

TITLE:

Aligning formal education and skills development for Industrial Development

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ABSTRACT

The core of industrial development is the belief that development is an important and a necessary vehicle towards achieving national goals such as poverty reduction, elimination of inequality and employment creation. Industrial development needs to be supported by educated and skilled labour pool, empowered to fulfil the industrialisation goals of the country. By definition, industrial development includes planning towards the development of new and specialised industries, with a need for financial planning towards research, education and skills development. Education and skills development policy must be a public and private partnership that ensures the quality of qualifications, skill development and vocational training. The NDP emphasises the importance of education and skills acquisition at all levels of qualifications and the need to have a clear linkage between education and training and world of work.

Research skills aligned to development and innovation constantly evolve and as such countries that innovate have elevated jobs that allow absorption of new job entrants and expansion of job opportunities. The future of industries under Industrial Revolution4 (IR4) will demand a pronounced strategy towards skills evolution into technology, internet, automated manufacturing and big data analytics. In achieving the beneficiation goal, the country must develop skills that will benefit the goal within the 4th Industrial Revolution. In addition, efforts should be taken to bridge the skills gap within the qualification phase with the intent to address the current structural problem in unemployment. The current model in skills development with SETAs tasked with expert identification and bridging skills gap within industries needs a review as the country still exhibit skills mismatch. Furthermore, policy must look at education and skills development that not only advance growth, but that also fosters societal resilience in the midst of technological revolution. Also, developing market signals for job demand is important for continued engagements between all role players in skills development chain, ensuring that systems are put in place to identify 1) obsolete skills, 2) need for up-scaling and 3) new skills to meet evolving industry needs.

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INTRODUCTION

At the core of industrial development is a belief that this development is an important and a necessary vehicle towards achieving national goals such as poverty reduction, elimination of inequality and employment creation. Industrial development may not achieve desired outcomes if not supported by educated and skilled labour pool, empowered to fulfil the industrialisation goals of the country. By definition, industrial development includes planning towards the development of new and specialised industries and this requires recognising the need for financial planning towards research, education and skills development.

Current industrialisation demands are different from demands of the past decades due to the level of technical advancement in terms of skills and educational needs. As economies are no longer developing in isolation, there is a need to meet both domestic and international standards and expectations from industries identified as key for industrialisation. Growth and meaningful contribution of labour to industrialisation require assessing national education and skills levels. As a middle income country (World Bank, 2018), employability in South Africa may demand more emphasis on specialised high-level training when compared to improving basic education levels and TVET in low income countries (Albaladejo and Weiss, 2017).

Relevant qualifications and better skills are not only important for employability, but for sustainable participation of local citizens within the industrialisation path, reducing dependency on the importation of labour. Furthermore, this will ensure that most of the labour remuneration circulates within the domestic economy, and results in better living standards for citizens. In addition, better skills and qualifications aligned with national industrialisation plan may afford the country a certain level of competitive edge within related global value chains (Albaladejo and Weiss, 2017). It is therefore important to understand the direction taken in order to align the education and skills development policy with the industrialisation drive.

The next section will look at the Industrial Policy Action Plan (IPAP) industries and skills demand for each. Then international experiences are looked at thereafter. A look at the labour market follows, and education and skills development policy is the next section. A broad discussion follows and a conclusion.

INDUSTRIAL POLICY ACTION PLAN (IPAP) DRIVERS

According to IPAP1 (2007), the SA economy exhibited a declining employment trend in traditional sectors¹, with no offsetting employment increase in labour intensive sectors such as manufacturing. To address this challenge, the National Industrial Policy Framework (NIPF, 2007) sought to promote labour-intensive industrialisation path, in addition to increase value-add production and economic migration to knowledge economy.

