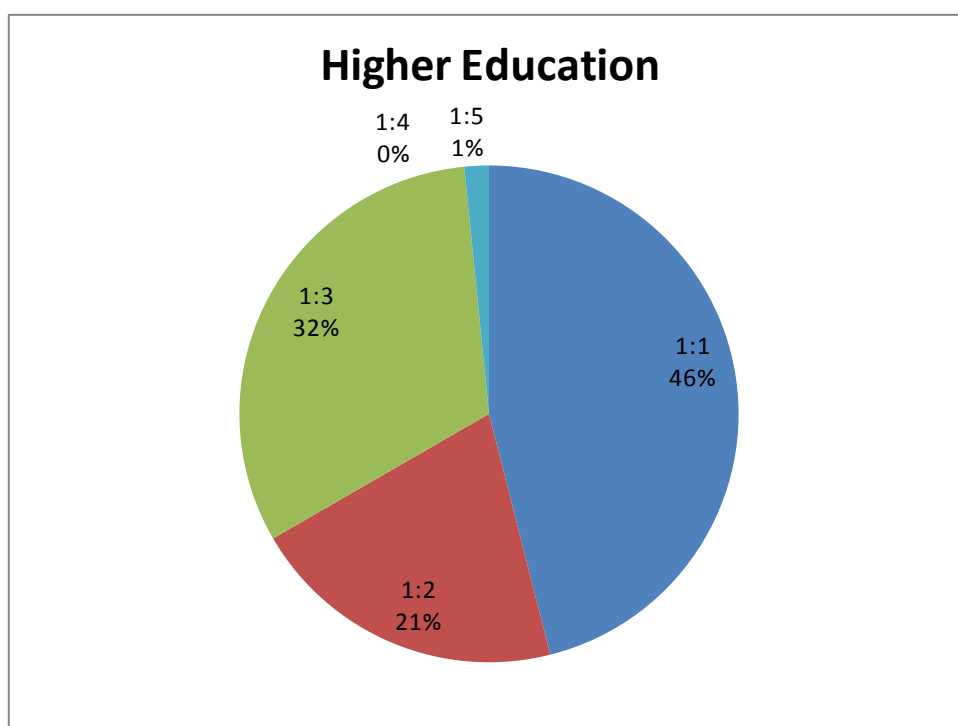


Figure 19: THRIP:Large Company Ratio Preference – Higher Education

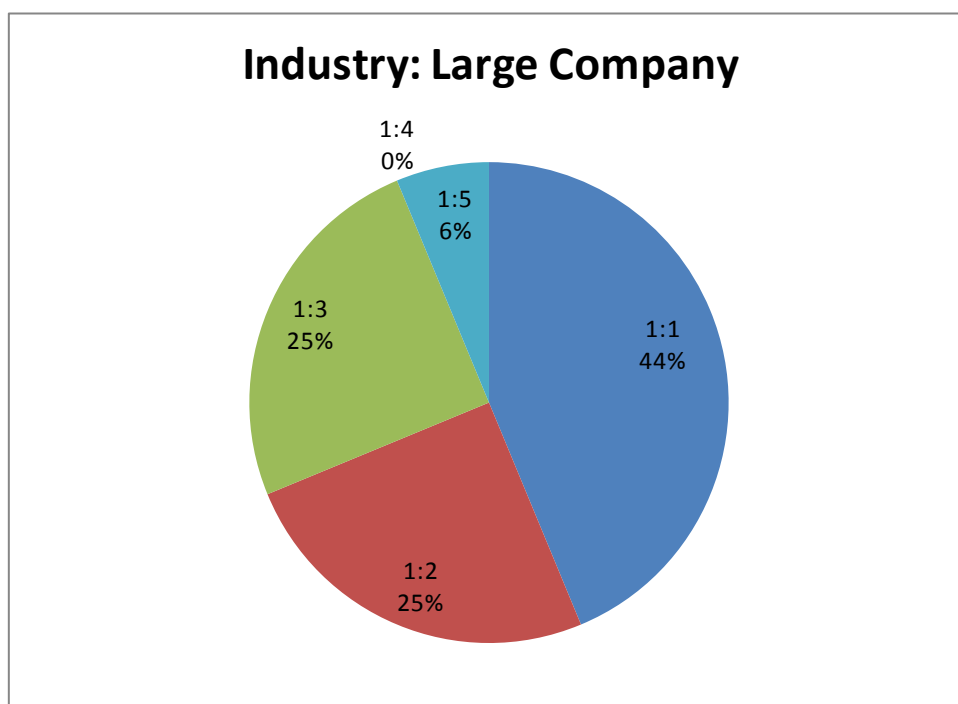


Figure 20: THRIP:Large Company Ratio Preference – Large Company

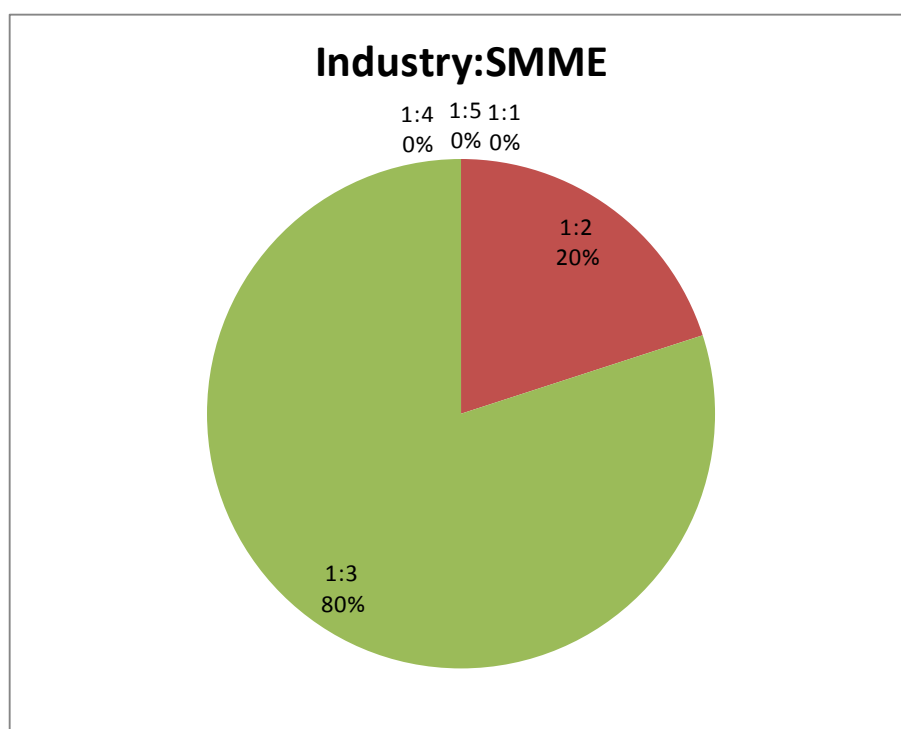


Figure 21: THRIP:Large Company Ratio Preference – SMME

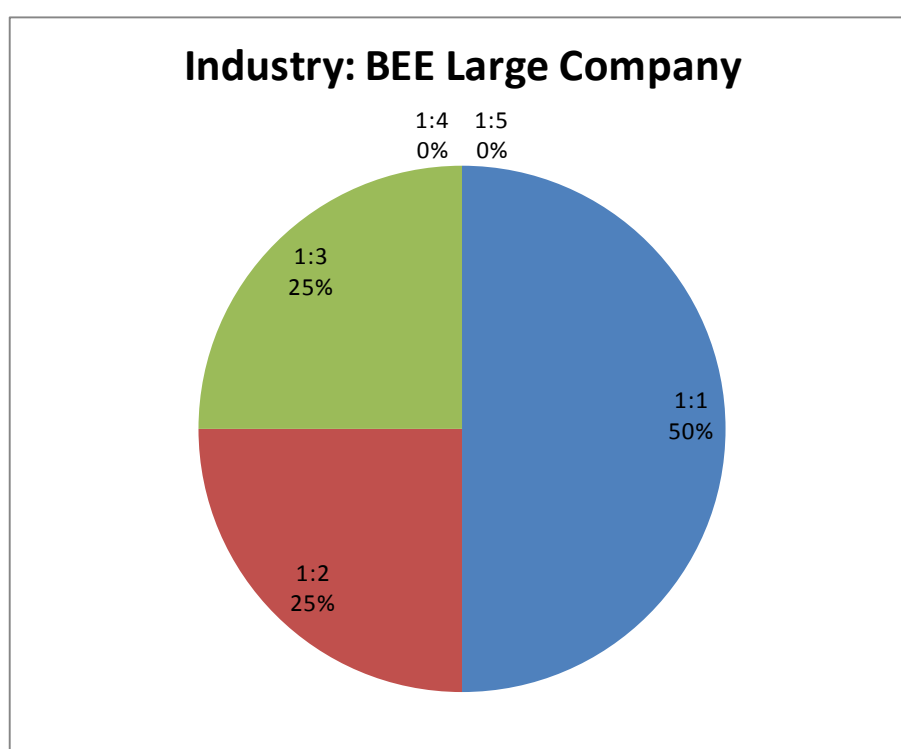


Figure 22: THRIP:Large Company Ratio Preference – BEE Large Company

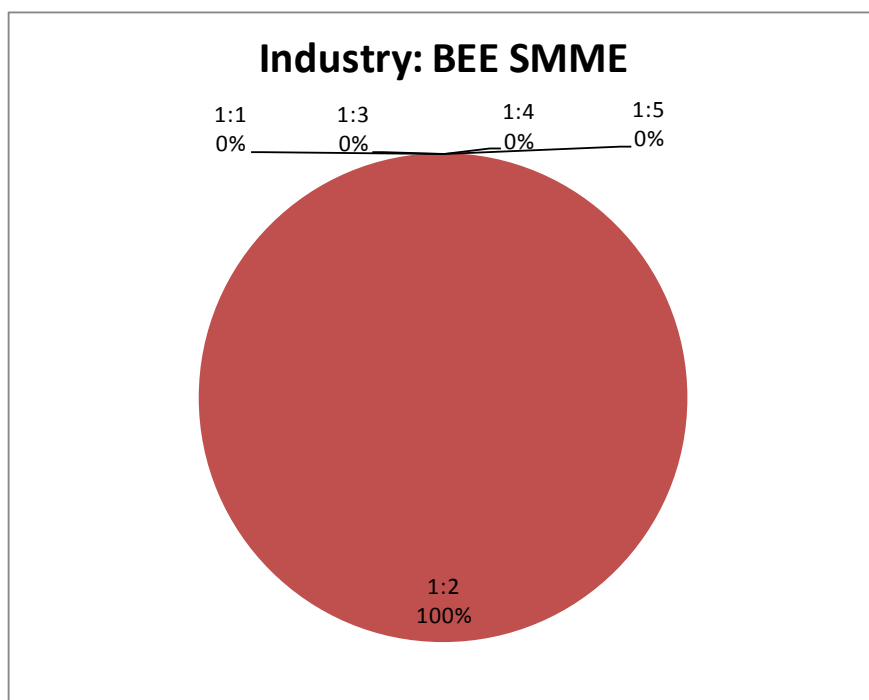


Figure 23: THRIP:Large Company Ratio Preference – BEE SMME

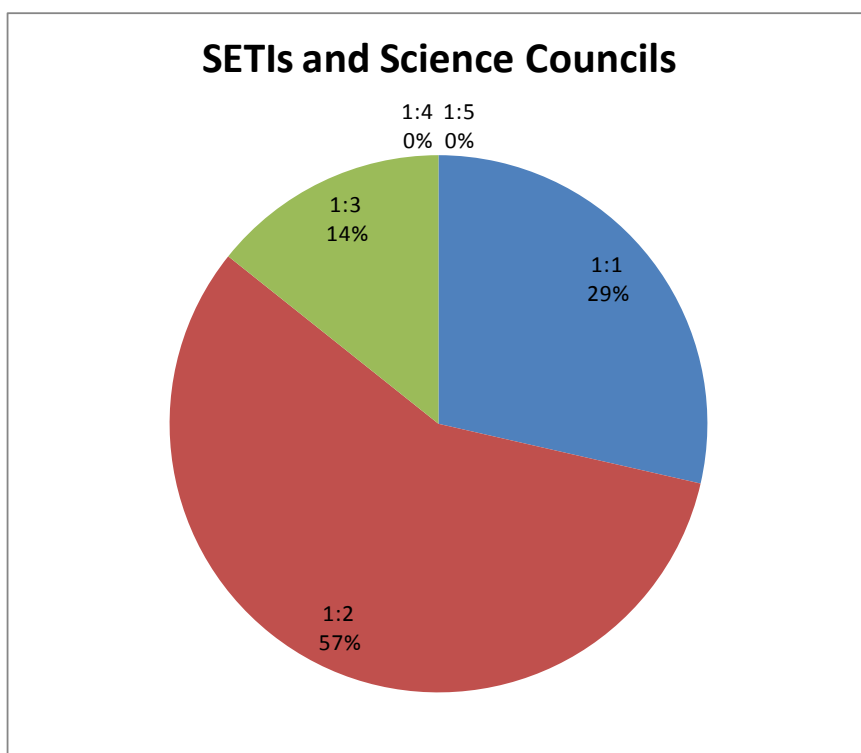


Figure 24: THRIP:Large Company Ratio Preference – SETIs and Science Councils

THRIP sensitivity to external influences

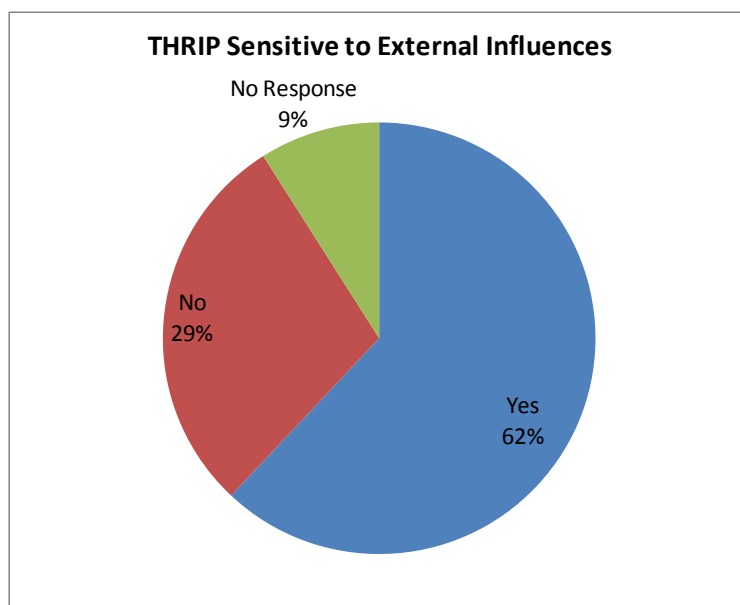


Figure 25: Opinion on whether THRIP is sensitive for external influences

The opinion on whether THRIP is sensitive to external economic and socio-political influences is shown in Figure 25. The “No Response” category is for respondents that did not consider providing information on this topic.

The type of external economic and socio-political influences that people thought THRIP was sensitive to are:

- Economic and financial crisis for 2008/9
- Energy crisis
- Fad-chasing
- Government priorities
- International funders withdrawing
- Intellectual Property (IP) Act
- Lack of research culture in industry
- Market dynamics

Critical shifts in relationships between universities and companies over the past 3 to 5 years

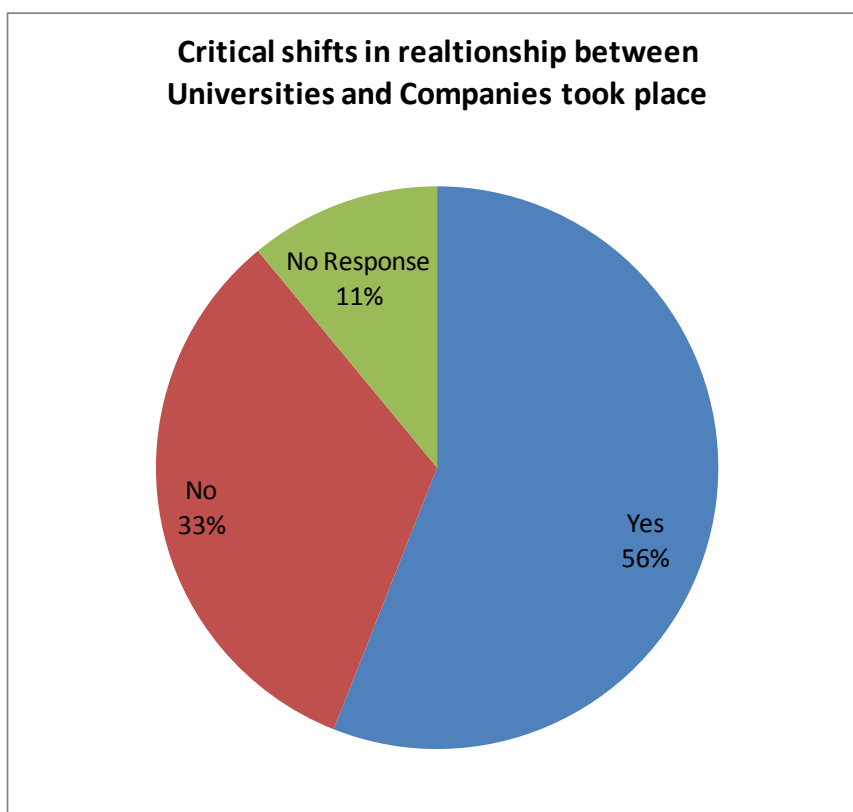


Figure 26: Opinion on whether there were critical shifts in relationships between universities and companies

In Figure 26 it is shown that the majority of respondents thought there were critical shifts in the relationship between universities and companies in the past 3 to 5 years.

These shifts included:

- The 3:1 Company:THRIP contribution ratio discourages companies to invest
- Ownership of intellectual property is unclear, following the introduction of the IP Act
- Companies want problem solving and not human capital development
- Companies do not employ human capital developed by THRIP readily and adequately
- Expectation by companies of value for investment is higher
- Expertise in companies is lacking and they turn to universities, making them more reliant on collaboration
- There is a greater appreciation for the value of THRIP additionality to industry objectives
- Industry emphasis is on immediate results, a practice that is unaligned with academic focus
- Industry is more selective in the type of collaboration
- Industry is inclined to rather invest in more consulting projects instead of long term R&D
- More R&D is moved offshore

- No effort is made to sustain the flow of information between industry and academia after a THRIP project is concluded
- A shift is experienced away from R&D only to commercialisation
- Tax rebate incentives compete with THRIP investment
- Universities are more aware of challenges facing industry
- Universities, research councils and industry communicate and collaborate more
- University mergers have put off industry to invest in THRIP

Alignment of THRIP and SMME needs

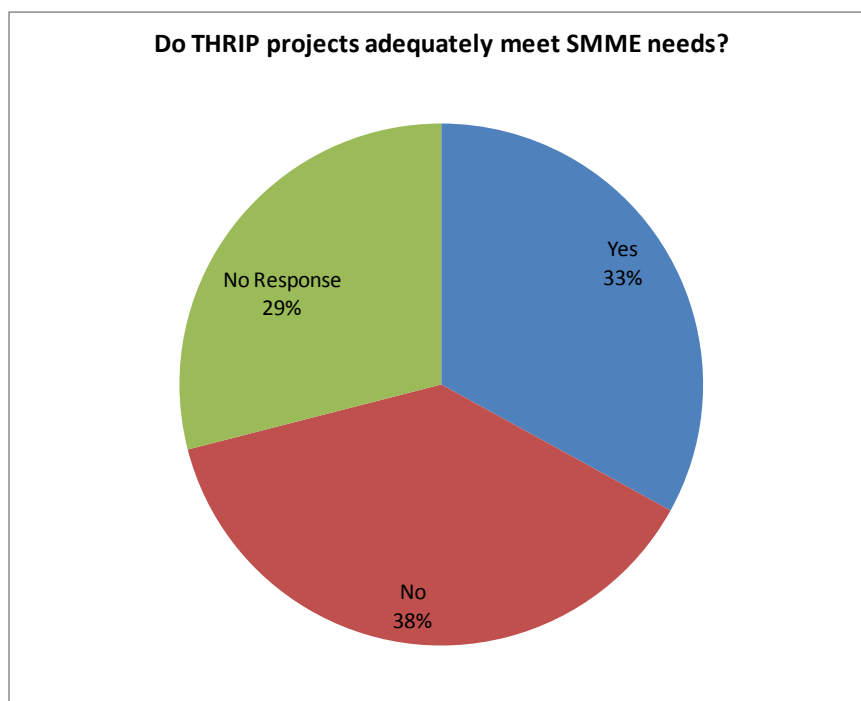


Figure 27: Response to the question: "Do THRIP projects adequately meet SMME needs?"

Divided opinion was expressed on the question whether THRIP project adequately meet SMME needs. In the list of what was perceived as specific requirements of SMMEs for THRIP funding, the following was provided (only the first two inputs were provided by SMMEs, the rest is a perception by the rest of the activity groups):

- Funds must be received more rapidly - most SMMEs do not have spare cash for research (SMME input)
- More information and communication is required; better access and distribution points of information will be welcomed; more research on future markets, opportunities and demands need to be provided by THRIP (SMME input)
- Faster project establishment is required
- Large and difficult projects should be allowed to run longer than 3 years
- Many submissions list numerous SMME partners that are not making sufficient contributions just to attract a higher funding ratio, and the SMMEs do not really benefit
- Most SMMEs do not have research expertise and this program should be there to develop research ideas at Universities, without SMMEs necessarily putting funds in, but rather time
- Most SMMEs cannot contribute financially, but are willing to contribute "in kind" by providing information and professional time free of charge
- Real R&D by larger companies with the exclusive focus to deliver something of significant commercial value, should be split from R&D initiatives to enhance SMMEs and small BEE companies

- SMME are reluctant to take risks in THRIP programmes
- SMMEs are not undertaking research as part of their business activity
- SMMEs battle to put up even 50% of the research funding
- SMMEs do not have capacity to fund extensive research but they need to have access to R&D
- SMMEs generally want very quick returns on funds made available
- SMMEs need to get a competitive edge by being agile and therefore do not have the time to wait for a thesis or research project to be completed; they are looking for cheap, reliable product developers rather than researchers
- SMMEs should be better informed on the opportunities arising from THRIP
- The real need in SMMEs is for highly trained manpower
- The requirement for a mix of SMMEs and large companies is counterproductive
- THRIP should be an easy path to obtaining high quality research for SMMEs
- THRIP was not created for SMMEs, it is successful in the large company space; a separate scheme for SMMEs is required

Alignment of THRIP and BEE needs

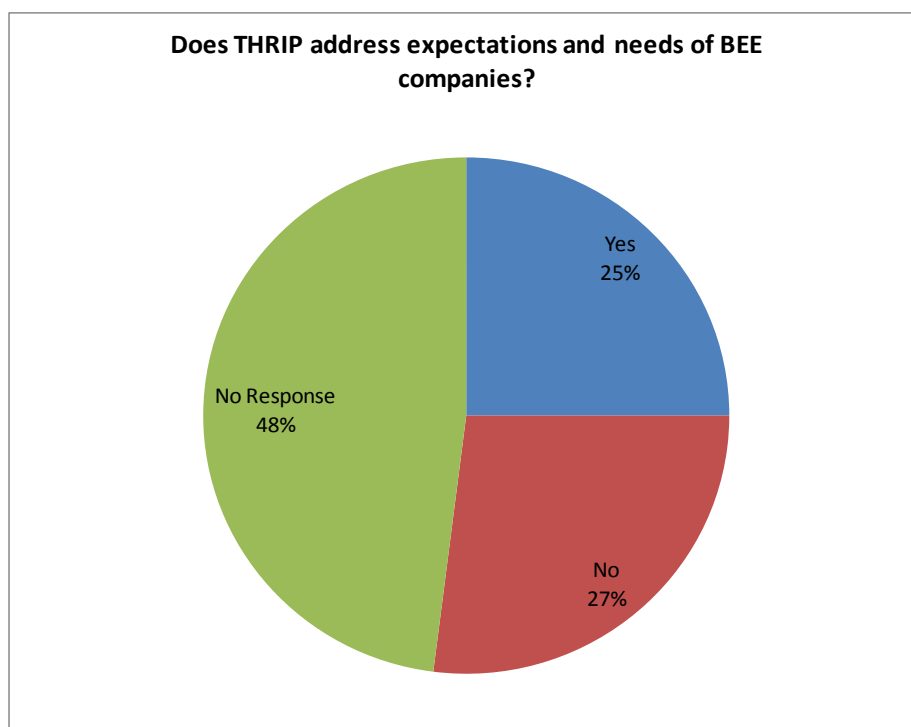


Figure 28: Response to the question: “Does THRIP address expectations and needs of BEE companies?”

Figure 28 shows the spread in opinion whether THRIP addresses BEE needs adequately. A large component of the respondents was undecided. The low participation of BEE SMMEs also makes this result speculative on the part of the activity groups that participated.

In addressing the question on what the expectations and needs from BEE companies are of THRIP, the following responses were recorded:

- A simpler application process and better guidance is required
- More rapid fund availability will be welcome
- More flexibility in time frames is required
- Good project management support must be provided
- Access to high quality research is required by BEE companies
- A larger awareness of the opportunities available via THRIP participation is required
- BEE companies have low financial reserves to spend on research, but have the ideas and creativity universities do not have
- BEE companies seldom have the opportunity to contribute to research
- BEE companies need to enter new markets and generate revenue and increase employment
- Good students, sound supervision and fast results are required
- More stimuli to innovate and incubate are required

- Skilled people are required
- THRIP needs to be more aggressive in developing black enterprises. In fact there should be special funds or the funding ratio should be such that BEE business must be supported to develop research expertise and assist them with product development, without them having to put funds but show commitment through personnel and time.

SMME benefits from participating in THRIP funded projects

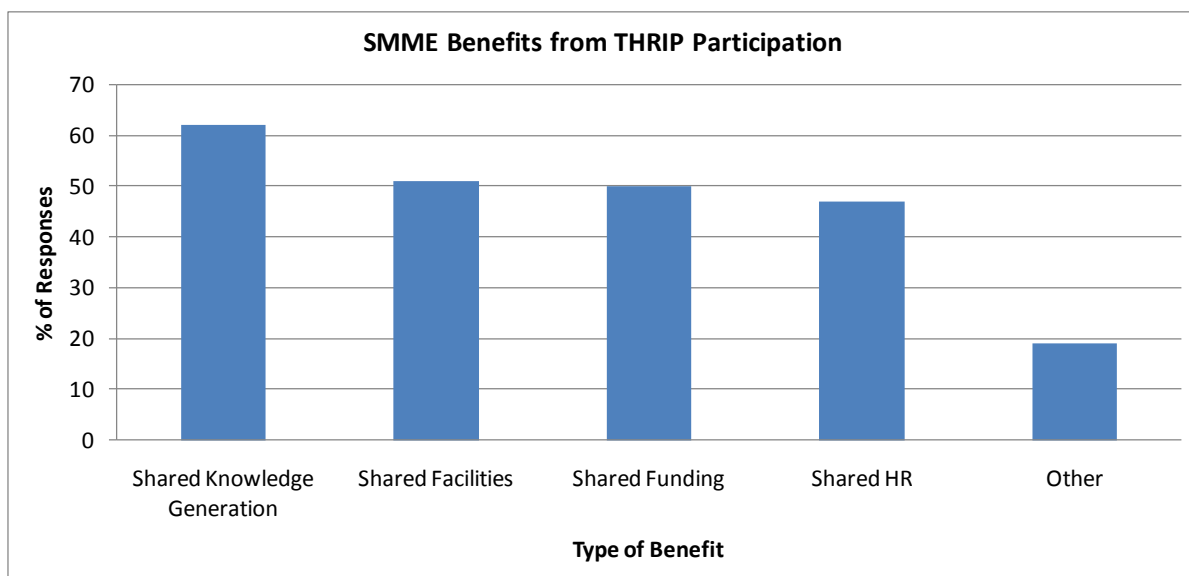


Figure 29: Importance of benefits an SMME can derive from THRIP

The responses to the question: "What are the most important benefits an SMME can get from participating in THRIP funded projects?" are given in Figure 29. Shared knowledge generation is listed as most important. This is followed by an almost equal rating for shared facilities, shared funding and shared human resources. The "other" category included benefits such as:

- Accelerated incubation and innovation
- Access to research networks
- Availability of graduates for employment
- Competitive advantage through R&D
- Ideas and social capital
- Increased income
- Investigate future technologies and make these cost-effective to implement
- New business opportunities
- Relationship building
- Strong partners to assist with commercialisation and/or marketing

Private company benefits from participating as an industry partner in THRIP projects

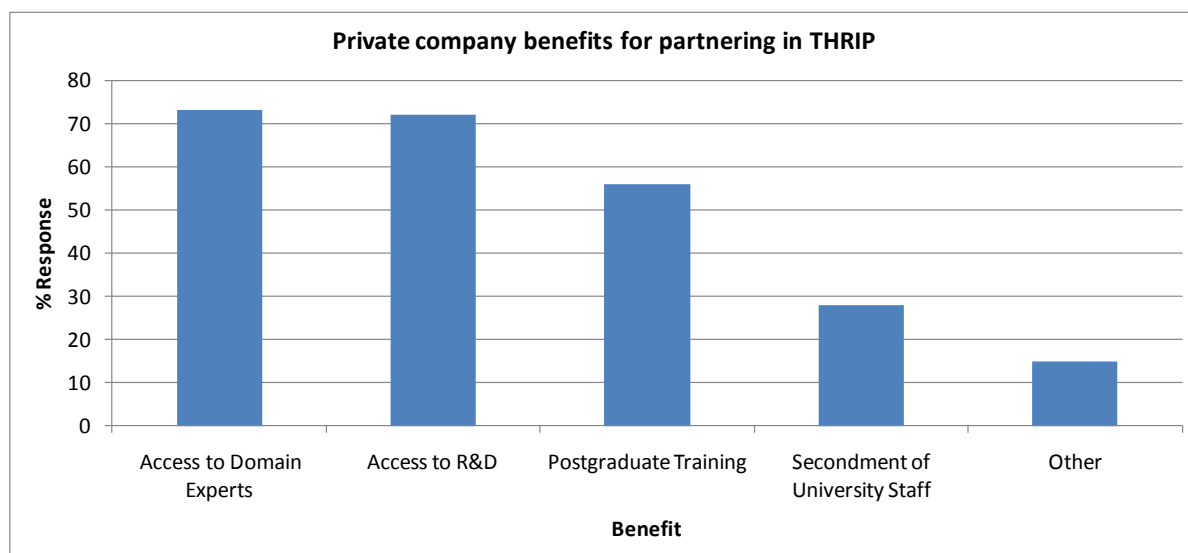


Figure 30: Importance of benefits for a private company participating in THRIP

Access to domain experts and access to R&D are the most important benefits a private company derives from participating as an industry partner in THRIP. This is followed by postgraduate training for employees and secondment of the university staff to the company (TIPTOP). Other benefits identified are:

- Access to international experts improves competitiveness
- Extended R&D capacity
- Fast track product development
- Importance of research overrules low returns
- Increased output per investment unit
- Increased turnover
- Involvement in R&D outside core areas, including social and government interest
- Leveraging funding by working on co-funded programmes
- Long term, low cost researcher involvement
- Risk reduction in introducing new technology

Business needs for sharing public funding benefits such as offered by THRIP

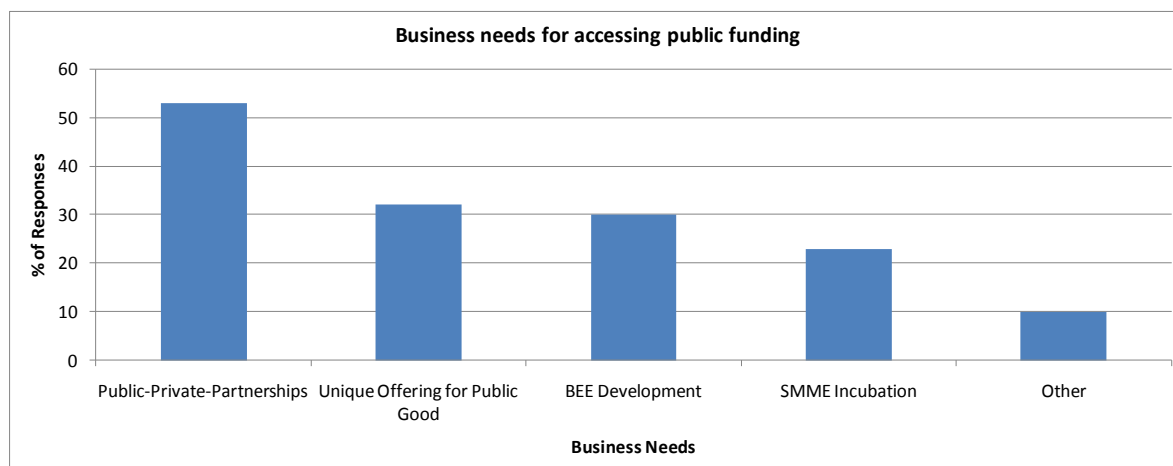


Figure 31: Business needs for accessing public funding via participation in THRIP

The importance of business needs for sharing the benefits of private funding such as provided by THRIP are shown in Figure 31. The advantage of participating in public-private-partnerships (PPPs) is followed by the ability to make unique offerings for public good, the potential of BEE development and SMME incubation.

Other benefits that were listed include:

- The ability to get high level skilled graduates so as to make the business competitive
- The opportunity to make a cost effective evaluation of technology for potential future use
- Developing a local competitive base of expertise to compete on a global basis
- Human resources improvement
- The ability to broaden R&D scope and explore tangential avenues

Better alignment of THRIP with company-specific needs

Several issues were raised and solutions suggested to align THRIP better with company-specific needs. These are summarised in Table 3.

Table 3: Issues and solutions to better align THRIP with company-specific needs

Access to matching funding for R&D Companies like to leverage their funds and obtain value for money Timing of announcement of THRIP application results Basis of funding	Provide the right ratio to make it attractive Level of funding must properly offset the administrative costs Announce before the year end Fund projects on the basis of commercial implementability, potential revenue, job creation and socio-economic development Less administrative burden; less stringent requirements; more flexibility of use of funding Changing the national IP policy Take decisions along business principles and consider growth potential THRIP should know the market needs Technology; Human Resources; Industry
Administration and flexibility IP policy and size of contribution Decision base	 Allow business to negotiate more and be more flexible Co-fund and co-use R&D facilities
Knowing the market Refocus on what name means (Technology and Human Resources for Industry Programme) Negotiation processes	 The responsibility lies with the academics to justify business involvement Predominantly support projects that meet large company research goals, as it is only large companies that can afford to contribute major funding to research projects Work more closely with company human resource departments to enhance awareness of the THRIP model
THRIP has moved away from its initial role to boost funding and partnerships with industry and universities Negotiating business involvement	 Focus more on research requirements and less on the personnel involved The funding matrix must be as wide as possible and not restrictive
Focus on large companies	High technology, long term projects that offer a competitive advantage to an industry as a whole and not to a large commercial company in particular should be regarded separately from purely commercial product development
Awareness in industry	
Focus on research	
Broadness of funding base	
Industry vs. company level focus	

Communication	Improve web site and correspondence style
Bureaucracy	Less bureaucracy to be built into processes
Quality of THRIP project leader	The THRIP project leader must not be an academic but have industry experience.
	Project must be done in a normal project management environment. It helps if the industry partner has R&D experience.
Aggressive approach	THRIP needs to engage business more aggressively, probably through a cluster of Business/University/Black Business
Ratios	The TRIP:Industry investment ratios should be revised
Strictness of rules	Less restrictions should be present on how the funds can be applied or leveraged
Return to original idea	Align THRIP projects not only with the industry but also with THRIP prerogatives
Refocus on business principles	Marketing and communication; Access to knowledge and research; Access to specific resources/testing
Make researchers aware of industry needs	Assemble a database of company needs in order for researchers to match their field of expertise with the needs of industry
Moving the goalposts to accommodate staff capacity	Industry should be accommodated by not changing the reporting dates all the time to allow for THRIP staff to have more time to do administration
Role of SMMEs	SMMEs cannot always be found to be included in project consortia

The state of industry/university partnership formation skills in the South African market

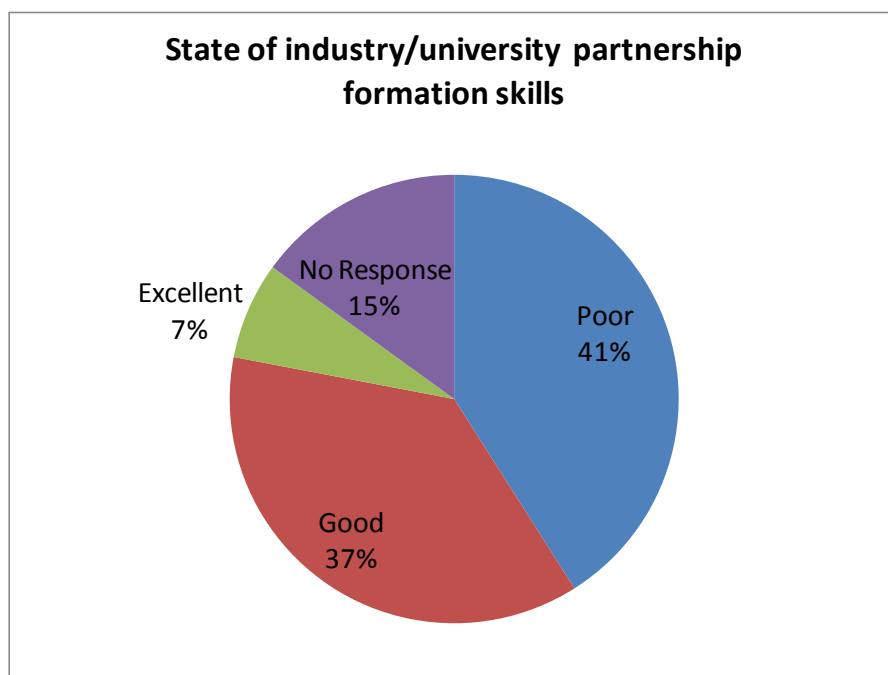


Figure 32: The state of industry/university partnership formation

The opinion on the state of industry/university partnership formation skills is shown in Figure 32. There is almost an equal split in opinion on whether it is excellent/good or poor.

Guidance and support on partnership formation is required from THRIP to move to a more positive situation where these partnerships can be formed more easily and with confidence.

Academic benefits derived from participating in THRIP

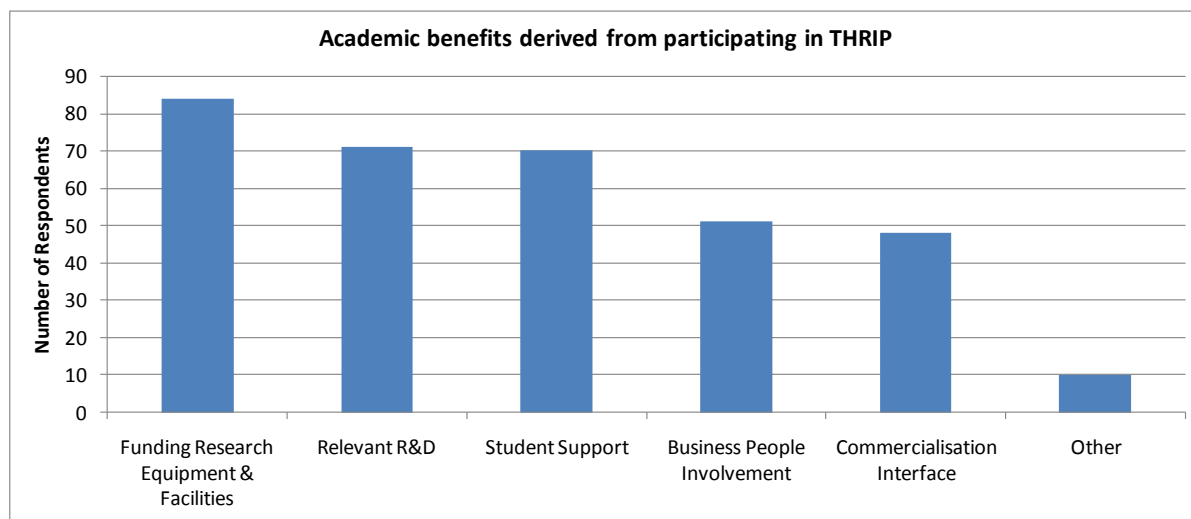


Figure 33: Rating of academic benefits derived from participating in THRIP

Figure 33 shows the rating provided by respondents on the benefits derived from participating in THRIP. Access to funding for research equipment and facilities was rated highest, followed by research into relevant business/industry issues and access to student support. The involvement of business people in university research and working close to the commercialisation interfaces were rated slightly lower. Some other benefits that were identified include:

- Allow students to work on real-life projects to prototype phase. This really broadens their experience and usually allows them to be of value quicker to their first employer.
- Awareness of both staff and students of how their expertise is applied in industry. Exposure is given to industry to the students who then often can join the companies once they complete their studies
- Encourage network building between engineers in industry and academia
- The possibility is provided to do higher risk basic research as part of additionality
- Funding is provided that is desperately needed by academics but which cannot be sourced through the usual methods
- Research is carried out beyond the immediate industry need

Gap in government funding to be addressed by THRIP

As part of probing the competitive positioning of THRIP as a government funding scheme, the question was asked: “What gap in government funding options should THRIP address?”

The following ideas emerged:

- Applied pre-competitive research of an exploratory nature
- Assist to prove that a trial concept can be successful commercially
- Create the ability to have money to pursue creative opportunities that are not available through the usual funding models
- Facilitate the training of high level, high technology human resources as needed by industry on the basis of priorities agreed by the industry and academic partners
- Focus on large companies that have R&D needs, and recognise that SMMEs do not in general have R&D needs, but rather training needs
- Fund high risk R&D, where other research funding seems to be absent
- Fund long term projects
- Fund partnerships through competitive state of the art equipment
- Fund post-graduate students to do research in a competitive (international) market
- Funding of post-graduate students in industry-related fields
- Moving from academic research to new products
- Offer subsequent sustainable job creation beyond the project research phase
- Make the funding open to all sectors and avoid pre-determined 'growth sectors' as targets
- Leverage tax incentives for industry involved in co-funding THRIP projects
- Long term strategic R&D to the benefit of the country and commercial benefit of companies
- More funding for expensive, large capital items is needed
- Move closer to venture capital and start-up funds
- Post-graduate applied research aimed on commercial issues and development of technology for future implementation
- Problem-solving orientated research, defined by South African industry needs
- Technology development and implementation
- Focus on competitive advantage to industry as a whole and not only to large commercial companies
- Make available funding for the commercialisation of the product developed in the project

The relevance of THRIP in terms of the market dynamics

To further probe the competitive positioning of THRIP, the relevance of THRIP in terms of the market dynamics was investigated. The following were stated:

- Focus on making companies more globally competitive
- This type of funding is an important driver when there is economic difficulty and industry can contribute less than normally
- Apply the funding to smooth funding decreases when markets slump and do not follow fluctuations in the economy
- The market changes faster than the THRIP application cycle allows for
- This type of funding plays a huge role in the support of small companies and the release of new products in the market leading to expansion of the company and creation of new job opportunities
- The short to medium-term market potential should be borne in mind
- The funding platform is not enabling for new industry establishment and socio-economic growth
- The THRIP model suffers under poor economic conditions
- THRIP must continuously evaluate the market needs

Project clusters for THRIP to focus on

In Figure 6 the investment focus of THRIP over the period 2006 to 2007 was given.

The respondents were asked to rate which project clusters THRIP should focus on. The outcome is shown in Figure 34.

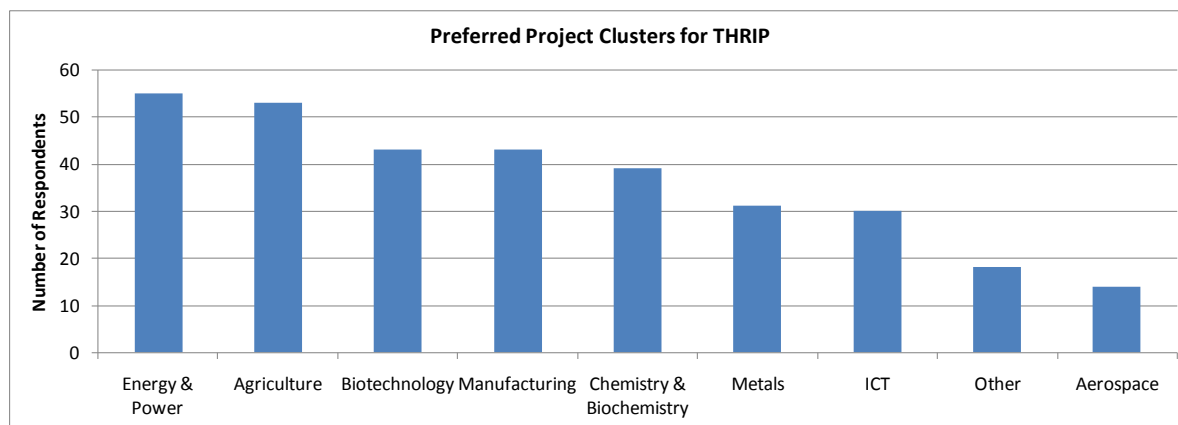


Figure 34: Project clusters THRIP should focus on

Energy is perceived to be the most important cluster, followed by agriculture, biotechnology, manufacturing, chemistry and biochemistry, metals and ICT. Aerospace is deemed the least important.

Other project clusters named were very specific and may already be included in the ones listed in Figure 34:

- Aquaculture
- Biomedical
- Business Processes & Innovation
- Engineering and the Built Environment
- Environmental management & science
- Indigenous Botanicals
- Mathematical Sciences applied to Business Problems
- Medicine
- Minerals
- Nanotechnology
- Renewable Energy
- Water Desalination

A mapping of the preferred project clusters on the existing funding trend is shown in Figure 35.

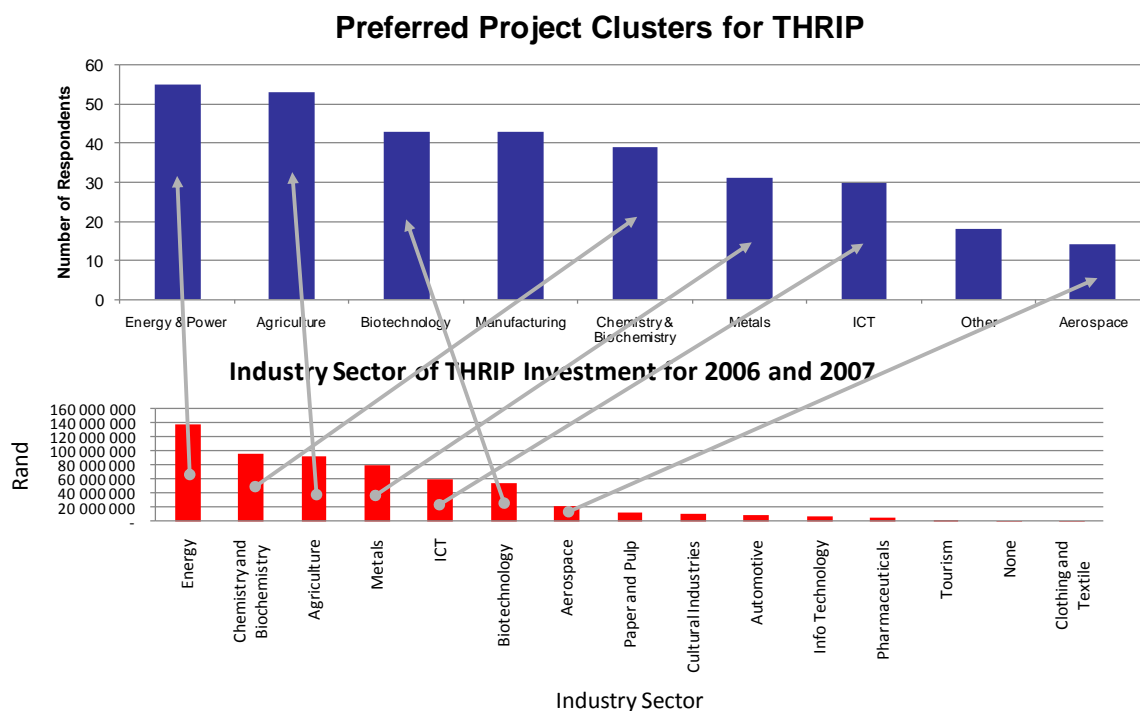


Figure 35: Comparison of cluster ranking of funded projects with preferred cluster ranking

There is consensus that energy is the most important cluster to fund. There is however a strong opinion that THRIP should not selectively target any of these clusters and that the market should dictate the importance. This is especially important since in THRIP industry should provide the guidance of where funding should be allocated for human resource and technology development.