¹ Mining and Agriculture

| 2007 FOCUS Sectors | 2014-15 FOCUS Sectors | 2017-18 FOCUS Sectors |
|---|--|---|
| Capital/Transport equipment and Metals* | Clothing, Textiles, Leather and Footwear | Automotives |
| Automotive assembly and Components* | Automotive | Clothing, textiles, leather & footwear |
| Chemicals, Plastic fabrication and Pharmaceuticals* | Metal Fabrication, Capital & Rail Transport Equipment | Metal fabrication, capital and rail transport equipment |
| Forestry, Pulp and paper, and Furniture* | Mineral Beneficiation (Upstream and Downstream) | Agro-processing |
| | Agro-Processing | Forestry, timber, paper, pulp and furniture |
| | Forestry, Timber, Paper, Pulp and Furniture | Plastics |
| | Biofuels | Chemicals, pharmaceuticals & cosmetics |
| | Plastics, Pharmaceuticals, Chemicals and Cosmetics | Primary minerals beneficiation |
| | Business Process Services | Green industries |
| | Cultural and Creative industries | Business Process Services |
| | Green industries | Water and sanitation |
| | Upstream and Midstream Oil and Gas | Marine manufacturing & associated services |
| | Boatbuilding and Associated Services Industry | Aerospace and defence |
| | Nuclear Energy | Electro-technical and white goods industries |
| | Advanced Manufacturing: | |
| | Aerospace and Defence | |
| | The South African software industry | |
| | Public Residential Electrification Programme for low cost housing | |
| | Electronics industry support | |
| | White goods | |

Source: thedti

IPAP9 (2017/18) continues to emphasise focus on labour intensive sectors in line with the NIPF as seen in the table below. Although the sectors under consideration have shrunk from those of 2014/15, sectors that are maintained for the current iteration (2017/18) have a potential to improve employment numbers if implementation is governed efficiently. Most of these sectors align with the National Development Plan (NDP 2030, 2012) drivers as can be seen in the table below.

FIG 3.1 INDICATIVE SCENARIOS - EMPLOYMENT OUTCOMES BY 2030

| Sectors Thousands | 2010 | 2030 | | |
|---|-----------------------|------------------------------------|------------------------------|---------------------------|
| | Employment in 2010 | Scenario 1 mediocre minerals | Scenario 2 solid minerals | Scenario 3 diversified |
| Agriculture | 627 | 514 | 627 | 804 |
| Mining | 297 | 269 | 388 | 437 |
| Manufacturing | 1 556 | 1 880 | 2 169 | 2 289 |
| Leader & high paid services (e.g. finance, transport) | 2 025 | 3 009 | 3 657 | 4 188 |
| Follower services (e.g. retail, personal services) | 1 927 | 4 180 | 4 875 | 4 967 |
| Construction & utilities | 828 | 1 054 | 1 278 | 1 407 |
| Informal sector & domestic work; excl EPWP | 2 922 | 4 093 | 4 604 | 5 012 |
| Public sector, private social services & parastatals | 2 529 | 3 278 | 3 518 | 4 225 |
| Expanded Public Works Programme (EPWP) | 420 | 5 483 | 2 644 | 431 |
| Total | 13 131 | 23 760 | 23 760 | 23 760 |
| Average GDP growth | | 3.3% | 4.8% | 5.4% |
| Percentage working-age population working (excl EPWP) | 41.0% | 47.1% | 54.4% | 60.1% |
| Unemployment without EPWP | 25.0% | 27.7% | 16.5% | 7.7% |

Source: SAGOV

One of the NDP goals is to enhance capabilities of the citizens to enable them to live desired lives (NDP 2030, 2012). The goal may easily translate to include, among other objectives, developing strategies to capacitate the workforce population through skills and quality education for meaningful contribution towards national development that will result in better living standards. Uncompetitive labour markets have been identified as one of the challenges in the SA economy, a structure that skews economy towards high skills and high productivity sectors.

In creating a better job environment the NDP 2030 (2012) envisages that by 2030 South Africans should have access to the highest quality in education and training such that SA graduates are highly skilled and educated enough to meet current and future economic and social needs. Of importance is education and skills acquisition at all levels of qualifications² and the need to have a clear linkage between education and training and world of work (NDP 2030, 2012).