THRIP and other competitive funding

The question: “Is there other competitive research funding that is easier to obtain than THRIP funding?” was posed to understand how access to THRIP funding featured with respect to other funding instruments. The instruments were specifically not mentioned.

The opinion distribution is shown in Figure 36.

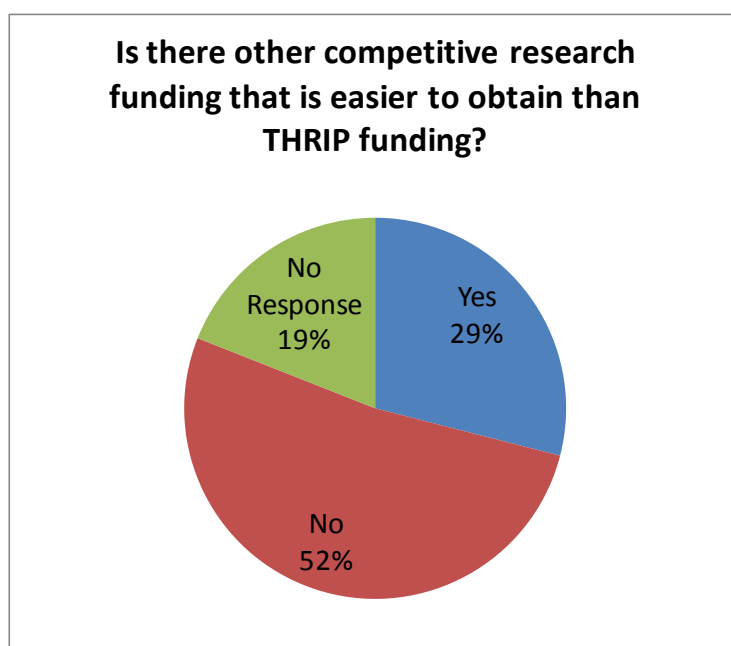


Figure 36: Opinion on other competitive funding that may be easier to obtain than THRIP

Most respondents agreed that THRIP is the easiest competitive R&D funding to obtain in its context of funding instruments. Of those that were of the opinion that easier funding mechanisms exist; the following were listed as easier to obtain than THRIP:

- Bilateral agreement funding
- BRIC
- Direct contracts with industry partners
- Direct funding from government departments
- Eskom TESP
- EU
- Innovation Fund
- International funding agencies
- MRC
- NRF
- Red Meat Research and Development Trust of South Africa
- Research tax incentive offered by SARS
- SANERI
- Water Research Commission

The relevance of the size of THRIP grants

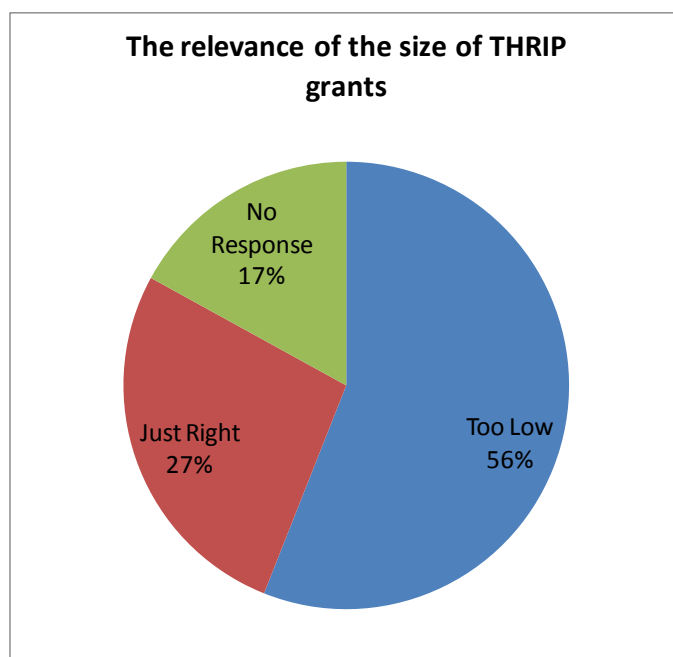


Figure 37: *Opinion on the relevance of THRIP grant size*

Most respondents thought the THRIP grant size was too low. The THRIP grant size typically varies from R 2 000 to R 5 million. The lower funding bracket reduces the impact of THRIP funding. It will be important in future to narrow the contribution to achieve maximum impact.

Cost components supported by THRIP

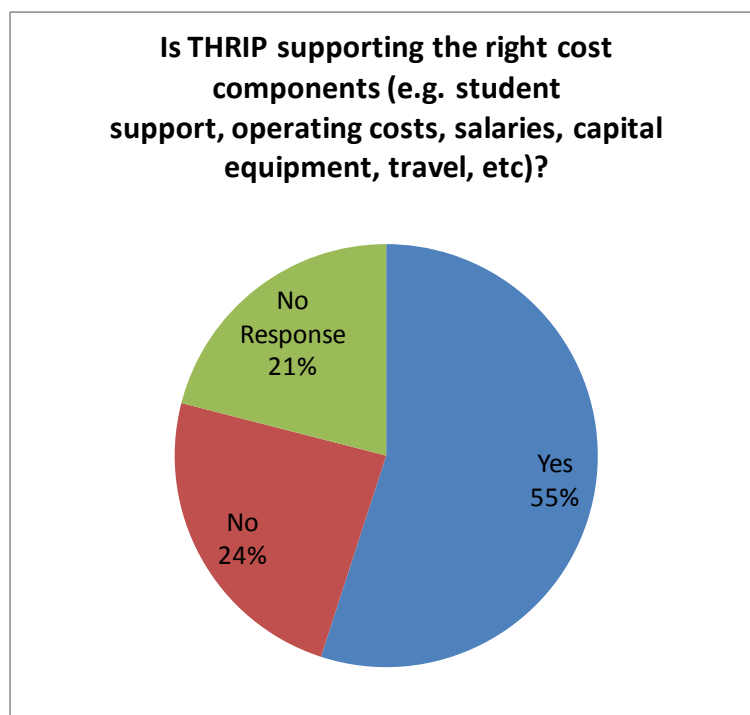


Figure 38: Relevance of THRIP supporting the right cost components

Most respondents felt that THRIP was supporting the right cost components such as student support, operating costs, salaries, capital equipment, travel, etc. In a question on what more THRIP could support the following were given:

- Analysis costs
- Conference registration and travel money for students
- Covering the administration burden it imposes
- Funding to pay specialists in the university for consultation time
- Human Capital Development
- Increase the funding per student
- Incubation, commercialisation, innovation
- Infrastructure
- In-kind contributions by companies
- International conference and travel
- Larger support for equipment
- NRF rules for the amount of THRIP funded money which can be allocated to each student for a bursary are not competitive. These amounts should be brought in line with bursaries provided by the industry.
- Operating costs and salaries
- Private sector to cover salary component
- Purchase of literature

- Researcher fees in Science Councils
- Software
- Student support
- TIPTOP should be increased

Delivery by THRIP consortia

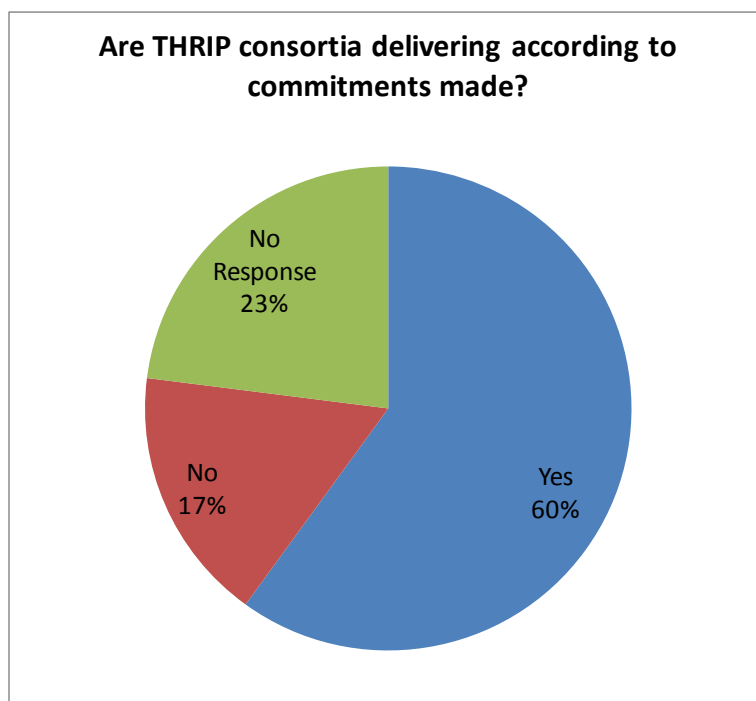


Figure 39: Opinion on the capacity for THRIP consortia to deliver according to its commitments

Figure 39 shows the opinion of the respondents on the ability of THRIP consortia to deliver according to expectation created via commitments made. The majority felt that the consortia were achieving their commitments.

THRIP grant administration

The status and quality of THRIP grant administration were tested in terms of effectiveness of the application process, the panel review process and THRIP grant management support provided by the NRF. The rating of the grant administration aspects are shown from Figure 40 to Figure 42.

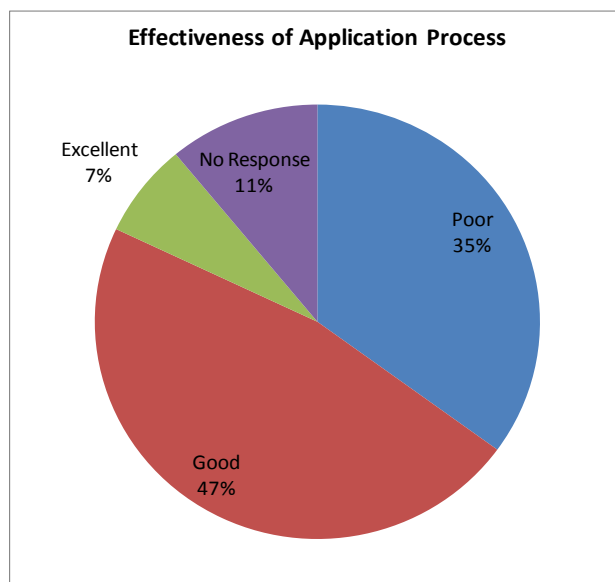


Figure 40: Effectiveness of THRIP grant application process

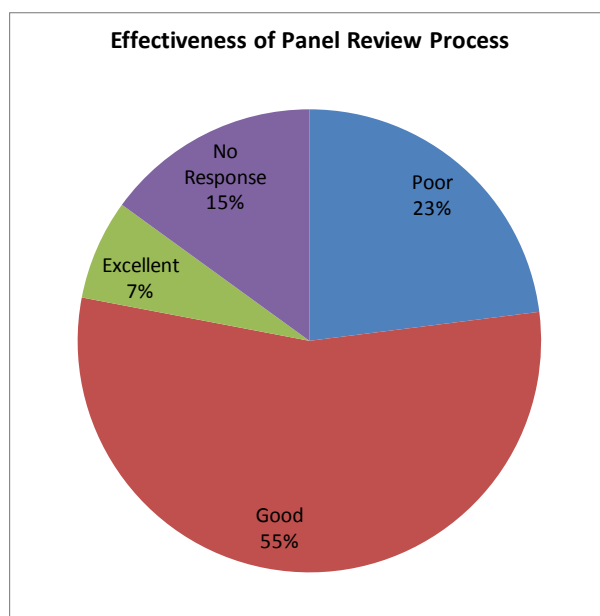


Figure 41: Effectiveness of THRIP panel review process

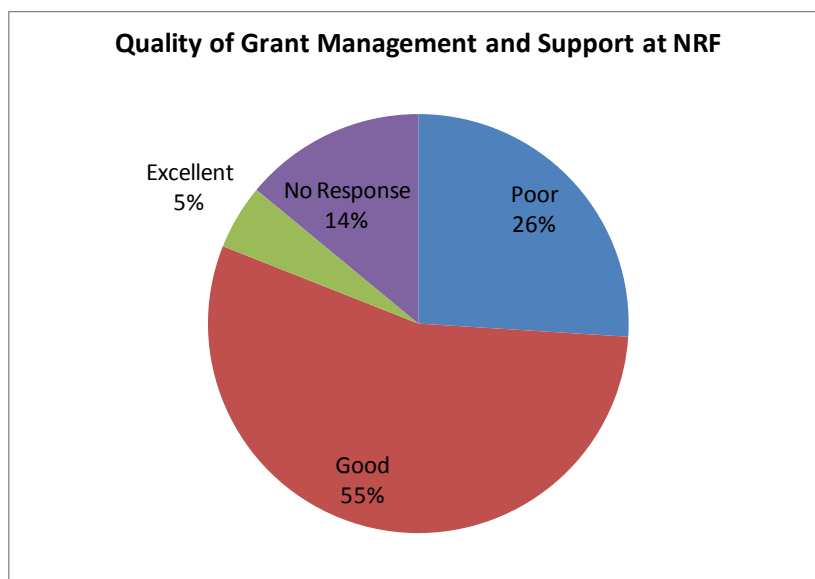


Figure 42: Effectiveness of grant management and support at the NRF

The majority of people felt that THRIP administration processes were excellent or good. The NRF as a grant management agency were given a vote of confidence in the handling of THRIP.

THRIP at the interfaces

The interfaces between THRP and academia and THRIP and industry were assessed in terms of communication, the understanding of needs, and project alignment with needs from industry and offerings from universities.

THRIP/Industry Interface

The results for the THRIP/Industry interface are shown in Figure 43 to Figure 45.

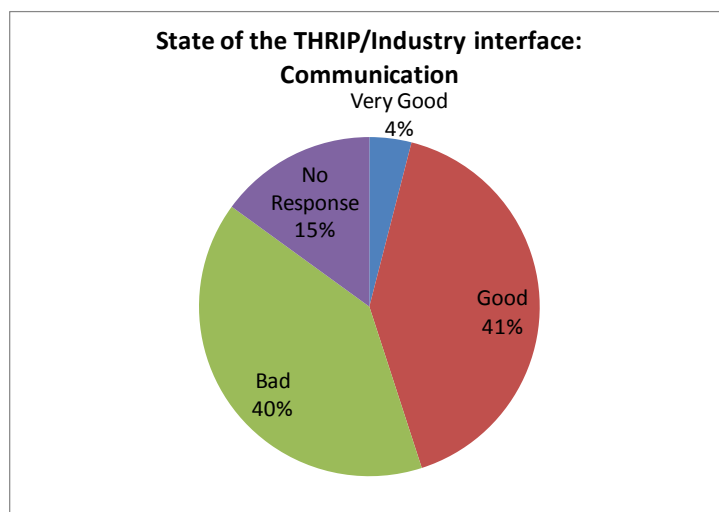


Figure 43: State of communication over the THRIP/Industry Interface

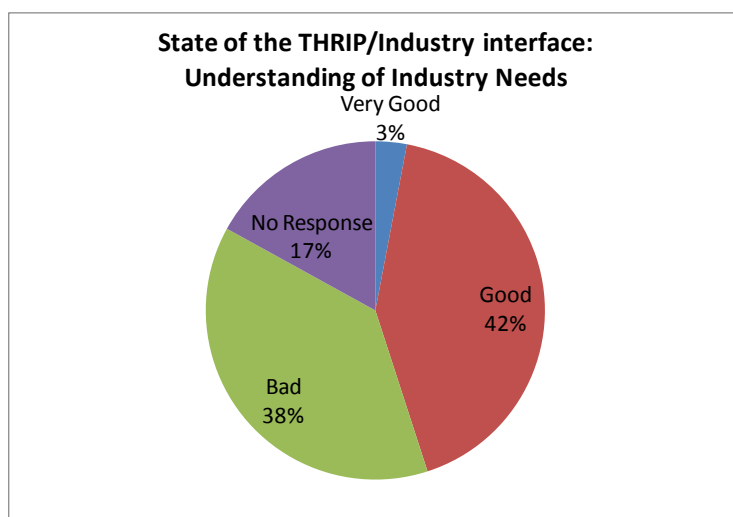


Figure 44: State of understanding of industry need over the THRIP/Industry interface

The split in opinion is almost equal for the state of communication and understanding of industry

needs. This shows that strong interventions may be required to improve the situation. THRIP management should give attention to clarifying these interface related issues in THRIP.

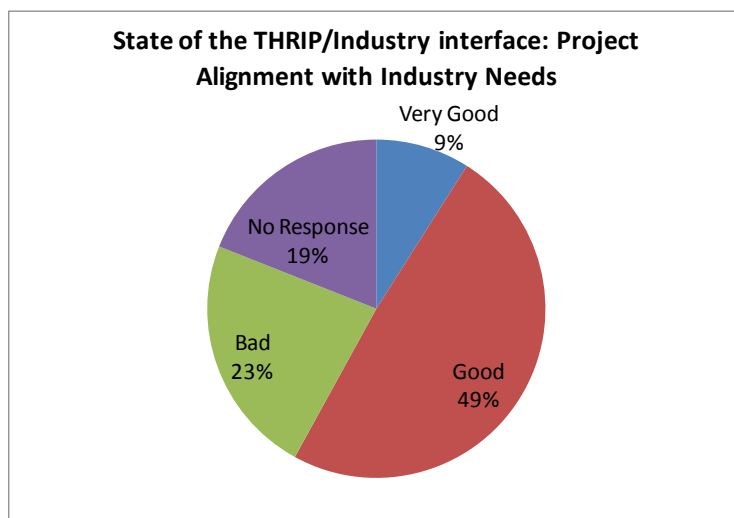


Figure 45: State of THRIP project alignment with industry needs

The majority of respondents felt that the THRIP project alignment with industry needs was very good or good.

THRIP/University Interface

The results for the THRIP/University interface are shown in Figure 46 to Figure 49.

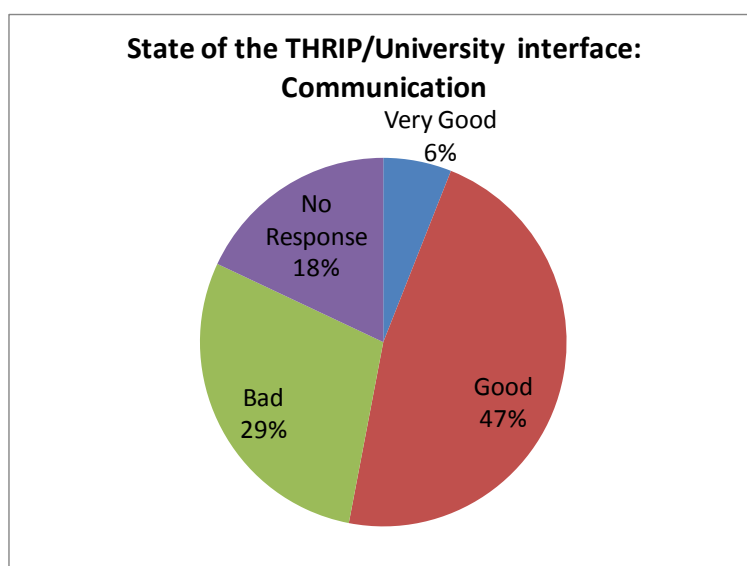


Figure 46: State of communication over the THRIP/University interface

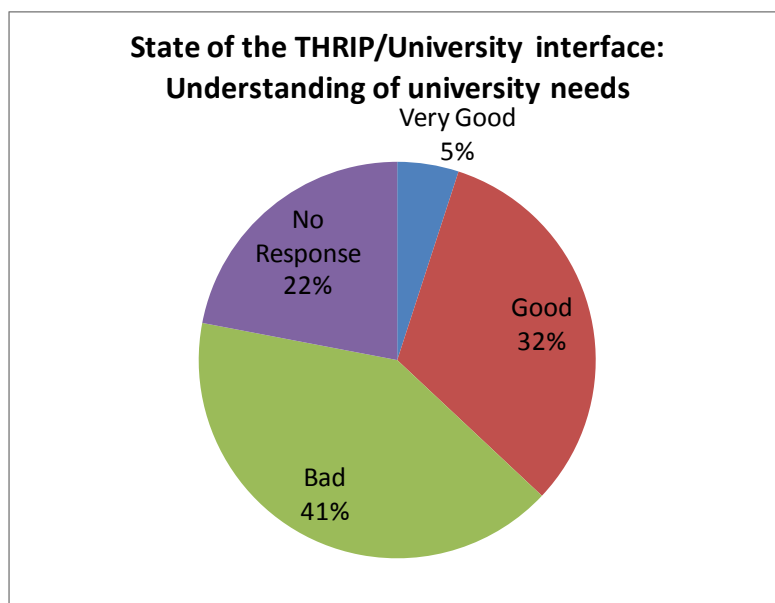


Figure 47: State of understanding university needs over the THRIP/University interface

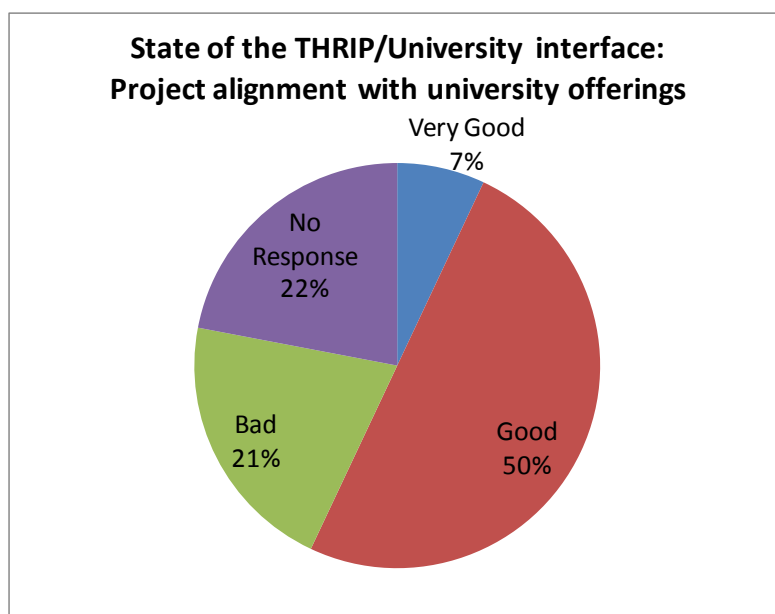


Figure 48: State of THRIP project alignment with university offerings

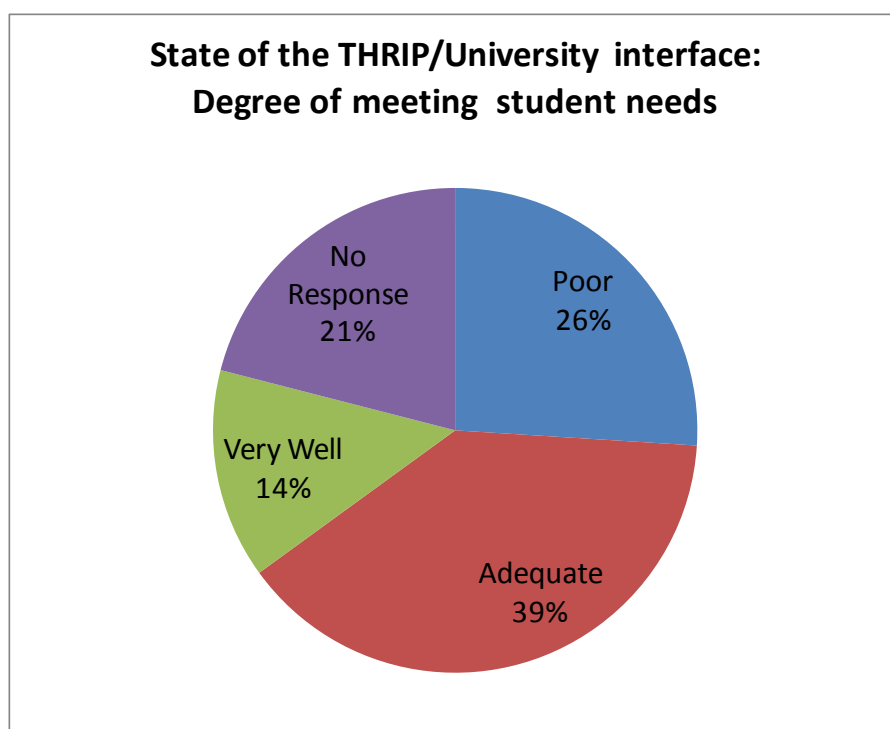


Figure 49: Degree of meeting student needs in THRIP projects

An almost equal split in opinion exists on the ability of THRIP to understand university needs. The state of communication and alignment with university offerings is very good or good. The degree to which THRIP meets student needs is predominantly positive.

The need for soliciting projects

The question: “Is there a need for THRIP to solicit projects as well as just calling for proposals?” were met with an almost equal split in opinion as shown in Figure 50.

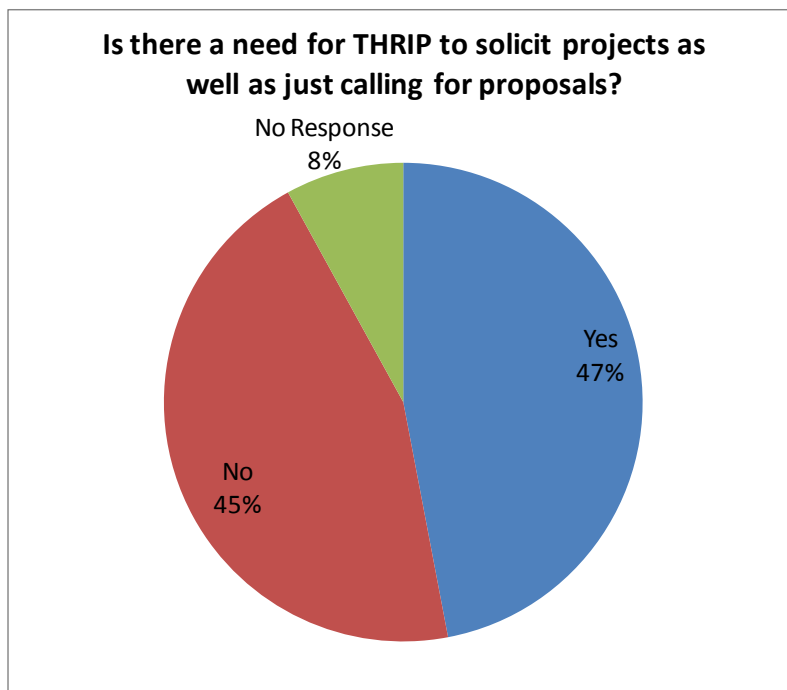


Figure 50: The need for THRIP to solicit projects

Soliciting projects would include the targeting of projects in certain priority areas as well as THRIP going out and brokering parties to form consortia to address gaps in the project or industry sector environment.

The split in opinion shows that there is a definite need for THRIP to be more pro-active in setting up project environments, probably in areas and among potential partnerships that are less experienced in putting together THRIP project consortia and proposals.

Ring fencing of THRIP funding

Should THRIP ring fence funding per business type (BEE or not) and size (large, medium, small)? The reaction to this question is shown in Figure 51.

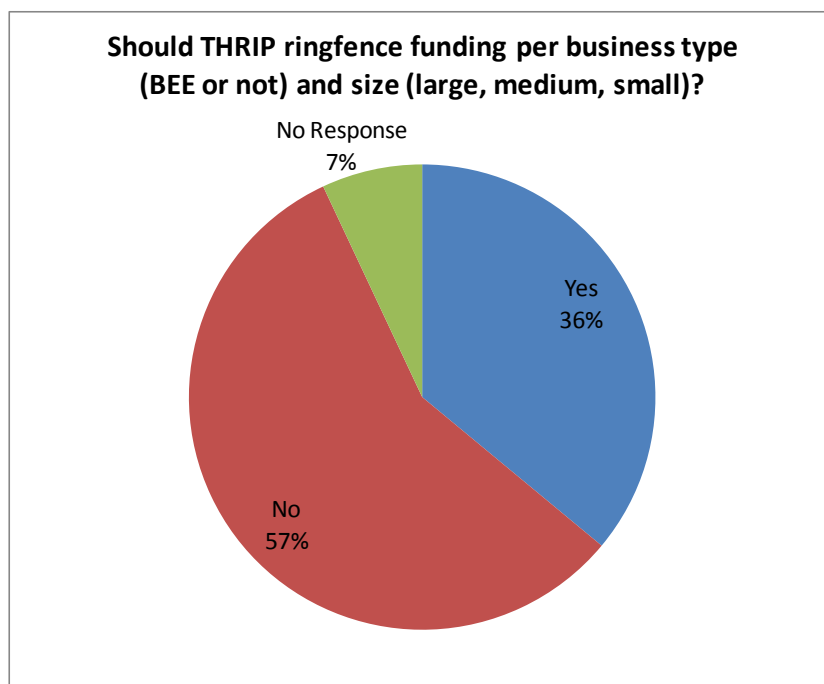


Figure 51: The advisability of THRIP ring fencing funding

A clear message was given that THRIP should not ring fence any funding whether it is per business type or size of company. THRIP could, however, provide incentives to stimulate participation from certain areas where there is slower development of participation.

In-kind contributions for industry

The question: “Should THRIP re-instate "in-kind" contributions from industry to qualify for the funding ratios?” was met with strong support as shown in Figure 52.

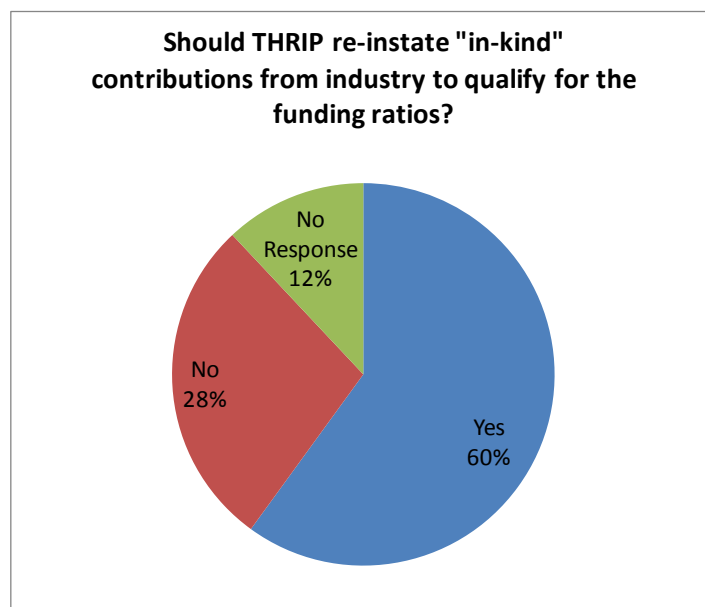


Figure 52: Reinstatement of in-kind contributions

In-kind contributions may be particularly attractive for SMME participation. This normally involves time allocated by industry staff to the project, without payment from the project. Sharing of facilities and mentoring or advice could also be considered as in-kind contributions.

Typical in-kind contributions that emerged from the international benchmark¹ are:

- Access to unique databases
- Analytical and other services
- Equipment
- Materials
- Patents and licences
- Salaries
- Travel
- Use of facilities

¹ Linkage Projects Funding Rules for funding commencing in 2010

Ideal duration of a THRIP project

In asking what the ideal duration of a THRIP project is, the fact that the main aim of THRIP is the development of highly qualified human resources should be taken into account. In South Africa a master's degree may take up to 3 years and a PhD up to 5 years. It is thus advisable, as shown in Figure 53 that the duration of a THRIP project should be either 3 years or 5 years.

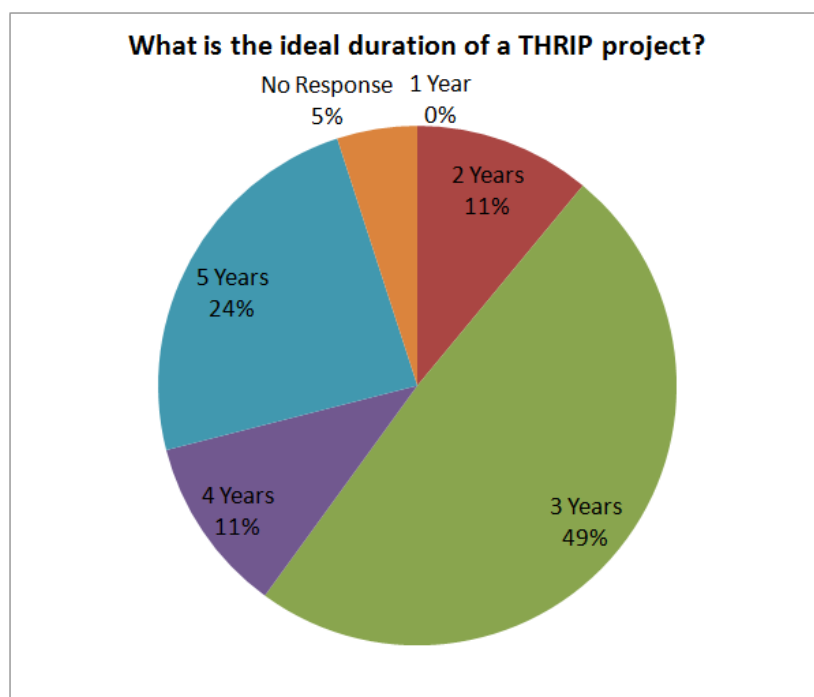


Figure 53: Opinion on the ideal duration of a THRIP project

The rationale for shorter projects than 3 years may be to bring solutions faster to the market.

THRIP management communication and project support

The response to the question: “How well does THRIP management do communication and project management support?” is shown in Figure 54.

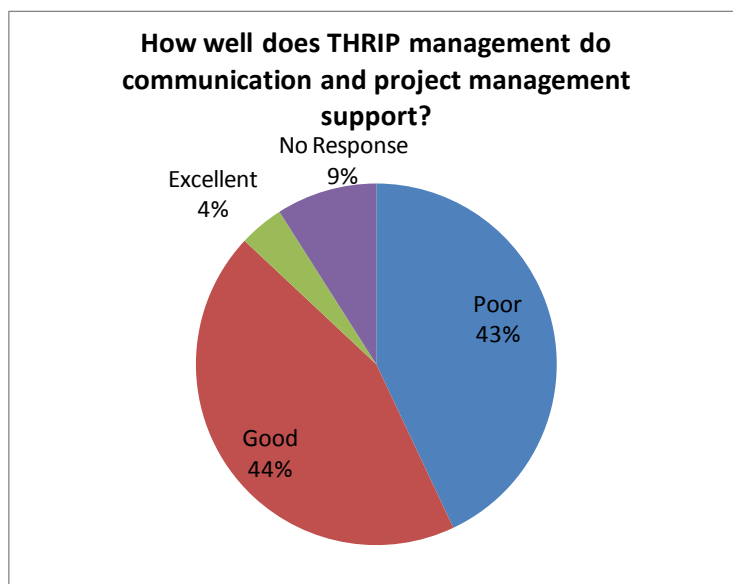


Figure 54: Degree to which TRIP management performs on communication and project management support

There is not a significant positive response to this question and a divided opinion is revealed. THRIP management should intervene strongly here and work towards an improved perception on communication and project management support.

Reapplication for THRIP projects

The question: “Would it be helpful if THRIP funded a project for its duration and re-application was not necessary annually?” resulted in the feedback presented in Figure 55.

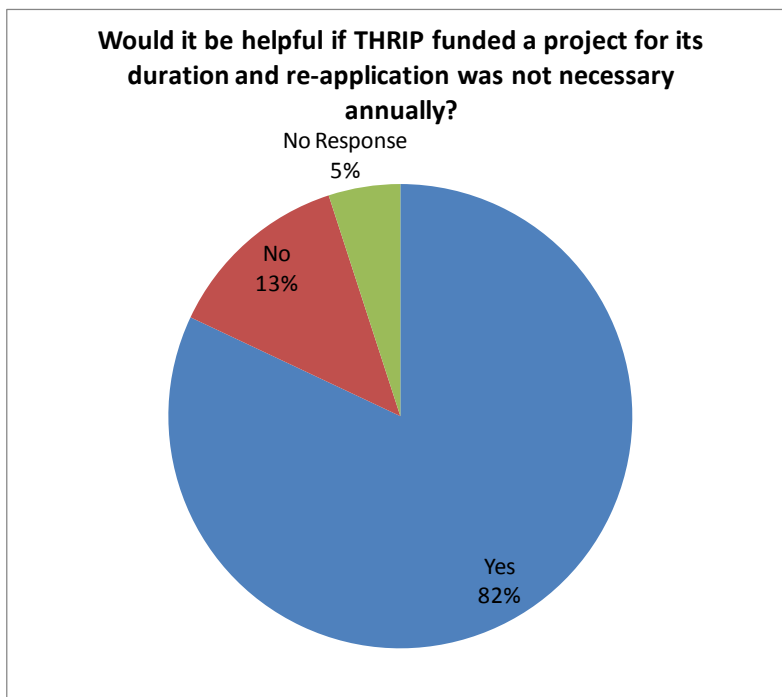


Figure 55: Long term funding agreement required

There is overwhelming support that projects must be funded for its duration (normally three years). This should be accepted against the fact that **the dti** as the main sponsor of the grant funding only get confirmation from treasury on an annual basis and that no firm guarantee could be given. The MTEF (Medium Term Expenditure Framework) however provides a three year view of expected expenditure.

This kind of agreement will be conditional to very good progress reports on an annual basis.

This arrangement will reduce the burden of reapplication on the consortium and the panels that review the applications.

Taking the THRIP model to other government departments

The possibility of taking the THRIP model (co-funding of government and industry) to other departments was tested in the survey. The response is shown in Figure 56.

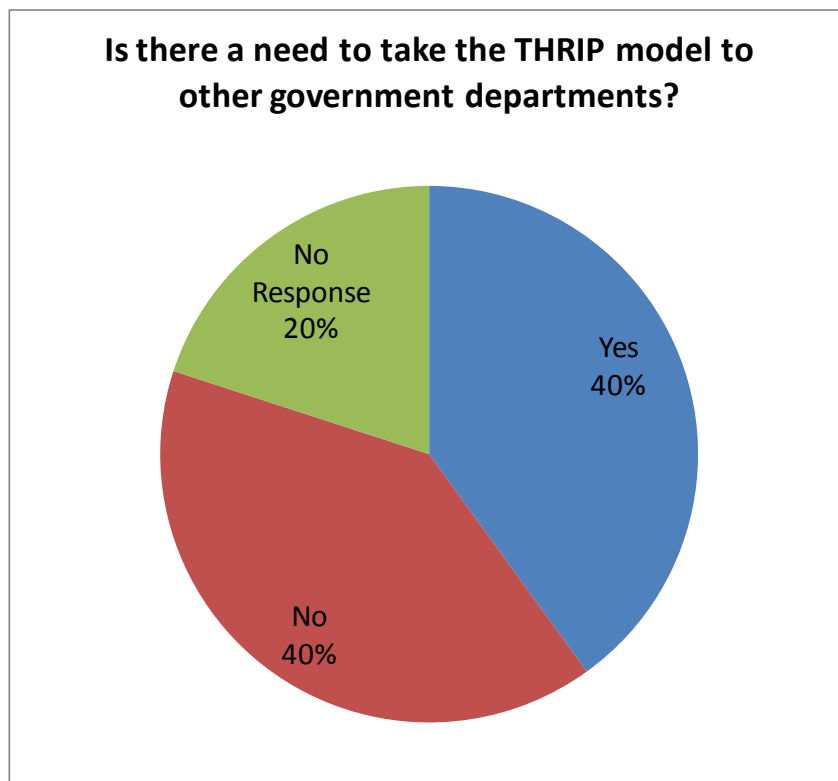


Figure 56: Opinion on the need to take the THRIP model to other government departments

A divided opinion exists. In an extension of the question to indicate which departments, the following were listed:

- Department of Science and Technology
- Department of Agriculture, Fisheries and Forestry
- Department of Education
- Department of Water and Environmental Affairs
- Department of Energy
- Department of Health
- Department of Home Affairs
- Department of Safety and Security
- Department of Mineral Resources
- Department of Sport and Recreation
- Department of Transport
- Department of Communications
- Department of Public Enterprises
- Department of Defence

It should be noted that it is not a requirement to clone the THRIP environment exactly if it is succeeded to convince other departments to participate on a joint funding basis with industry. The basic principles of sector-government co-investment, skilled human resource development and student support could be followed.

In most cases the NRF is seen as the ideal management agency for such collaborative research support.

The three departments that were mentioned specifically where good potential may exist for “THRIP-like” programmes are:

- Department of Energy
- Department of Agriculture
- Department of Mineral Resources

Discussions have been underway with the Department of Agriculture on such a development.

The industry associations that are closely linked to specific departments may benefit largely by such expansion of the THRIP idea.

Reason for decline in THRIP applications

Respondents were asked to provide reasons in their opinion for the decline in the number of applications for THRIP grants in the past two years. The responses are listed in Table 4 based on the activity sector it originated in.

Table 4: Reasons for decline in THRIP applications per activity sector of respondents

SETIs and Science Councils	<p>Too many rules that work against interest of industry-technology partnership; the project submission and review process is tedious</p> <p>A reduction in research capacity in general</p> <p>Industry tends to fund only problem areas during the downturn and less funding for longer term projects to involve post graduate students</p>
Higher Education	<p>Ratio change</p> <p>IPR (intellectual Property Rights) Act</p> <p>Global recession</p> <p>Admin burden: Value (Cost:Benefit ratio) of project too high</p> <p>SMME involvement difficult to effect</p> <p>Late announcement of results of funding</p> <p>Late release of funds</p> <p>Rating process takes too long</p> <p>No mechanism for applications when a new opportunity arises</p> <p>No feedback on unsuccessful projects to improve reapplication or new applications</p> <p>Annual reapplication for a three year project is cumbersome</p> <p>Global business downturn</p> <p>A shortage of suitable industry partners</p> <p>The way THRIP has lost its way, and concentrates on short term SMME and BEE support instead of human resource development</p> <p>Cheaper for industry to have research done on a contract basis</p> <p>Changing of the rules from year to year; THRIP shifted from a success story (easy, simple rules and stable) to a programme that is unstable, rules changing all the time, wrong focus (SMME) and too much admin</p> <p>Overly bureaucratic application and administration process; the outcomes have often been so late that the industrial partner has lost all interest by the time the outcome is known</p> <p>Both large companies and universities have notoriously slow and bureaucratic processes relating to contracts and payments</p> <p>Lack of incentive for large companies and parastatals to invest in THRIP</p> <p>Lack of confidence of industry in universities</p> <p>Disastrous policy change that indicated that large industry-funded projects would not be funded</p> <p>Researchers view the THRIP approach as: heavy handed; ill-considered; bureaucratic; onerous; fickle</p> <p>Too many predetermined ways in which funds can be used and applied for</p> <p>Companies do not come forward for any research need or HR development</p>

	<p>SMMEs and BEEs can, in general, only afford a small contribution towards the research project</p> <p>No money available to train students as part of the projects</p> <p>The MCDM (Multi-criteria Decision Model) has become totally irrelevant</p> <p>Grants are awarded based on the profile of the industry partners rather than the quality of the research or any other factors</p> <p>SMMEs get contracts by being faster and cheaper than the big companies and not by developing (theoretically) better in-house technologies</p> <p>Very onerous annual report</p> <p>Due to the need for qualified staff, companies do not allow bursars to carry on to post graduate studies</p> <p>Large companies do not believe SMMEs can contribute anything in teaming up</p> <p>THRIP has unilaterally adjusted funding ratios over the years which makes forward planning impossible</p> <p>Industry partnerships are difficult to obtain especially for remote universities</p> <p>Symptomatic of a general decline of research output in South Africa and not THRIP-specific</p> <p>The very complicated and not-user friendly method for industry partners to approve the liaison with researchers</p> <p>Academics are too occupied with high teaching loads, low salaries and inadequate funding to have energy for external collaborations</p> <p>Industries moving research programmes off the continent</p>
Industry: BEE Large Company	<p>Economic situation and project costs increased exponentially in order to perform quality research and development</p> <p>Too much emphasis on reporting and less on actual results</p> <p>It does not support some of the very important areas of research so researchers and administrators are losing interest</p>
Industry: Large Company	<p>Onerous, opaque and bureaucratic processes</p> <p>The THRIP website</p> <p>Decline in useful research options</p> <p>The aging of the research community</p> <p>Lack of innovation drive by industry</p>
Industry: SMME	<p>Low awareness of THRIP</p> <p>Decline in confidence in public sector</p> <p>Very difficult to find willing industry partners</p>
Unknown	<p>Lack of students that want to work on longer term projects</p>

If the feedback is analysed and prioritised according to the frequency of mentioning a certain reason for the decline, the graphical view in Figure 57 emerges

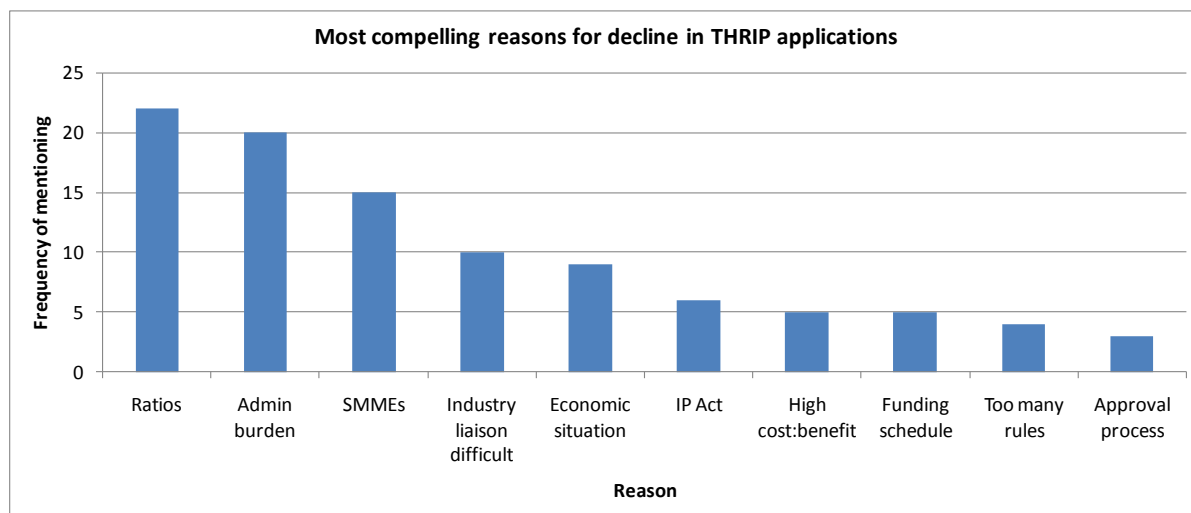


Figure 57: Most compelling reasons mentioned by respondents for the decline in THRIP applications

The top five reasons listed are:

- The change in THRIP: Large company contributions from 1:2 to 1:3 in 2007
- The administrative burden of applying and reapplying for THRIP
- The difficulty in finding appropriate SMMES with an interest in a firm requirement for R&D to partner with
- The fact that universities find it difficult to liaise with industry
- The current world-wide economic recession

Another factor mentioned is that industry associations were not allowed to collate and prepare applications on behalf of universities anymore. The administrative burden this placed on universities has resulted in them losing interest to apply.

Open comments and suggestions following from the survey

Table 5 indicates some open comments and suggestions per activity sector on how to improve the situation of declining interest in THRIP.

Table 5: Open comments and suggestions

SETIs and Science Councils	<p>Select appropriate review panels based on the project theme</p> <p>Fund the entire project</p> <p>Improve application and approval processes</p> <p>Bias projects that are implementable commercially within 5 years</p> <p>SMME and BEE involvement is important from the dti perspective and THRIP should aim to assist in matchmaking between HEIs and SMMEs/BEEs</p> <p>Place an advert to encourage innovation in the private sector and to encourage the private sector to invest in research</p> <p>In-kind contributions should also qualify</p> <p>The NRF-online system should be improved upon</p> <p>The annual renewal process could be simplified by merely refreshing the initial objectives to progress to date and rather focus on the objectives to be accomplished for the next year</p>
Higher Education	<p>The funding framework (what is funded) and the application process need revisiting</p> <p>Announce grants before year end</p> <p>More flexibility in the application of funds</p> <p>Make decisions along clear lines, based on merit</p> <p>Lengthening the grant duration and allowing roll-over of funds</p> <p>Rethink the notion that large scale research is needed in SMMEs</p> <p>Fix the ratios and fix the problems emanating from the new IP law</p> <p>Allow more freedom for researchers who have excellent track records (have established themselves) to handle the project in collaboration with the industrial partner rather than have to be affiliated with the THRIP programme</p> <p>The strict rule based approach has discouraged many researchers from even trying to apply</p> <p>The process of application and award needs to be simplified. The time period of award adjusted to take account for how long the bureaucratic processes in universities and large companies take to complete. Realistic bridging funds should be provided by some mechanism</p> <p>THRIP needs to become more than just a fund administrator and actually get to grips with the needs of industry and research and understand what is required. Markets and research are more dynamic and SMMEs in particular need more flexible access to funding on a needs driven basis - thus accept proposals for projects in continuous basis</p> <p>Engage academia and industry</p> <p>Adopt a less bureaucratic system</p> <p>Be more predictable</p> <p>Improve communication</p> <p>Improve service</p> <p>Focus again on what the initial intension of THRIP was</p>

	<p>The emphasis placed on having an SMME and/or BEE as industrial partner is a strong disincentive to apply for THRIP funding</p> <p>Provide feedback on reasons for projects that are declined</p> <p>The funding mechanism must commit to allow a student to complete the degree, even if industry support falls away</p> <p>THRIP should not be exclusive in terms of focus sectors</p> <p>Support the scientists who can do the job and the industries that believe they are receiving value for their money</p> <p>Human resource development is more important than technology development</p> <p>Start a separate programme for SMME development via a THRIP-like mechanism and keep THRIP to what it originally was</p> <p>Simplify the application process (application and no reapplication)</p> <p>The ratio of students per project is not realistic anymore - it should be in the region of 1 student per R300 000 to R500 000</p> <p>Train and accredit THRIP managers, let them present a budget and apply for funding, and give them more freedom to do projects according to clear-cut THRIP goals</p> <p>Relax the rules on industry partnerships and include state institutions such as CSIR</p> <p>Need to get more black academics and engineers/technicians into the whole THRIP (application, reviewing and planning) process so there is more inclusivity</p> <p>THRIP requires intensive funds management which is not really available at a university</p> <p>Include funding for setting up an HEI-industry relationship</p> <p>The synergy of THRIP was the large companies, these are where the large monies/IP/Research breakthrough will come from</p>
Industry: BEE SMME	<p>The release of results and funding should happen not later than January</p>
Industry: Large Company	<p>The (web site) software is not user friendly and gives problems</p> <p>The application and report structure needs to be streamlined</p> <p>Go back to Conditions of Grant and funding ratios as applicable in the years 2000-2006</p> <p>Industry partners in approving a project are expected to react without being informed when their reaction is needed</p> <p>The MCDM scoring needs to be changed</p>
Industry SMME Unknown	<p>The approval process via the web page is very unfriendly</p> <p>Clarify the R&D tax benefits to companies</p> <p>Online application system not always user friendly, sometimes very slow</p> <p>Shorten the time between application and approving of a project</p> <p>Re-instate 1:1 funding ratio for associations</p>

Scenarios

Using inputs from the web survey the regional workshop debates and individual interviews, three scenarios are now developed with a discussion of potential benefits and indications of risks.

The three scenarios broadly address the following:

- Consequences of maintaining current THRIP focus, strategy and funding ratios
- Consequences of a change in THRIP focus, strategy and funding ratios, with recommendations for new ratios (this includes the option of reverting to previous funding ratios)
- Consequences of moving to a different framework of THRIP focus, strategy and funding rules, with recommendations for a new set of funding rules

Preamble to scenario development

In this preamble some issues that were raised in the survey, during the regional workshop debates and in personal interviews are reviewed and commented upon. These were all important considerations for drawing up the scenarios.

The dti objectives

The THRIP focus is aligned with the objectives of **the dti**: “Growth, Equity and Employment.” For THRIP to remain funded by **the dti**, it should maintain this alignment. It further has to be recognised that priorities change with changing administrations in government. The argument to return to the “old” THRIP focus and alignment is thus unattractive to policy makers.

The role SMMEs are expected to play in economic growth is the driver behind the emphasis on drawing them into THRIP. To support economic growth, **the dti** is dedicated to grow THRIP via investment to stimulate SMMEs, R&D and technology transfer.

Equity is important from a race and gender point of view, but also from a geographical point of view to create balance in rural and peri-urban areas that are underdeveloped.

Employment of skilled, high level human resources is of prime concern. Not only must THRIP generate such skills, but the market must be developed to employ these people. Often it is necessary to create opportunities for such employment and the vehicle for employment is often an SMME.

SMMEs and THRIP

The role of THRIP and the role of the SEDA (Small Enterprise Development Agency) and STP (SEDA Technology Programme) should not be confused, but should be aligned. STP focuses on incubation and currently 29 small business incubators are operational in South Africa.

It remains an important objective for **the dti** and THRIP that SMMEs are engaged in R&D. The definition of SMMEs needs to be clearly clarified. Apart from large differences in structure, operation, motivation and activities between micro, very small, small and medium sized enterprises,

the technology dependence of an SMME needs to be qualified.

A technology-based enterprise is seen as one where the ability exists to develop an ongoing stream of new products or services which meet the market needs; to manufacture these products or implement these services while maintaining appropriate levels of quality and cost; to develop, adapt or adopt new technology to meet future needs; and to respond promptly to unexpected competitive moves or unforeseen opportunities. It is SMMEs with these needs and characteristics that would benefit most from THRIP.

The needs of an SMME are often not well understood. It is worthless to form an academic opinion on what SMMEs require. The only people who know are those that own and operate SMMEs. To those SMMEs that are formal businesses with a success motive the challenges are the same as to large companies. The bottom line is important, cash flow is not negotiable. Too often governments have support programmes for SMMEs and universities entrepreneurship programmes that are not closely related to the real need of an SMME, which is to be profitable.

It may be dangerous to assume that academics understand how to put programmes together that would benefit SMMEs. Large business and small business operate differently, and their role should be enhanced in defining THRIP interventions. As such it should be possible for especially small business to gain financially from THRIP and not to only contribute in funding and in-kind. If science councils can gain financially, SMMEs should have the same benefit. This however, is complicated by the Public Finance Management Act (PFMA) that states that no public funding could flow to a private concern in grant form.

Finding favourable ratios for SMMEs is commendable, but any, albeit very small, contribution from an SMME brings about the same relative financial justification as a large investment from a large company.

Businesses operate according to the free market principle. If they have a need, they will invest in addressing that need. SMMEs, in particular, cannot be incentivised easily to take up a “social responsibility” role. Large companies, on the other hand may assign such a role to themselves.

It is important to recognise that “SMME” covers a wide range of enterprises that differ in structure function and research need. It is likely that further investigation of SMME characteristics in relation to their research needs will be required.

Acquiring R&D vs social responsibility of creating capacity

In essence, companies have the freedom to acquire R&D the way they want to. This could be in the form of short term contract work, technology transfer or in-house R&D. THRIP operates at the level where there is a broader social responsibility to address a common market need for skills, well knowing that investment may not lead to direct own benefit but for the benefit of an industry or an economy as a whole. It is at this interface where universities that have the mandate to develop high level human resources for the country and to support businesses via R&D and knowledge development and transfer have a role.

THRIP should always be positioned to acknowledge these differences and to be an equal partner to

academia and to business. The direction of projects should be driven by business and the participation of business should be that of free choice. Incentives should thus be developed that address the various sizes of industry players, the needs of the different sectors and the offering universities can make as suppliers of education, R&D and knowledge.

“THRIP is not the NRF”

A perception may exist, especially among academics, that THRIP is an extension of the NRF funding environment. The importance of quality control and good research cannot be compromised, but employing the rating system for researchers has not been and should not be a precondition to apply for THRIP funding.

The basic principles of receiving THRIP funding are, and need to be:

- To generate the right level of skills in the right (industry led) focus areas of the right number, and racial and gender balance
- To ensure that industry benefits not only from a steady supply of these skilled people, but also from research that emerges from the projects and new knowledge that is shared by the THRIP partnerships.

Industry associations

The role of industry associations as they currently participate in THRIP should not be underestimated. In most cases, an industry association is a voluntary, self-organising entity that came together because they have a common goal. In the case of those dealing with THRIP the goals match those of THRIP viz. human capacity development and research. In most cases industry associations require the payment of levies from their members, either voluntary or statutory. These are then applied as counter investment on behalf of the consortium to facilitate THRIP projects. The benefit of working with an industry association is that they:

- Provide direction as to the most appropriate research to conduct
- Have a skills strategy for the consortium
- Facilitate partnerships between parties in their consortium and academics
- Acts as a first filter for THRIP projects
- Could provide administrative support in compiling THRIP applications

Given the sector focus that industry associations have, they may benefit from other “THRIP-like” programmes that may be set up with other government departments in future.

Beneficiaries of THRIP

Who are the real beneficiaries of THRIP? When it comes to funding, it is clear that universities are by far the largest beneficiaries of the investment. Universities, as partners, do not make a financial contribution, but rather do this through making time available of staff to do the training and the research. Most universities apply a levy to THRIP funding, which has been identified as a disincentive for staff to participate in THRIP. The survey revealed that academics think that access to funding to acquire research equipment and facilities is the largest benefit from participating in THRIP. This will raise questions from **the dti** and the requirement that universities should rather contribute

financially from other sources to such required facilities as part of their partnership agreement may become a reality. Furthermore, students are not seen as beneficiaries, and researchers are gaining the most. Shaping THRIP to engage more students and making them real beneficiaries could become a future requirement.

THRIP and commercialisation

A future trend in requirements from **the dti** may be to focus more on increasing competitiveness and the commercialisation interface. This means that solutions in the form of products and services emerging from the THRIP funding need to appear in the market. Some of the research supported by industry associations has managed to culminate in applications of great benefit to those consortium members. Although the primary emphasis of THRIP is not on product development, there should be a will to follow through and commercialise outcomes and not just to stop at publishing results or registering intellectual property rights. Here the industrial partners could play a major role, since they have the experience in commercialisation. The commercialisation drive should be seen as an additionality and should not be diverting the focus from high level human resources and knowledge creation. A lot more of the THRIP outcomes could potentially be commercialised if it were a priority and incentives were given to train people that know how to do the commercialisation. The drive to commercialise outcomes could then be supplemented by other financial instruments such as the Innovation Fund, the Support Programme for Innovation in Industry (SPII) and the creation of Centres of Competence (CoCs) under the Technology Innovation Agency (TIA).

THRIP and innovation

The state of innovation in THRIP should be broader than just technological. Social, service and market innovation should be kept in mind. This may open opportunities for consortia not only made up of science, technology and engineering expertise but may in future include the social sciences, humanities and economic sciences. Although **the dti** has been reluctant to open it up to this broader scope in the past and stuck to closely related domains such as the management of technology, the drive towards application and implementation may require a broader approach.

THRIP as a springboard for technology platforms

By including commercialisation as a desired THRIP outcome, an opportunity arises to develop technology platforms that could be widely used to support industry, large and small and to create a base for educating and training people in the scarce high technology skills required to make the economy globally competitive. These technology platforms (see Figure 58) are spanned by SMMEs, large companies and academia. They could be supported by **the dti** via THRIP funding and aimed at developing students to become commercially oriented, and so to replace the so-called “Innovation Chasm” generation of researchers that do not follow through to see the commercial benefit from their work with a new generation of applied researchers.

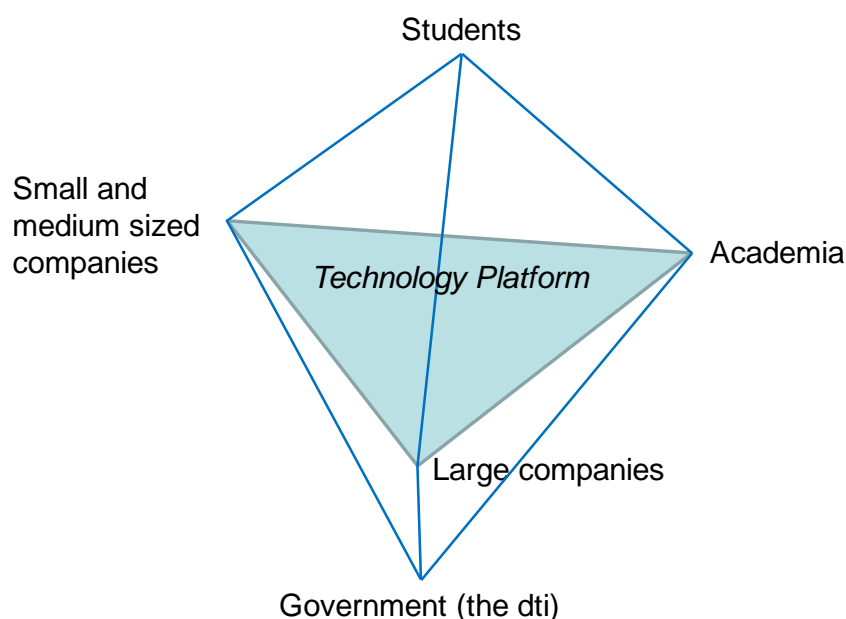


Figure 58: Building technology platforms leading to commercialisation

Focusing grant support

THRIP also has the option of moving away from supporting such a wide funding range of projects and, rather than supporting smaller and large projects, put more money into focused, well established consortia that demand larger project funding. In this way the impact may be increased. This may be contradictive to supporting SMMEs, but could be addressed by choosing the type of SMME involved more selectively and concentrate on technology-based SMMEs rather than a broad range of SMMEs. This will do away with the caveat raised in the survey that consortia often include SMMEs for the sake of having an SMME present. It will also shift the emphasis from including small suppliers to enabling small partners that are either supplying high tech components based on the advanced knowledge created via THRIP funding to a larger solution that could be commercialised quicker, or developing SMMEs as channel partners to get the solutions into the market.

Refocusing THRIP towards real market requirements will make it more difficult for academic institutions to just use THRIP as a subvention to keep more researchers funded, but to constructively help to build on focused knowledge and skills environments identified by industry partners as having potential to be applied in the market soon. In this way business entities, the market sector addressed and the economy as a whole could benefit faster. Focus in this could be combined with parallel processes to encourage and enable entry-level researchers.

Leadership in shaping THRIP

The stakeholder notion that THRIP was conceived by academics and should be left to academics to be “put on track again” is a debatable one. Good academic researchers living close to their industry partners will naturally have this capability, but in general academics are isolated from market realities. This is demonstrated by the finding in the survey that the academic-industry relationships are difficult to forge and that THRIP should provide assistance in building the consortia. Stronger

partnerships are required, with commitment from both the industry and academic side. Too often it is left to the academic partners to represent the projects as was the case with the regional workshops in this investigation. The few industry partners that attended (some without their academic partners) provided realistic inputs as to where the programme should be heading. Much more serious partnership alliances are required to make the programme have the impact it should on growing the economy.

Simplifying THRIP

Simplifying THRIP would be beneficial to everyone involved in it. Simplification brings about responsibility though. One of the reasons why THRIP rules have become more and more convoluted is that grant holders did not comply with basic requirements of reporting. Joint responsibility for managing projects according to treasury requirements could lead to simpler application, reporting and continuation processes.

Mentors in THRIP

The role of mentors has not been developed well in the South African industry-university partnerships such as THRIP. Retired academics and business people that still have the technical and business/commercial knowledge could become involved to a larger extent. Although THRIP has shied away from supporting consultants in the past, bringing in experienced mentors and compensating them for this work could be a consideration in the future.

Equity and redress in THRIP

Equity and redress in THRIP will remain a real and important driver for how funding is applied. The argument that black and female researchers and BEE companies are not available is not holding good. Many THRIP participants have been successful in the past in attracting and training black and female students via the funding. It is known that these people are attractive to industry and are offered positions which may take them out of the research domain. A concerted effort is required to retain some of these students that graduate and to mentor and guide them to become the leaders of THRIP of the future, whether on the academic side or the industry partner side. Such an equity and redress plan should be developed and be made visible for THRIP and its participants and be supported by **the dti**. Creating the right equity balance is so important that it cannot be left to chance to correct itself. The option of paying the salaries of such persons from THRIP project funds could be considered.

THRIP and the National Intellectual Property Registration Act (IPR Act)²

Significant concern has been expressed that the IPR Act will discourage companies to invest in THRIP. This concern is based mainly on uncertainty of interpretation of the Act, since it is very new and has not been tested extensively.

The object of this Act is to make provision that intellectual property (IP) emanating from publicly financed research and development is identified, protected, utilised and commercialised for the benefit of the people of the Republic, whether it be for a social, economic, military or any other

² Act No. 51 of 2008: Intellectual Property Rights from Publicly Financed Research and Development Act, <http://www.naci.org.za/pdfs/workshops/julNBAC/Act%20No.%2051%20of%202008%20-%20Intellectual%20Property%20Rights%20from%20Publicly%20Financed%20Research.pdf>

benefit. In essence it states that intellectual property emanating from publicly financed research and development shall be owned by the recipient (of the public funding). "Recipient" means any person, juristic or non-juristic, that undertakes research and development using funding from a funding agency and includes an institution. Should the recipient not want to retain ownership of such IP, the recipient must give the intellectual property creator the option to acquire ownership in the intellectual property and to obtain statutory protection for the intellectual property, provided that in the case where a private entity or organisation had provided some funding, such private entity or organisation shall first be offered such option before the intellectual property creator.

A private entity or organisation may become an exclusive licensee of intellectual property emanating from publicly financed research and development undertaken at an institution if such private entity or organisation has the capacity to manage and commercialise the intellectual property in a manner that benefits the Republic. Any private entity or organisation may become a co-owner of the intellectual property emanating from publicly financed research and development undertaken at an institution if there has been a contribution of resources, which may include relevant background intellectual property by the private entity or organisation; there is joint intellectual property creatorship; appropriate arrangements are made for benefit-sharing for intellectual property creators at the institution; and the institution and the private entity or organisation conclude an agreement for the commercialisation of the intellectual property.

The recipient (of public funding) determines the nature and conditions of intellectual property transactions relating to any intellectual property held by it, but must take into account the following:

- (a) Preference must be given to non-exclusive licensing
- (b) Preference must be given to BBBEE entities and small enterprises
- (c) Preference must be given to parties that seek to use the intellectual property in ways that provide optimal benefits to the economy and quality of life of the people of the Republic
- (d) Exclusive licence holders must undertake, where feasible, to manufacture, process and otherwise commercialise within the Republic
- (e) Each intellectual property transaction must provide the State with an irrevocable and royalty-free licence authorising the State to use or have the intellectual property used throughout the world for the health, security and emergency needs of the Republic.

THRIIP has very little control over how the Act is applied or perceived. It can only endeavour to assist in interpretation and advise in drawing up the right kind of IP agreements for each of its projects together with professional legal advisors.

Nomenclature

In referring to "universities" in this report and specifically in further scenario development, the following is included:

- Universities
- Universities of Technology
- Comprehensive institutions (mergers of previous universities and technikons)

When "large companies" are addressed, it includes local and international companies that are classified as "large" and do not fit into **the dti** enterprise classification scheme for SMMEs (see

appendix B).

When SMMEs are addressed, the classification includes enterprises that are classified (Appendix B) by **the dti** as:

- Medium
- Small
- Very small
- Micro

In most cases an SMME is considered as a technology-based SMME according to the definition given above.

Science, Engineering and Technology Enterprises (SETIs) including Science Councils could fit into the notion of a Research Institute and could be included with “universities” or with enterprises, depending on the role they play in a consortium (co-funding or providing R&D).

Scenario 1: Maintaining current THRIP focus, strategy and funding ratios

Scenario one is about maintaining the *status quo*.

Focus

In this scenario the current focus of THRIP on highly skilled human resources and technology for industry is retained. (Note that this is already a deviation from the understanding of the “original” THRIP which was only focused on “technological human resources for industry”).

Visualising Scenario 1

The association of partners in Scenario 1 is outlined graphically.

University-individual business entity consortia

The combination of academic and individual business entity associations is shown in Figure 59 with the funding ratio as it is at present.

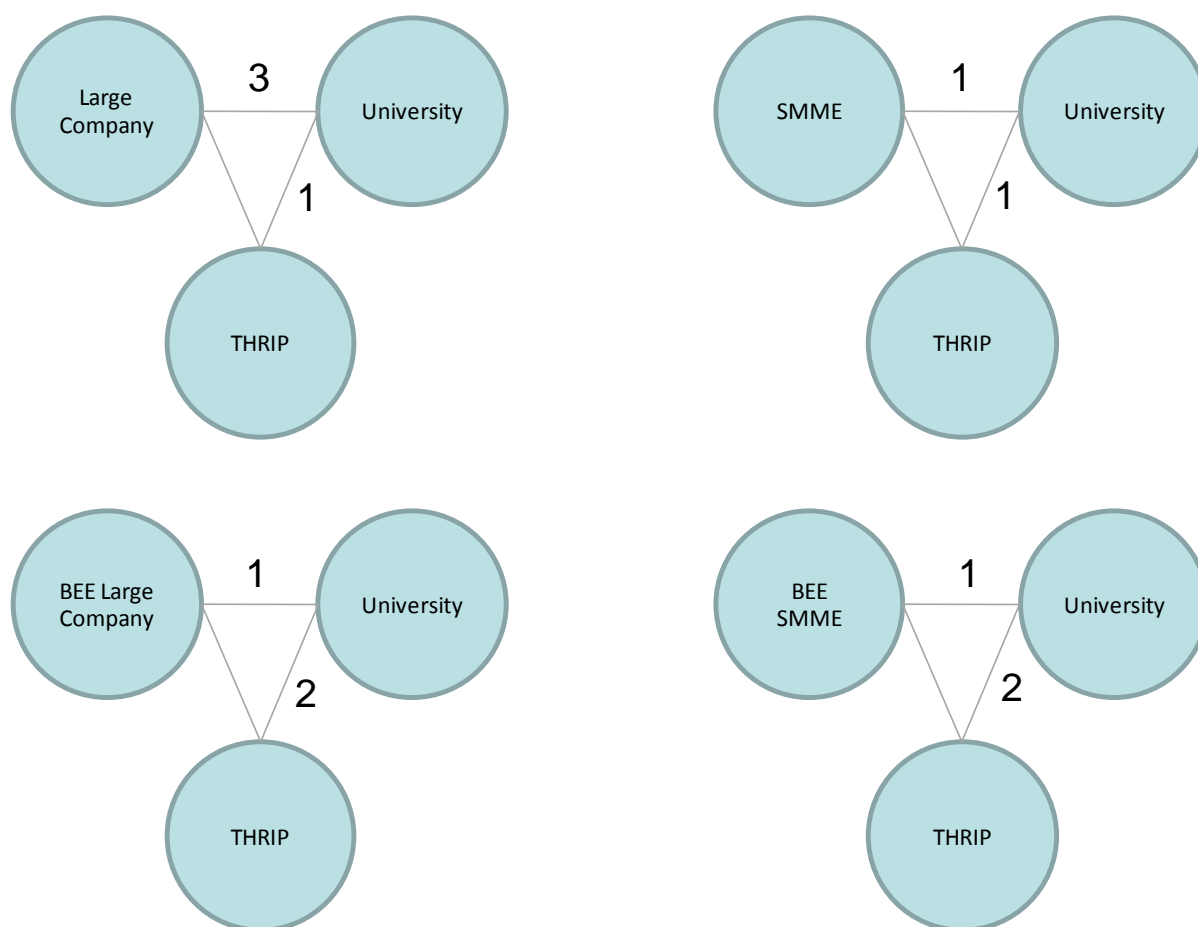


Figure 59: Scenario 1 – The associations among academic and business entities remain the same and funding ratios are maintained at current levels

University – multiple business entity consortia

In the case where academia works with a multiple of business entities, the association is presented graphically in Figure 60.

Direct consortia

Here the business entities form a consortium on their own and develop a THRIP project with the university partner.

Industry associations

An industry association may also be formed on a voluntary, self-organising cluster principle. Normally the industry association provides strategy and direction of R&D in the specific industry sector. The industry association works with the university or a group of universities and co-fund with THRIP.

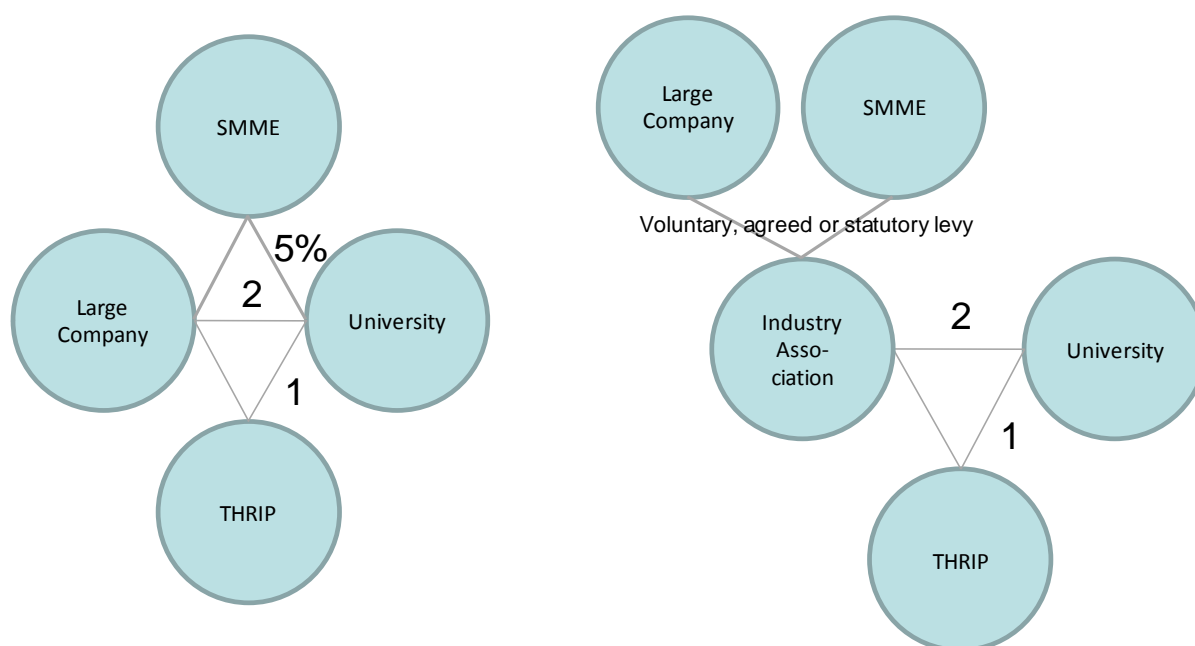


Figure 60: Scenario 1- Consortia of business entities work directly with universities or via an industry association at current funding ratios

Strategic drivers

The strategy is guided by the need to have more SMMEs and more BEE companies included in the partnerships with academia and to incentivise such inclusion by the current set of funding ratios which is shown in Table 6.

Ratios for scenario 1

Ratios for scenario 1 are summarised in Table 6.

Table 6: Current THRIP ratios are maintained in Scenario 1

INDUSTRY PARTNER (S)	THRIP CONTRIBUTION (R)	LARGE INDUSTRY CONTRIBUTION (R)	SMALL & MEDIUM ENTERPRISE CONTRIBUTION
Large company(ies) only	1	3	N/A
Large company(ies) plus minimum of 25% by number of SMMEs (e.g. consortium with 1, 2 or 3 large companies must have at least 1 SMME partner)	1	2	5 % of highest contribution
All SMMEs	1	N/A	1
All SMMEs and all BEE	2	N/A	1

Impact of following scenario 1

The growth path for THRIP in this scenario is limited in the sense that there is a strong perception by large companies that THRIP is disincentivising them in favour of SMMEs. The feedback received in the survey and during workshop and individual discussions point to the fact that the decline in the number of applications was strongly influenced by the change in funding ratio in 2007 of THRIP:Large Company to 1:3 from the 1:2 it was before.

The fact that several large companies did not disagree in the survey with keeping the ratio at 3:1, may be explained by the interpretation of the IPR Act that the more a company invests, the more claim it could make on owning the IP.

In this scenario, the universities will remain the main beneficiaries; they will use the money largely for acquiring research infrastructure according to the survey feedback on the benefits of the academic sector and focus on doing relevant R&D and student support. Old partnerships will remain and new ones will depend on the funding available in the companies. Low participation from SMMEs will be the norm as the perception becomes entrenched that SMMEs do not need high level research.

The scenario is thus not aligned with the need to involve SMMEs in R&D which is strongly expressed by **the dti**. The academic fraternity over-emphasises the one output, being high level human resources, not addressing the needs of the sponsor (**the dti**) to look at other aspects as well. If the situation is left unchanged the misalignment between academia and **the dti** views may cause THRIP to be a failure. The importance of the programme is recognised in the light of the declining grant funding opportunities in other funding environments such as the NRF core grants.

Following through on this scenario, the funding available from industry may stay constant at the increased (1:3 from 1:2) level, but the number of participants and thus the number of projects may stagnate or even decline further.

The unhappiness with the ratios may be offset somewhat by the negotiation of a new Memorandum of Understanding between the NRF and **the dti** that is based on the 3-year Medium Term Expenditure Framework allocations to THRIP that has enabled THRIP management to change the scheduling of funding announcements. These will take place by 31 December 2009 and by 31 November from 2010 and into the future.

More of the same will not be inspiring to make THRIP the vibrant environment it is supposed to be and this scenario is not the preferred one to continue on.

Scenario 2: A change in THRIP focus, strategy and funding ratios, with recommendations for new ratios

In Scenario 2 the academic-industry associations remain the same, with a change in the funding ratios and the introduction of a stronger competitive edge and commercialisation drive and a differentiated focus on SMMEs.

Focus

The importance of high level skilled human capacity in technology fields remains the high level focus. A change in THRIP focus in line with the expectations of **the dti** as the main sponsor and custodian includes moving closer towards commercialising outcomes of THRIP projects while still placing more emphasis on SMMEs and equity and redress.

Visualising Scenario 2

The association of partners in Scenario 2 is outlined graphically.

University-individual business entity consortia

In Figure 61 the association of individual business entities with universities are shown with new funding ratios. The major shift is back to a default of THRIP:Large company of 1:2 which is in line with the average opinion in the THRIP stakeholder community.

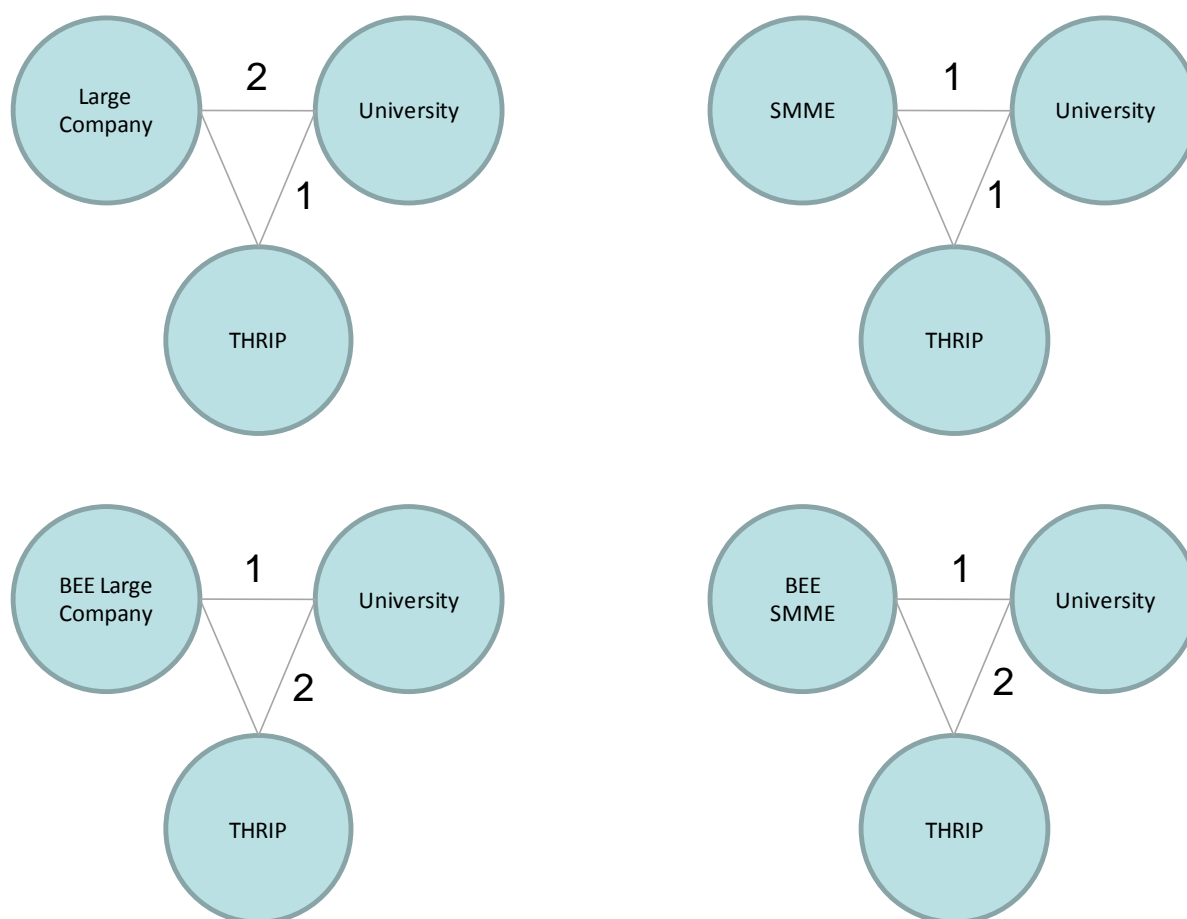


Figure 61: Scenario 2 – The associations among academic and business entities remain the same but funding ratios are adjusted to encourage large companies to participate and to incentivise SMME participation

University – multiple business entity consortia

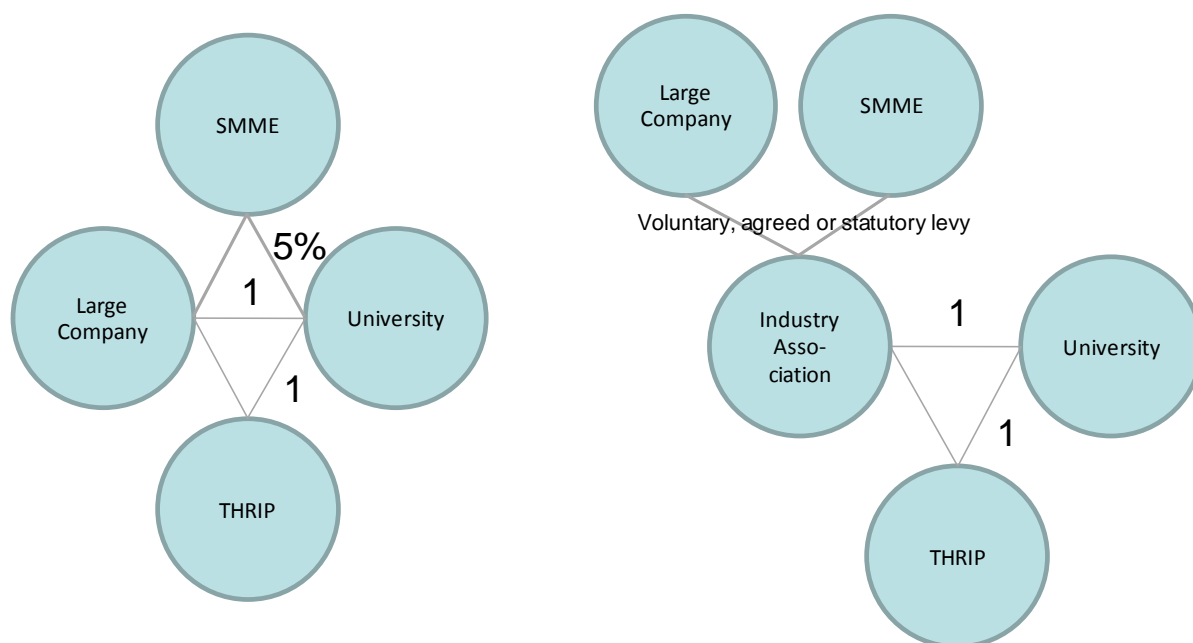


Figure 62: Scenario 2- Consortia of business entities work directly with universities or via an industry association and adjusted funding ratios are introduced

Direct consortia

The major shift in ratios, however, is to incentivise the participation of SMMEs further. This is shown graphically in Figure 62. Wherever a university manages to work with an SMME and large company in consortium, the ratio of THRIP:Large company is made 1:1 to encourage large companies to find the SMMEs and include them in the consortium. The SMME still contributes 5% of the industry contribution.

Industry associations

To encourage the role industry associations are playing and to compensate them for the strategic inputs, direction giving and administration work they are doing, the ratio of THRIP:Industry associations is set at 1:1, regardless of the composition of the industry association out of large and SMME companies. The industry associations are given the right again to compile applications on behalf of their member companies and to provide first level evaluation and selection to assist THRIP in funding the right combinations of activities of importance to the specific industry sector represented by the industry association.

Strategic drivers

In addition to the need for including SMMEs, the movement of THRIP activity closer to the market with the aim of commercialising THRIP project outcomes is added.

Technology platforms

Technology platforms were discussed earlier in this document and relate to a special type of consortium where universities, large companies and SMMEs work together with the specific aim to generate students with the skills and capabilities to implement research for competitive advantage and to commercialise R&D. Such a technology platform contains all the components in the innovation value chain that are required to take the idea through to the market in the fastest possible time. It is thus supported not only by technological innovation, but also by service, market, economic and social innovation and forms a holistic approach to making business success from knowledge and research. It is a domain where universities cannot play alone based on their mandates and may include a certain level of R&D in industry as well.

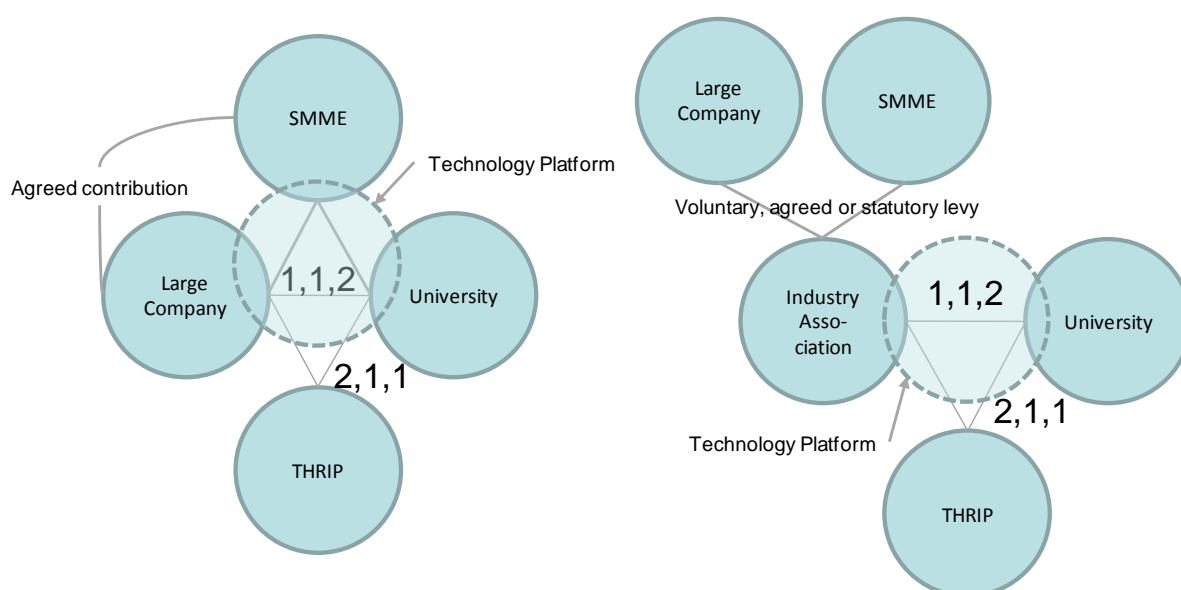


Figure 63: Scenario 2 – introducing technology platforms for commercialisation

The positioning of the technology platforms with respect to the partners is shown in Figure 63.

Ratios for scenario 2

The ratios in this scenario are summarised in Table 7. The relative contributions among the industry partners and/or industry association are negotiated internally.

Table 7: New THRIP ratios are introduced in Scenario 2

INDUSTRY PARTNER (S)	THRIP CONTRIBUTION	LARGE INDUSTRY CONTRIBUTION	SMALL & MEDIUM ENTERPRISE CONTRIBUTION	INDUSTRY ASSOCIATION	TECHNOLOGY PLATFORM
	(R)	(R)			
Large company(ies) only	1	2	N/A	N/A	N/A
Large company(ies) plus SMME(s)	1	1	5 % of large company contribution	N/A	N/A
All SMMEs	1	N/A	1	N/A	N/A
All SMMEs and all BEE	2	N/A	1	N/A	N/A
Industry associations	1	N/A	N/A	1	N/A
Technology platforms					
(Year 1)	2	Negotiated	Negotiated	Negotiated	1
(Year 2)	1	Negotiated	Negotiated	Negotiated	1
(Year 3)	1	Negotiated	Negotiated	Negotiated	2

Impact of following Scenario 2

The negativity expressed in the survey about how THRIP addresses SMMEs and their need for research and the standard complaints that previously disadvantaged individuals (PDIs) are not available may be offset with an incentive in changing the funding ratios to encourage large companies to continue with THRIP and by incentivising them more to find and include SMMEs in their consortia.

Dealing with large companies

Here the approach is to return to the THRIP:Large Company ratio as it was before 2007, and changing that back to 1:2 from 1:3. More favourable ratios are also introduced for involving SMMEs than the current situation. The difference is that large companies who cannot find SMME partners do not perceive the programme as discriminatory anymore.

Dealing with SMMEs

A different dispensation for drawing in SMMEs is devised. An opportunity must be created to make it attractive to large companies to team up with SMMEs. In targeting technology-based SMMEs as described earlier, the larger companies will see the seriousness of joint venturing with SMMEs. Intervention will be required, since large companies will not readily collaborate with SMMEs just as universities will not easily collaborate with universities of technology. An incentive is suggested to make the THRIP:Large Company/SMME 1:1 with no minimum condition for number of SMMEs. The

SMME will have to be evaluated for its R&D synergies and the benefits it could derive from the association with the large company. The SMME will still be expected to contribute 5% of the large company contribution

In a separate approach, SMMEs will have to be mobilised to form partnerships with universities on their own. The level of interaction must strictly be managed at research collaboration. Technology transfer could be an outcome, but should not overlap with what Tshumisano is already doing through the universities of technology.

Focusing on student benefits

Another change in focus is to increase the benefits to students. Here larger contributions of student support would be allowed to bring the student support on par with other programmes where bursaries may be more attractive and lure students away from THRIP.

Dealing with equity and redress

Specific incentives for projects presenting good plans to address the equity and redress situation should be made available. Posts for black and female researchers on THRIP projects could be paid for in full as part of the grant.

Increase impact of industry associations

Industry associations should be encouraged to be formed and to take leadership in putting together THRIP applications on behalf of and in close liaison with their academic partners. Industry associations should be given a default funding ratio of 1:1 to encourage their investments which are derived from member levies. Their efforts in deciding on the right research for the industry sector, providing guidance to universities to do relevant research and in evaluating and screening THRIP applications, as well as providing management support and ensuring adequate and timeous reporting should be awarded in this way.

Introducing technology platforms

The identification of technology platforms that will fast track commercialisation of THRIP activity should be added as a funding category. Here careful planning and strong motivation by consortia consisting of large and small/medium enterprises, universities, government and student representation should identify technology platforms that are close to commercialisation. An incentive should be given to encourage these projects and a kick-off funding ratio of THRIP:Industry Partnership of 2:1 should be given for a minimum of one year. As the products or services emanating from the THRIP project enter the market, this subsidy can be reduced over a period of three years from 2:1 to 1:1 to 1:2. After that the products should be commercially independent.

Scenario 3: Moving to a different framework of THRIP focus, strategy and funding rules

In this scenario, **academic-based research is funded as in scenario 2**, but **the dti** starts a radical programme via THRIP to establish a research culture in industry by directly investing in industry to set up R&D initiatives that will make them more competitive.

Focus

The development of high level human capacity remains the main focus. The difference is that here a component of such human capacity development is done directly in industry and not only in the academic world. The inability of university-trained human capacity to close the “Innovation Chasm” which means that locally generated knowledge and research products are not deployed in the local market is now addressed by empowering industry in parallel to develop their own human resources with specialisation in commercialisation. The university subsidy system is preventing fast enough development of such skills and the focus on publishing research rather than following through to a commercial product is not addressing the declared need for crossing the “Innovation Chasm.”

Visualising Scenario 3

The association of partners and relative contributions in Scenario 3 are outlined graphically.

In-house R&D in companies

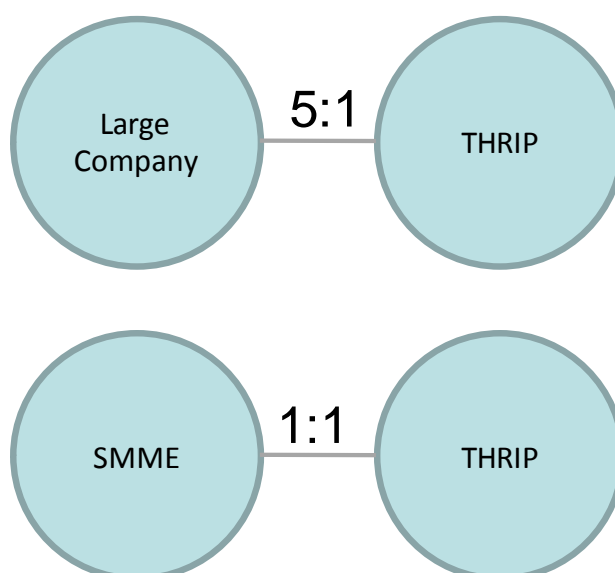


Figure 64: Scenario 3 – THRIP and industry contributions for setting up R&D initiatives in companies

In Figure 64 the situation is shown where a large company or an SMME decides to set up in-house R&D with the aim of also training high level human resources to effect commercialisation better. The direct THRIP investment could be in the following forms:

- Providing grants to large companies setting up in-house R&D on a THRIP:Industry ratio of 1:5
- Providing grants to SMMEs/BEEs that want to do in-house R&D and grow their own R&D skills base on a 1:1 THRIP:SMME basis

Attracting FDI in R&D

Figure 65 shows how THRIP could incentivise the attraction of FDI in R&D in both large companies and SMMEs. Here the FDI may be on a contract basis and may be proprietary, but a part of the foreign funding will be ring fenced for human capacity development and the THRIP funding will be

used to train the high level human resources required to make the R&D competitive and attractive to the foreign investor.

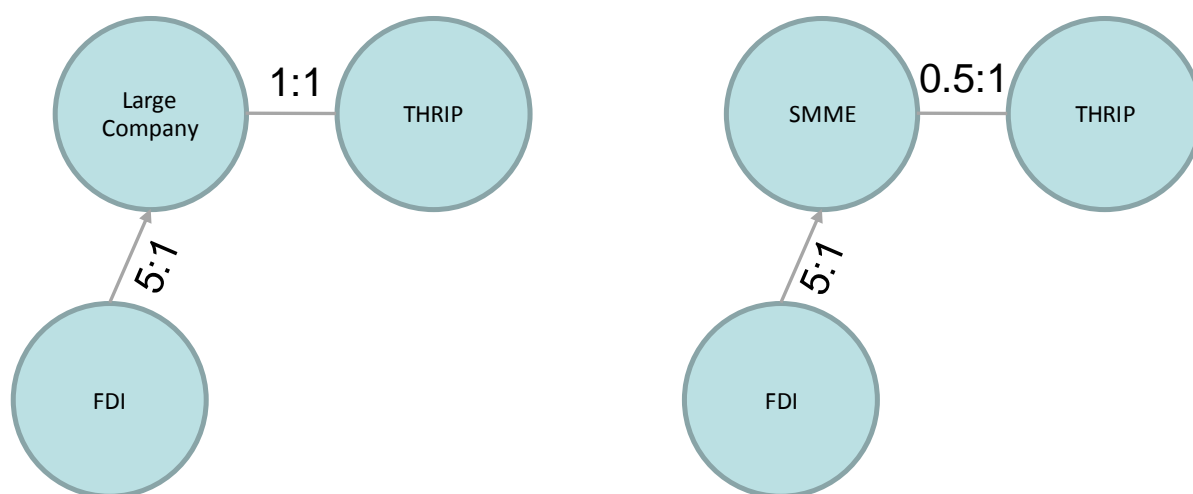


Figure 65: Scenario 3 – THRIP and enterprise contributions for attracting FDI for R&D in companies

THRIP could invest in large companies to attract foreign direct investment (FDI) in R&D on a ratio of THRIP:Large Company:FDI of 1:1:5. This investment could also count as a multiplier in NIPP if the multinational has an offset obligation.

When SMMEs succeed to attract FDI in R&D, THRIP could invest in SMMEs on a ratio of THRIP:SMME:FDI of 1:0.5:5.

Consortia formation around R&D in industry and the involvement of multinationals

In Figure 66 consortia formation between local large company(ies) and SMME(s) on the one hand and a combination of local large companies and SMMEs and multinationals is shown. The relative contributions between the consortia partners are a matter of internal negotiations. The consortium then approaches THRIP who makes an investment based on the ratios shown.

THRIP could incentivise local SMME/Large company R&D consortium formation on a basis of THRIP:Consortium of 1:2. Likewise SMME/Large company/Multinational collaborative research initiatives could be supported on a THRIP:Consortium ratio of 1:3

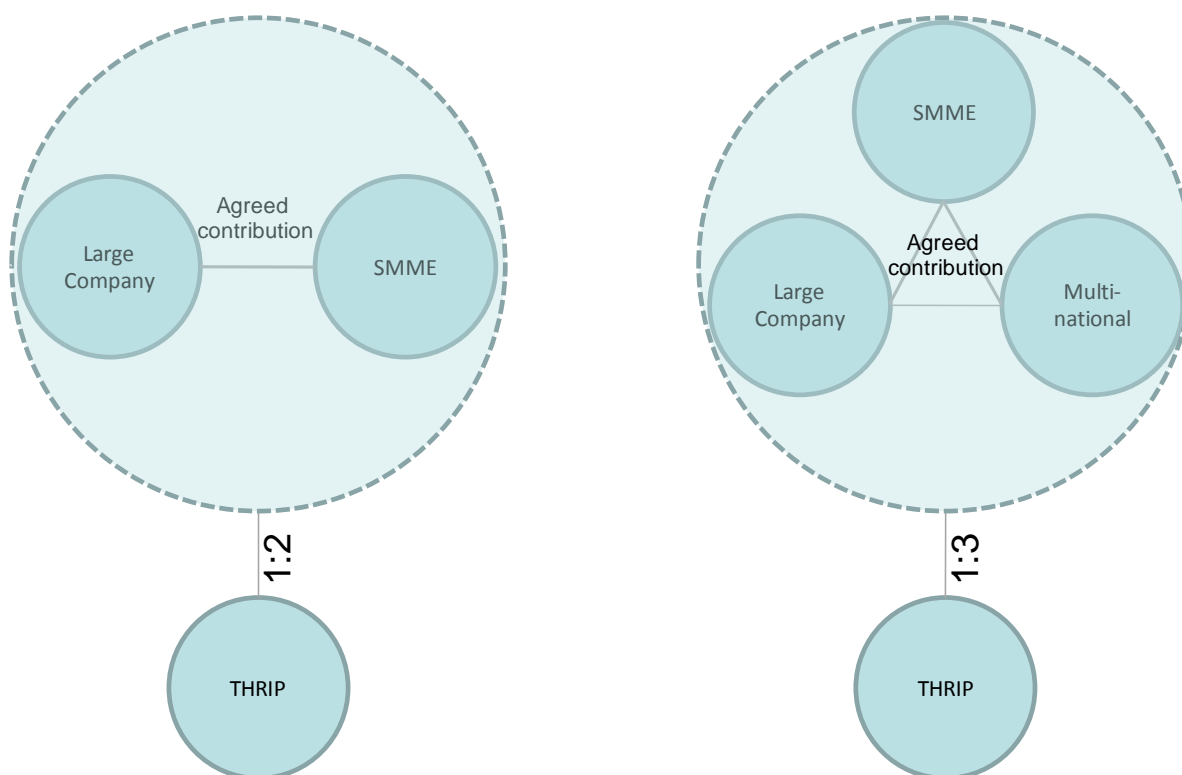


Figure 66: Scenario 3 – Consortium R&D in companies, including multinational participation

Strategic driver

The main strategic driver is the development of high level human resources in an industry-placed R&D environment where commercialisation for competitive advantage is the main objective. This is achieved by:

- Encouraging in-house R&D in industry
- Enabling SMMEs to become involved in industry and in-house R&D
- Making it attractive for international companies to do FDI in South African R&D
- Incentivising the formation of international consortia

Ratios for scenario 3

The ratios for Scenario 3 are shown in Table 8.

Table 8: Scenario 3- Radical THRIP intervention to encourage R&D in industry - Ratios

INDUSTRY PARTNER (S)	THRIP CONTRIBUTION	LARGE INDUSTRY CONTRIBUTION	SMALL & MEDIUM ENTERPRISE CONTRIBUTION	MULTINATIONAL CONTRIBUTION	CONSORTIUM
	(R)	(R)			
Large company setting up in-house R&D	1	5	N/A	N/A	N/A
Large company attracting FDI for R&D	1	1	N/A	5	N/A
SMME attracting FDI for R&D	1	N/A	0.5	5	N/A
SMMEs/BEEs setting up in-house R&D	1	N/A	1	N/A	N/A
SMME/Large company setting up joint in-house R&D	1	Negotiated	Negotiated	N/A	2
SMME/Large company/Multinational collaborative research initiatives	1	Negotiated	Negotiated	Negotiated	3

Impact of following Scenario 3

The industry/university interface has been adequately serviced by THRIP over its existence. South Africa is lacking research in industry at the scale its international competitors are doing. It is clear that supporting only the university/industry interface to generate more skilled human resources and R&D has not been successful in establishing such an industry R&D base. A radical change in approach, which may challenge the PFMA is suggested here where government co-invests with companies to strengthen their own internal R&D base.

This intervention will also prepare industry to co-invest with government in the academic sector as outlined in Scenario 2 in the “classical” THRIP approach. It will remove the standard academic concern that “industry does not understand R&D” and provide an impetus towards collaboration among large companies and SMMEs. Commercialisation will become the driver for developing high level human resources, and not university mandates alone anymore. In the end, though this approach may be controversial, it will close the gap between academia and industry and provide a smooth, continuous innovation value chain.

The following outcomes will be achieved through following this scenario:

- Development of the skilled R&D human resource base in industry
- Competitive products and services that are fast tracked to market entry
- The establishment of in-house R&D facilities and processes
- Multinational participation in R&D in the South African industry

- Foreign direct co-investment in R&D

The objective of building an SMME base that will drive the economy will be addressed in this way. SMMEs that do not have adequate funding to establish their own research activities will be given an opportunity to do this. This intervention will result in sustainable and continued development and rounding off of high level human resources that emerge from the existing THRIP environment (Scenario 2) to pursue a career in R&D in industry.

Various levels of additional support could be supplied by this new paradigm in THRIP:

Large companies:

- More will be invested by the company in in-house R&D with a resultant larger R&D investment tax benefit
- In a revised TIPTOP scheme, companies will receive a grant to appoint expert researchers from universities, science councils or international laboratories to work on agreed projects
- Companies will have to invest in in-house research infrastructure and equipment which will be available to THRIP projects they may conduct with the academic sector
- Government will fund liaison with multinationals to set up collaborative R&D initiatives that may be funded via NIPP (National Participation Programme) or similar offset schemes
- If a company is prepared to host an advanced laboratory that could be a national facility, subsidies for such facilities may be offered.

SMMEs:

- SMMEs may apply for competitive grant funding to set up their own R&D initiatives. A part of this grant funding may be used to partner with universities to set up industry/academic THRIP projects and is a direct subsidy to encourage SMMEs to become involved in THRIP
- SMMEs can be subsidised to venture into collaborative R&D with large companies and multinationals.
- SMMEs will benefit from increased investment in R&D and resultant tax benefits
- An SMME hosting an advanced laboratory that could be a national facility could be subsidised for such facilities.

Generic improvements to THRIP

Regardless of the scenario followed, certain improvements in the management of THRIP are desirable. These deficiencies emerged from the knowledge of the management team, the survey and workshop discussions and individual interviews.

Ratios (adjustment and strategic incentives- size, stage, sector)

The ratios have been discussed in detail, and the minimum changes to be made is to revert to a THRIP:Large Company shared funding ration of 2:1. This should be set as a default. Adjustments can then be made according to merit or the choice made from the scenarios presented can be instituted.

Strategic incentives, based on size of the project or participating industry partners, stage of development and sector prioritisation can be made, guided by the scenarios.

Timing of funding

The misalignment of the government financial year (April – March) and the academic year (January – December) has caused concern about the announcement of grants, the financial risk and the ability to appoint students at the right time. This has already been addressed by THRIP management in liaison with the NRF Corporate Management and **the dti**. From 2009 the projects will be announced before the end of the following year and funding will be released by January of the year of approval.

Research phases

A system should be developed for grant applicants to identify which of three research phases their project falls into: Initiating, Developing or Implementing. It would be expected that projects in the early stages should collaborate with THRIP until the implementation phase is reached – even if that phase is funded through a different funding instrument (for example TIA or the Innovation Fund).

SMMEs

The scenarios deal in great depth with the objective of including SMMEs in research and human capacity development. It addresses incentives to attract more SMMEs to work with universities and large companies as well as proposes a radical approach where SMMEs may be funded directly to establish a research culture that could lead to large participation in THRIP consortia in future. It is recognised that SMMEs are not representing a homogeneous group, but vary in technology dependence, size and operation. Interventions guided by the scenario suggestions are to be developed to balance diversity and simplicity in dealing with SMMEs.

IPR Act

The IPR Act has a major influence on how business perceive joint ventures with public funded institutions. The impact of the IPR Act on THRIP and R&D in general is not widely understood, because of its newness. THRIP management will undertake to communicate the impact of the act on THRIP consortia and implications it may have for certain projects. As such THRIP should familiarise itself with the act and be in a position to advise prospect grant holders in the proposal phase of a project.

Proactive project development

Where required, THRIP management should do brokering among parties to join into consortia to apply for THRIP funding, as well as providing assistance with relationship building.

THRIP Guide

THRIP management has declared that it wants to revise the THRIP Guide. Strategic decisions following from these scenarios will shape the new THRIP Guide. The Guide should include information on the tax incentives available for THRIP industry partners.

Student support and engagement

Student support has been identified as an area that requires a new approach. Students should be elevated as the main beneficiaries of THRIP and not researchers or consortia. In the end, students are the “trained human capacity” which is the main objective of THRIP. THRIP is investigating other means of student support.

It is accepted that bursaries are the domain of the National Department of Higher Education and that **the dti** cannot position itself as a main supplier of bursaries. Yet, student support via studentships and internships and subvention of bursaries should be expanded.

Other departments providing bursary schemes should be channelled towards THRIP to co-support high level human resource development.

Reapplication for existing projects

THRIP has expressed the intention to revise the current system where a grant holder has to reapply on an annual basis. Grants should be awarded for fixed periods (3 or 5 years are preferable) and grant holders should report on progress and financial movement on an annual basis. Based on this annual project report, the project should proceed if progress was satisfactory. This will eliminate the burden of re-assessing projects formally on an annual basis. This simplification of procedure will only succeed once grant holders report responsibly.

THRIP Administration

The THRIP management team is committed to continuously improve THRIP administration. To do this internal evaluation systems should be investigated. A large part of successful administration has to do with effective communication with stakeholders.

Recommendation and conclusion

This investigation was initially only aimed at understanding the decline in THRIP applications over a demarcated period. This remains the primary focus, but it also developed into a broad based overview of how THRIP can be improved as a programme. It is therefore poised to be used as a strategic springboard for optimising THRIP in terms of its impact and influence in the research and development community. It is a programme of critical importance, in line with international trends to bring academia and industry closer to each other.

Left alone, the so-called “triple-helix” (government-academia-industry) is not a natural collaboration space. The need for successful economic growth, new industry creation and the creation of wealth that would benefit the nation as a whole should be the driver instead of short term financial gains. THRIP should not be seen as a “gap-filler” where other finances are not available, like is the case to some extent currently, but as a programme where participation forms part of a national pride. As such it should be elevated above ordinary funding schemes by being flexible, accommodating and well-aligned to meet national goals. It is a unique opportunity where the supply and demand of high level human resources with a high potential to address economic growth could be in touch with each other and create a platform where economic growth does not remain a strategic vision, but becomes a reality.

Appendix A: International Benchmark

A comparison of the South African THRIP was done with:

- The Linkage Programme of the Australian Research Council in Australia
- The National Science Foundation (NSF) Industry/University Cooperative Research Centres (I/UCRC) programme in the USA
- Programmes of the South Korean National Research Foundation (NRF) including the Korean Science and Engineering Foundation (KOSEF), Korea Research Foundation (KRF), Korea Foundation for International Cooperation of Science and Technology (KICOS) and the Korea Advance Institute of Science and Technology (KAIST)

Australia

In Australia the Linkage Programme³ is managed by the Australian Research Council. The Linkage Projects scheme supports collaborative research and development projects between higher education organisations and other organisations, including industry, state- and local government to enable the application of advanced knowledge to problems. Typically, research projects funded under the scheme involve risk.

Proposals for funding under Linkage Projects must involve a Partner Organisation from outside the higher education sector. The Partner Organisation must make a minimum cash contribution of R5 000 (2009) and in kind, to the project that is equal to, or greater than, the ARC funding. There is a ratio of cash:in kind that is allowed.

Under the Linkage Projects scheme, the ARC offers postgraduate awards and fellowships to provide industry-oriented research training and enable postdoctoral researchers to pursue internationally competitive research opportunities in collaboration with industry.

In recommending funding for Proposals under Linkage Projects, the ARC may take into consideration the likely benefit of the research to Australian regional and rural communities.

The objectives of Linkage Projects are to:

- Encourage and develop long-term strategic research alliances between higher education organisations and other organisations, including within industry and end-users, in order to apply advanced knowledge to problems and/or to provide opportunities to obtain national economic, social or cultural benefits
- Support collaborative research on issues of benefit to rural and regional communities
- Enhance the scale and focus of research in National Research Priorities
- Foster opportunities for postdoctoral researchers to pursue internationally competitive research in collaboration with organisations outside the higher education sector, targeting those who have demonstrated a clear commitment to high-quality research
- Provide outcome-oriented research training to prepare high-calibre postgraduate research students

³ http://www.arc.gov.au/ncgp/lp/lp_default.htm

- Produce a national pool of world-class researchers to meet the needs of the broader Australian innovation system

The minimum level of funding which will be provided for a research program is AUS \$30 000 (US\$ 27 500) per year. The maximum level of funding which will be provided for a research program is AUS\$ 120 000 (US\$ 110 000) per year. In exceptional circumstances, the ARC may consider higher funding levels where an outstanding case is made.

The broad Themes under which research Proposals are to fall are:

- National and international collaboration in research
- Discipline research development
- Professional development for early and mid-career researchers
- Science, humanities, social science and technical and engineering research policy
- Multidisciplinary, interdisciplinary, or cross-disciplinary research
- Other areas, as approved by the ARC

Research programmes focus on:

- Climate change/water/sustainability
- Energy
- Security and safety
- Knowledge acquisition and transfer and social inclusion
- Industry development
- Indigenous research
- Australia and the Asia-Pacific region
- Health, nutrition and disease;
- Other areas, as approved by the ARC

In these areas the following types of research are supported:

- Pure basic research which is experimental and theoretical work undertaken to acquire new knowledge.
- Strategic basic research which is experimental and theoretical work undertaken to acquire new knowledge directed into specified broad areas that are expected to lead to useful discoveries. Such research provides the broad base of knowledge necessary to solve recognised practical problems.
- Applied research which is original work undertaken primarily to acquire new knowledge with a specific application in view. Such research is undertaken either to determine possible uses for the findings of basic research or to determine new ways of achieving some specific and predetermined objectives.

Proposals are selected using the following criteria:

- The contribution to the development of Australian research
- Collaborative approaches to research and research training
- Research and research training in the Themes
- The merit of the proposal in relation to its:
 - goals and potential outcomes

- conceptual framework, design, methods and analyses
- budget justification and value for money
- The extent to which the proposal may be expected to have results of broad benefit for research and scholarship in the natural and applied sciences, technological development and applied technology, the social sciences and/or the humanities.
- The potential for the research to contribute to issues of national significance.

The ARC does not claim ownership of any intellectual property in a proposal or which is created or developed from the conduct of a project funded. Except with written approval from the ARC, all proposals and ARC-funded research projects must comply with the *National Principles of Intellectual Property Management for Publicly Funded Research* and accord with any intellectual property policies of the researchers' organisations.

The USA

The National Science Foundation (NSF) supports supplemental requests for cooperative research projects between NSF Industry/University Cooperative Research Centres (I/UCRC)⁴. This approach provides the means for I/UCRCs to collaborate on projects of mutual interest that benefit the research portfolios of multiple centres.

The I/UCRCs programme develops long-term partnerships among industry, academia, and government. The centres are catalysed by a small investment from the National Science Foundation (NSF) and are primarily supported by centre members, with the NSF taking a supporting role in their development and evolution. I/UCRCs stimulate highly leveraged industry/university cooperation by focusing on fundamental research recommended by Industrial Advisory Boards.

Each centre is established to conduct research that is of interest to both the industry and the university with which it is involved, with the provision that the industry must provide major support to the centre at all times. The centres rely primarily on the involvement of graduate students in their research projects, thus developing students who are knowledgeable in industrially relevant research.

To industry, government, and other organisations with research needs the NSF I/UCRC programme provides the means to leverage R&D investments with multi-university centres renowned for their innovative research capabilities. To colleges and universities with research capabilities the NSF I/UCRC programme provides opportunities to partner with other leading institutions to conduct industrially relevant research, receive seed funding and recognition as a NSF research centre with access to professional resources and guidance aimed towards enhancing global competitiveness.

The following programmes are supported:

- Fundamental Research Programme for Industry/University Cooperative Research Centres (FRP) – provides funding for industry driven fundamental research that enables I/UCRC growth through increased industry participation

⁴ <http://www.nsf.gov/eng/iip/iucrc/>

- Supplemental Opportunity for SBIR/STTR (Small Business Innovation Research and Small Business Technology Transfer) – provides major funding to small business that enables them to join in I/UCRC research efforts
- Industry/University Cooperative Research Centres Programme - Funding to plan, start, and operate multi-university research centres.
- Collaborative Opportunity for Research Between I/UCRCs and the NSF funded programmes.

The I/UCRC Programme is influencing positive change in the performance capacity of the US industrial enterprise. Over the past two decades, the I/UCRCs have led the way to a new era of partnership between universities and industry, featuring high-quality, industrially relevant fundamental research, strong industrial support of and collaboration in research and education, and direct transfer of university developed ideas, research results, and technology to the US industry to improve its competitive posture in world markets. Through innovative education of talented graduate and undergraduate students, the I/UCRCs are providing the next generation of scientists and engineers with a broad, industrially oriented perspective on engineering research and practice.

With industrial and other support totalling 10 to 15 times the NSF investment, I/UCRCs are a premier example of "leveraged" funding - a model for the Federal Government in how to develop cost effective synergy with the nation's research and development process. This model has directly influenced several other Centres programmes that were subsequently established by NSF and other Federal agencies. Placed in this context, the I/UCRC Programme is a distinctive driver of the growing NSF-industry-university partnership. The emphasis in the past few years has been the establishing of nearly 30 multi-university I/UCRC centres.

The Centres have well over 600 memberships. Of these, about 90 percent are industrial firms, with the remaining 10 percent including State governments, National Laboratories, and other Federal agencies. Most universities also provide direct and/or indirect support (e.g., cost sharing) for their Centres.

The NSF investment in the I/UCRCs is intended to seed partnered approaches to new or emerging research areas, not to sustain the Centres indefinitely. The Foundation intends for I/UCRCs gradually to become fully supported by university, industry, state, and/or other non-NSF sponsors. Each I/UCRC is expected to maintain at least US\$ 300 000 of industrial support through membership fees, at least six industrial members, and a plan to work toward self-sufficiency from NSF. Over 80% of the centres established under the I/UCRC programme continue on as successful centres without NSF funding.

South Korea

The South Korean National Research Foundation (NRF) is the combination of Korean Science and Engineering Foundation (KOSEF), Korea Research Foundation (KRF) and Korea Foundation for International Cooperation of Science and Technology (KICOS).

The Korea Advance Institute of Science and Technology (KAIST)⁵ also makes funds available for research. The KAIST-mission addresses:

⁵ Information supplied by Z Dyosi, following private communication in Korea

- Education and training of highly qualified scientists and engineers equipped with theoretical and practical expertise
- Participate in mid-to long term government research projects and basic and applied research for the accumulation of Korea's competitiveness in science and technology
- Provision of research platforms to other research institutes and enterprises

The institution has IP management, technology transfer and business incubation offices.

The business incubator has 96 residents that include 19 new start companies in 2007. The institute focus on IT/electrical, semiconductor/materials, biomedical, machines and other research domains.

The institution also has a "technology hospital" that does consulting and provides solutions to technology problems. This hospital has 111 "clinics" for solving problems in IT (digital communication, security, network etc.), Bio- and Chemical (brain sensor, bio-system metabolics, etc.), energy and environment (solar energy, nuclear energy disasters, etc.), patent/design (intelligent systems, interaction design, industrial design, etc.).

Comparison of certain parameters for joint industry-government-academic joint research support programmes in South Africa, Australia, the US and South Korea

Item Programme	South Africa THRIP	Australia Linkage	USA NSF Industry/University Cooperative Research Centres (I/UCRC)	South Korea NRF/KOSEF
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Item Programme	South Africa THRIP	Australia Linkage	USA NSF Industry/University Cooperative Research Centres (I/UCRC)	South Korea NRF/KOSEF
Objectives	<ul style="list-style-type: none"> To contribute to the increase in the number and quality of people with appropriate skills in the development and management of technology for industry; To promote increased interaction among researchers and technology managers in industry, universities and Science, Engineering and Technology Institutions (SETIs), with the aim of developing skills for the commercial exploitation of science and technology. To promote the mobility of people between industry and, universities and SETIs with the aim of developing researchers and R&D managers; To stimulate industry and government to increase their investment in research, technology development, technology diffusion, and the promotion of innovation; To promote increased collaboration 	<ul style="list-style-type: none"> Encourage and develop long-term strategic research alliances between higher education organisations and other organisations, including within industry and end-users, in order to apply advanced knowledge to problems and/or to provide opportunities to obtain national economic, social or cultural benefits; Support collaborative research on issues of benefit to rural and regional communities; Enhance the scale and focus of research in National Research Priorities; Foster opportunities for 	<ul style="list-style-type: none"> Collaborate on projects of mutual interest that benefit the research portfolios of multiple centres. Industrial significance and endorsed with a portion of industry funds at centres Research should provide the potential for transformative research that contributes to the societal or economic environment of the United States 	<ul style="list-style-type: none"> To improve research capability in technology development by organising scientific manpower into research areas at universities. To fulfil social and industrial needs by providing quality education in science and engineering and encouraging university and industry linkage To contribute to regional industry by carrying out research activities pertinent to regional characteristics

Item Programme	South Africa THRIP	Australia Linkage	USA NSF Industry/University Cooperative Research Centres (I/UCRC)	South Korea NRF/KOSEF
	<p>between large and small enterprises, universities and SETIs, by conducting R&D activities leading to technology transfer and product or process development, and</p> <ul style="list-style-type: none"> • To promote thematic collaborative research and development projects within the NIPF. 	<p>postdoctoral researchers to pursue internationally competitive research in collaboration with organisations outside the higher education sector, targeting those who have demonstrated a clear commitment to high-quality research;</p> <ul style="list-style-type: none"> • Provide outcome-oriented research training to prepare high-calibre postgraduate research students; and • Produce a national pool of world-class researchers to meet the needs of the broader Australian innovation system. 		

Item Programme	South Africa	Australia	USA	South Korea
	THRIP	Linkage	NSF Industry/University Cooperative Research Centres (I/UCRC)	NRF/KOSEF
The purpose for the scheme	The Technology and Human Resources for Industry Programme (THRIP) is a government and private sector partnership programme established in response to the recognition of the shortage of these high-level technical skills for industry and, the need to improve the competitive edge of South Africa's industry through the development and diffusion of advanced technologies.	The <i>Linkage Projects</i> scheme supports collaborative research and development projects between higher education organisations and other organisations, including within industry, to enable the application of advanced knowledge to problems.	Collaborative research between universities and industry in line with industrial priorities. The support of small business in a spectrum of small business funding instruments. An industry-university linkage mechanism is an organisational structure (e.g., department, unit) designed to house and support transactions between industry and a university. This relatively specialised organisational form is referred to as a boundary-spanning structure. These are relatively complex boundary-spanning structures because they must link dissimilar	The University-Industry programme supports joint ventures and provides advice to university and industry partnerships

Item Programme	South Africa THRIP	Australia Linkage	USA NSF Industry/University Cooperative Research Centres (I/UCRC)	South Korea NRF/KOSEF
			institutions and buffer conflict or friction. They achieve this, in part, by adopting features which represent a compromise between corporate and academic norms. Staffing is usually multidisciplinary allowing mechanisms to handle large-scale, multidisciplinary, applied, task-related projects which could never be handled through an academic department alone.	

Item Programme	South Africa THRIP	Australia Linkage	USA NSF Industry/University Cooperative Research Centres (I/UCRC)	South Korea NRF/KOSEF
Clusters supported	<ul style="list-style-type: none"> • Agriculture • Services • Construction • Energy • Financial and Business Services • Manufacturing • Mining • Transport • Communication • Trade • ICT 	<p>According to priority goals:</p> <ul style="list-style-type: none"> • Environmentally Sustainability • Promoting and Maintaining Good Health • Frontier Technologies for Building and Transforming Industries • National safeguarding 	<ul style="list-style-type: none"> • Advanced Electronics • Advanced Manufacturing • Advanced Materials • Biotechnology • Civil Infrastructure Systems • Information, Communication, and Computing • Energy and Environment • Fabrication and Processing Technology • Health and Safety • System Design and Simulation 	<p>New growth engine programme:</p> <ul style="list-style-type: none"> • Digital contents and software solutions • Future automobile technologies • Intelligent robots • Next generation batteries • Digital displays • Next generation semiconductors • New biomedicine organs • Next generation mobile telecommunications • Digital TV/broadcasting • Intelligent home networking

Item Programme	South Africa THRIP	Australia Linkage	USA NSF Industry/University Cooperative Research Centres (I/UCRC)	South Korea NRF/KOSEF
Application process	<ul style="list-style-type: none"> Using the Guide and the Multi-Criteria Decision Model (MCDM) which guides proposal assessment, to prepare a THRIP proposal; (MCDM is available on the THRIP website: http://www.nrf.ac.za/thrip; Registering and applying online at http://nrffonline.nrf.ac.za; and Submit application online to the industry partner. The industry partner will accept or reject application online. THRIP applications can only be submitted to the Research Administration once all the industry partners accepted/approved the application. 	<ul style="list-style-type: none"> A Proposal should be submitted as a mature research plan ready for implementation. The Proposal must contain all the information necessary for its assessment without the need for further written or oral explanation, or reference to additional documentation, unless requested by the ARC, including its College of Experts. Administering Organisations must use the on-line form within the RMS, accessible via the ARC Web Site. 	<ul style="list-style-type: none"> Proposals for funding must be submitted through an Internet based web interface 	<ul style="list-style-type: none"> A proposal is received online from the research institution There are no presentations to the panel

Item Programme	South Africa THRIP	Australia Linkage	USA NSF Industry/University Cooperative Research Centres (I/UCRC)	South Korea NRF/KOSEF
Selection and approval process	<ul style="list-style-type: none"> Organising independent external experts, in various technical fields, to assess the applications. Assessment is guided by the Multi-Criteria Decision Model Making the final decision on support (THRIP management); Communication of outcomes to the research administrator by email; and Preparation and mailing of allocation and regret letters to the research administrator, individual project leaders and their industrial partners. 	<ul style="list-style-type: none"> Assessment of Proposals is undertaken by the ARC, which has the right to make recommendations solely on the basis of its expertise. The ARC College of Experts assists with the assessment of Proposals. In addition to assessment by the ARC, a Proposal may at the ARC's absolute discretion be assessed by external assessors. The process can take up to 10 months 	<ul style="list-style-type: none"> All proposals submitted are peer reviewed by a panel of experts There are three coordinating mechanisms for the evaluation. First, NSF IUCRC staff provide overall guidance for the evaluation effort. Second, all evaluators comprise a coordinating committee for the evaluation effort. This group meets twice each year to share briefings on the findings of different components of the 	<ul style="list-style-type: none"> Reviewers are selected in KOSEF Expert Pool Peer review by digital management system (postal review) Panel review by field expert On-site review by site visit and examination Final selection by selection committee Selection committee comprise of management at KOSEF The application take about two months to approve

Item Programme	South Africa THRIP	Australia Linkage	USA NSF Industry/University Cooperative Research Centres (I/UCRC)	South Korea NRF/KOSEF
			evaluation effort, exchange information, orient new evaluators, and vote on issues related to the evaluation effort. Finally, a team from North Carolina State University (NCSU) has been contracted to coordinate and support the IUCRC evaluation assessment activities.	

Item Programme	South Africa					Australia	USA	South Korea
	THRIP					Linkage	NSF Industry/University Cooperative Research Centres (I/UCRC)	NRF/KOSEF
Funding formulas used	INDUSTRY PARTNER (S)	THRIP CONTRIBUTION (R)	LARGE INDUSTRY CONTRIBUTION (R)	SMALL & MEDIUM ENTERPRISE CONTRIBUTION	VERY SMALL ENTERPRISE CONTRIBUTION	Proposals for funding under <i>Linkage Projects</i> must involve a Partner Organisation from outside the higher education sector. The Partner Organisation must make a significant contribution in cash and/or in kind, to the project that is equal to, or greater than, the ARC funding).	<ul style="list-style-type: none">The NSF I/UCRC supplement amount requested by each Centre from the NSF must be matched by an Industry Advisory Board (IAB) commitment. The IAB of each Centre must use funds already collected by the centre through its memberships as this opportunity represents a choice that it can make in selecting centre projects.Thus an effective minimum 1:1 NSF: Industry	Many companies are investing large amounts of funding to the University-Industry projects.
	Large company(ies) only	1	3	N/A	N/A			
	Large company(ies) plus minimum of 25% by number of SMMEs (e.g. consortium with 1, 2 or 3 large companies must have at least 1 SMME partner)	1	2	5% of highest contribution	No financial contribution			
	All SMMEs	1	N/A	1	No financial contribution			
	All SMMEs and all BEE	2	N/A	1	No financial contribution			
	TIPTOP OPTIONS							
	TIPTOP: Generally, THRIP will contribute 33% (i.e. R1: R2) up to a maximum of R83 333 per person on an annual basis and firm will pay the balance. For THRIP projects where the placements involve SMMEs, BEEs and for black or female (South Africans) TIPTOP candidates, THRIP will pay 50% (up to a maximum of R125 000 per person on an annual basis) of the costs, and the participating firm the balance (maximum annual package is R250 000).							

Item Programme	South Africa THRIP	Australia Linkage	USA NSF Industry/University Cooperative Research Centres (I/UCRC)	South Korea NRF/KOSEF
			<p>contribution.</p> <ul style="list-style-type: none"> In reality industrial and other support is totalling 10 to 15 times the NSF investment 	

Item Programme	South Africa THRIP	Australia Linkage	USA NSF Industry/University Cooperative Research Centres (I/UCRC)	South Korea NRF/KOSEF
Types of research supported	<ul style="list-style-type: none"> THRIP will consider support of projects in which the primary aim is to promote and facilitate <ul style="list-style-type: none"> ➤ scientific research ➤ technology development ➤ technology diffusion, ➤ or any combination of these. All projects funded by THRIP must include human resource development. The choice of technological focus for the activities to be supported by THRIP is left to the industrial participants and their partners. 	<ul style="list-style-type: none"> Pure basic research which is experimental and theoretical work undertaken to acquire new knowledge without looking for long-term benefits other than the advancement of knowledge; Strategic basic research which is experimental and theoretical work undertaken to acquire new knowledge directed into specified broad areas that are expected to lead to useful discoveries. Such research provides the broad base of knowledge necessary to solve recognised practical problems; and Applied research which is 	<ul style="list-style-type: none"> Industrially relevant fundamental research 	<p>Two types of centres that were funded by KOSEF are:</p> <ol style="list-style-type: none"> Science Research Centres – emphasize on creative basic research to ensure exploration of basic theory and knowledge that may lead to outstanding papers. Engineering Research Centres- Focus on basic engineering research with the potential for industrial advancement, while encouraging interdisciplinary collaborations between industry and academia

Item Programme	South Africa THRIP	Australia Linkage	USA NSF Industry/University Cooperative Research Centres (I/UCRC)	South Korea NRF/KOSEF
		original work undertaken primarily to acquire new knowledge with a specific application in view. Such research is undertaken either to determine possible uses for the findings of basic research or to determine new ways of achieving some specific and predetermined objectives.		

Item Programme	South Africa	Australia	USA	South Korea
	THRIP	Linkage	NSF Industry/University Cooperative Research Centres (I/UCRC)	NRF/KOSEF
Project costs supported	<ul style="list-style-type: none"> • Personnel (salaries) • Running costs • Overheads • Local travel • Local conferences • International travel • Equipment • Registration of patents 	<ul style="list-style-type: none"> • Personnel (salaries) • Relief from teaching or other duties for chief investigators • Equipment • Maintenance • Access to workshop services • Domestic and international travel costs 	<ul style="list-style-type: none"> • Centre costs 	<ul style="list-style-type: none"> • Equipment • Travel • Salaries • Running costs • Student bursaries

Appendix B: Detailed Web Survey Questionnaire



an initiative of **the dti**

Survey on THRIP Application Trends



Confidential



an initiative of **the dti**



[TechnoScene \(Pty\) Ltd](#) has been assigned by the [National Research Foundation](#) (NRF) to evaluate the decline in [THRIP](#) (Technology and Human Resources for Industry Programme) applications between 2006/07 and 2008/09.

THRIP is a partnership programme that is funded by the [Department of Trade and Industry](#) (**the dti**) and managed by the NRF. THRIP promotes partnerships in pre-commercial research between business and the public-funded research base including universities and research institutions. It also encourages and supports the development and mobility of research staff, students and technology managers in participating organisations.

A key challenge to THRIP is the decline in the number of applications received for research funding, and the associated decline in research and development outputs. The purpose of this survey is to establish the reasons for that decline. When you respond, please keep this in mind and do not give generic answers about the programme.

We will appreciate your comments in the survey below. You are welcome to only fill in parts of the questionnaire that pertain to your interest, that is whether you are an academic, business person or student involved in THRIP.

Personal details *(It will be appreciated if you could make these available, but if you feel you rather would stay anonymous, you are welcome to do so.)*

Title

Name

Surname

Institution

Tel Number

Code	<input type="text"/>	Number	<input type="text"/>
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Fax Number

Code	<input type="text"/>	Number	<input type="text"/>
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Mobile Number

email address

Sector of activity (It will be appreciated if you could fill this in, since this will assist in the analysis)

Your sector of activity

- ☐ Higher Education
- ☐ Industry - Large Company
- ☐ Industry - SMME
- ☐ Industry - BEE and Large Company
- ☐ Industry BEE and SMME
- ☐ Government

Your role in THRIP

- ☐ Researcher
- ☐ Industry Partner
- ☐ Visiting Academic in industry through TIPTOP
- ☐ Visiting industry practitioner in academia through TIPTOP
- ☐ Mentor
- ☐ Student
- ☐ Research Administrator
- ☐ Other, please name

Are you currently in a consortium that is a THRIP grant holder?

- ☐ Yes ☐ No

Have you previously been in a consortium that was a THRIP grantholder?

- ☐ Yes ☐ No

Are you considering to apply for THRIP funding?

- ☐ Yes ☐ No

If yes, please name the THRIP project(s)

Period in which funding was received from THRIP

 to

THRIP impact. Estimate the impact THRIP funding has had in your own environment on:

New knowledge

High	Medium	Low
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Human capacity development

High	Medium	Low
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Research and development outputs

High	Medium	Low
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

New solutions that were implemented

High	Medium	Low
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

THRIP Ratios

Set the THRIP funding ratios where you believe they should be (the current ratio is indicated above the selector)

INDUSTRY PARTNER (S)	THRIP CONTRIBUTION (R)	LARGE INDUSTRY CONTRIBUTION (R)	SMALL & MEDIUM ENTERPRISE CONTRIBUTION	VERY SMALL ENTERPRISE CONTRIBUTION
Large company(ies) only	1 <input type="text" value="1"/>	3 <input type="text" value="3"/>	N/A	N/A
Large company(ies) plus minimum of 25% by number of SMMEs (e.g. consortium with 1, 2 or 3 large companies must have at least 1 SMME partner)	1 <input type="text" value="1"/>	2 <input type="text" value="2"/>	5 <input type="text" value="5"/> % of highest contribution	No financial contribution
All SMMEs	1 <input type="text" value="1"/>	N/A	1 <input type="text" value="1"/>	No financial contribution
All SMMEs and all BEE	2 <input type="text" value="2"/>	N/A	1 <input type="text" value="1"/>	No financial contribution

External Influences on THRIP

Is THRIP sensitive to external economic and socio-political influences?

☐ Yes ☐ No

Which particular influences?

Have there been critical shifts in relationships between universities and companies over the past 3 to 5 years?

☐ Yes ☐ No

What are the shifts?

THRIP and Business

Do THRIP projects adequately meet SMME needs?

☐ Yes ☐ No

List specific requirements of SMMEs from THRIP funding

Does THRIP address expectations and needs of BEE companies?

☐ Yes ☐ No

What are the expectations and needs from BEE companies of THRIP?

What are the most important benefits an SMME can get from participating in THRIP funded projects?

Shared human resources	<input type="checkbox"/>
Shared equipment and facilities	<input type="checkbox"/>
Shared knowledge generation	<input type="checkbox"/>
Shared funding	<input type="checkbox"/>
Other	
<input type="checkbox"/> Name them	

What are the private company benefits derived from engaging as an industry partner in THRIP projects?

Access to experts in specific areas	<input type="checkbox"/>
Access to R&D	<input type="checkbox"/>
Post-graduate training for employees	<input type="checkbox"/>
Secondment of university staff to company	<input type="checkbox"/>
Other	<input type="checkbox"/>
Name them	

What are the business needs for accessing public funding like that offered by THRIP?

Public-Private Partnerships	<input type="checkbox"/>
Unique offering for public good	<input type="checkbox"/>
BEE development	<input type="checkbox"/>
SMME incubation	<input type="checkbox"/>
Other	<input type="checkbox"/>
Name them	

How can there be better alignment of THRIP with company specific needs?

What is the state of industry/university partnership formation skills in the South African market?

Poor	Good	Excellent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

THRIP and Academia

What are the academic benefits derived from participating in THRIP?

Research into relevant business/industry issues	<input type="checkbox"/>
Working close to the commercialisation interface	<input type="checkbox"/>
Involvement of business people in university research	<input type="checkbox"/>
Access to funding for research equipment and facilities	<input type="checkbox"/>
Access to student support	<input type="checkbox"/>
Other	<input type="checkbox"/>
Name them	

THRIP competitive positioning

What gap in government funding options should THRIP address?



What is the relevance of THRIP in terms of the market dynamics?



Which project clusters should THRIIP focus on?

ICT	<input type="checkbox"/>
Chemistry and Biochemistry	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Biotechnology	<input type="checkbox"/>
Manufacturing	<input type="checkbox"/>
Energy and Power	<input type="checkbox"/>
Agriculture	<input type="checkbox"/>
Aerospace	<input type="checkbox"/>
Other	<input type="checkbox"/>

Name them

Is there other competitive research funding that is easier to obtain than THRIIP funding?

☐ Yes ☐ No If "yes" please name it:

What is the relevance of the size of THRIIP grants?

☐ Grant size too low
☐ Grant size just right

Is THRIP supporting the right cost components (e.g. student support, operating costs, salaries, capital equipment, travel, etc)?

- ☐ Yes
☐ No

What more should it support - please name

Are THRIP consortia delivering according to commitments made?

- ☐ Yes ☐ No

THRIP Grant Administration

How effective is the application process ?

Poor	Good	Excellent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How effective is the panel review process?

Poor	Good	Excellent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What is the quality of of grant management and support at the NRF?.

Poor	Good	Excellent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What is the state of the
THRIIP/Industry interface in terms of:

Communication	<input type="radio"/> Very good <input type="radio"/> Good <input type="radio"/> Bad
Understanding of industry needs	<input type="radio"/> Very good <input type="radio"/> Good <input type="radio"/> Bad
Project alignment with industry needs	<input type="radio"/> Very Good <input type="radio"/> Good <input type="radio"/> Bad
Other	<div> <div>Very Good:</div> <div>Good:</div> <div>Bad:</div> </div>

What is the state of the
THRIP/University interface?

Communication	<input type="radio"/> Very good <input type="radio"/> Good <input type="radio"/> Bad
Understanding of university needs	<input type="radio"/> Very good <input type="radio"/> Good <input type="radio"/> Bad
Project alignment with university offerings	<input type="radio"/> Very good <input type="radio"/> Good <input type="radio"/> Bad
To what degree are student needs met by THRIP	<input type="radio"/> Very well <input type="radio"/> Adequate <input type="radio"/> Poor
Other (specify)	<div> <div>Very Good:</div> <div>Good:</div> <div>Bad:</div> </div> <div> <input type="text"/> </div>

Is there a need for THRIP to solicit projects as well as just calling for proposals?

☐ Yes

☐ No

Should THRIP ringfence funding per business type (BEE or not) and size (large, medium, small)?

(This might enable THRIP to apply more favourable ratio to, for example, large industries, but to limit the total funding available to that sector.)

☐ Yes

☐ No

Should THRIP re-instate "in-kind" contributions from industry to qualify for the funding ratios?

☐ Yes

☐ No

What is the ideal duration of a THRIP project?

- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☐ 4 years
- ☐ 5 years

How well does THRIP management do communication and project management support?

Poor	Good	Excellent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Would it be helpful if THRIP funded a project for its duration and re-application was not necessary annually?

- ☐ Yes
☐ No

Is there a need to take the THRIP model to other government departments?

- ☐ Yes
☐ No

If "yes" name them

What, in your opinion is the most pressing reason for a decline in THRIP applications over the past two years?

Open comments and suggestions for improvement.

You may now send us your input by clicking on the "submit" button below. Resetting will clear all data from the whole form. If you want to make small changes go back to the form element and make the change there. After submitting the information, a confirmation page will be displayed which you can save or print for your own record of the information that you submitted. To return from the confirmation page to this page and to make amendments to the data supplied, use the "Back" button on your browser. We will confirm receipt of your information by e-mailing you.

Submit

Reset

Appendix C: Classification of SMME

Sector	Full time paid employees				Annual Turnover (millions)				Total Gross asset value (property excluded) (millions)			
	Medium	Small	Very Small	Micro	Medium	Small I	Very Small	Micro	Medium	Small	Very Small	Micro
Agriculture	100	50	10	5	4	2	0.4	0.15	4	2	0.4	0.1
Mining and Quarrying	200	50	20	5	30	7.5	3	0.15	18	4.5	1.8	0.1
Manufacturing	200	50	20	5	40	10	4	0.15	15	3.75	1.5	0.1
Construction	200	50	20	5	20	5	2	0.15	4	1	0.4	0.1
Retail and Motor trade	100	50	10	5	30	15	3	0.15	5	2.5	0.5	0.1
Wholesale Trade	100	50	10	5	50	25	5	0.15	8	4	0.5	0.1
Catering, Accommodation	100	50	10	5	10	5	1	0.15	2	1	0.2	0.1
Transport, Storage	100	50	10	5	20	10	2	0.15	5	2.5	0.5	0.1
Finance & Business Services	100	50	10	5	20	10	2	0.15	4	2	0.4	0.1
Repair/Allied Services	100	50	10	5	30	15	3	0.15	5	2.5	0.5	0.1
Communications	100	50	10	5	20	10	2	0.15	5	2.5	0.5	0.1
Other Trade	100	50	10	5	10	5	1	0.15	2	1	0.2	0.1

Commercial Agents	100	50	10	5	50	25	5	0.15	8	4	0.5	0.1
Community& Social Services	100	50	10	5	10	5	1	0.15	5	2.5	0.5	0.1
Personal Services	100	50	10	5	10	5	1	0.15	5	2.5	0.5	0.1

Source: Registration for the Supplier Database of the Department Trade and Industry