One of the challenges captured in IPAP9, and previous iterations, is the skills shortage and mismatch between available skills and industry demands in order for the economy to realise growth and higher employment. Over the subsequent IPAP iterations, skills development has been tied into different sector interventions to address identified skills shortage. The path for industrialisation, similar to NDP 2030 goals, demands quality and relevant education, training and research and innovation.

Science, Technology and Innovation (STI) in sustainable industrialisation is specifically captured as a supporting tool for SMEs in relation to better, improved and advanced manufacturing in the sector. The Industrial Development Report (UN, 2016), states that without technology and innovation, industrialisation will not happen, and without industrialisation, development will not happen. The partnerships between public and private industry stakeholders in advancing innovation (2016 DST) must direct efforts towards productive industrialisation, supporting skills in innovation and research.

² Early Childhood Development, Basic schooling, Post-schooling and Research and Innovation systems

The automotive development plan has identified major programmes that seek to expand manufacturing of parts and assembling of models and as such skills development is vital in the efficient implementation and operations within the programmes.

The Clothing, Textiles, Leather and Footwear (CTLF) skills development program was established with the intention to move skills from operators to technologists, scientists and scientists within the industry, with one of the interventions being to explore distinct technologies that will better the industry (IPAP 2014/15). However, IPAP 2017/18 industry indicates an increase in output while employment is falling, a disturbing trend. Beneficiation in the raw hides is further seen as a potential job creation mechanism, in ensuring reduction in leakage of raw materials out of the domestic value chain.

The Metal Fabrication, capital and rail transport equipment sector, with a huge job creation potential and programmes for localisation and beneficiation, requires skills and qualifications update to align with sector demand, as identified in sector challenges for the 2014/15 IPAP iteration. The tool making apprenticeship accreditation is an important step in ensuring localised and home based employment in the sector. The Rail Recapitalisation programme should play a significant role in addressing a stagnant employment in this sector, and in order to extract more local employment opportunities at all level skills updating and development is crucial. The Foundry industry is further a key role player in sustaining the tooling and manufacturing industries for sustainable industrialisation.

Identified focus value chains for agro-processing need a thorough analysis to ensure potential jobs are realised from skills development and research for efficient industries. The beneficiation programme for the sector provides a potential for developing and updating skills to successfully achieve objectives for industrialisation targets in the sector. New processes and high-end products for inputs into the poultry value chain are crucial for making the industry competitive and prosperous.

In relation to forestry, timber, paper, pulp and furniture sector, beneficiation as well as upscaling of small and medium firms are major actions. Therefore, it is important for these small producers to access different markets and develop other products and processes away from dependency in the production of timber for construction. Research and skill development in relation to sawmilling (management skills, new products), furniture (designers, wood machinist) as well as pulp and paper (artisans, highly skilled manpower) is important in ensuring targets are met for the industry.

For plastics, pharmaceuticals, cosmetics and chemicals, one of the strategies involves penetrating African markets through export expansion and import substitution. This will require up-scaling skills to meet export market, while positioning local workforce for creating new processes and products to substitute imports in plastic industry. In addition, the localisation of the market source for medicine devices demands empowerment of local firms – technology and skills - to exceed expectations in order to substitute imports by private health sector. Skills development in the chemical sector to require institutions of higher learning to be romped in in developing a successful strategy for the sector, while the cosmetics industry is constrained by the lack of high-level skills.

Primary minerals beneficiation seeks to boost local content and service maintenance for mining equipment, reducing dependency by mining houses on high value-add equipment from offshore

suppliers. The creation of the mining hub for R&D will stimulate new processes and products that will demand skills upscaling and development.

The strategy around water resources, including desalination and sanitation technologies afford the country a huge potential in job creation through new capacity (new SMMEs) to supply local and African markets. The envisaged processes and products from successful R&D outputs require skilled workforce.

The Marine manufacturing and associated services industry also has a significant potential in developing technically skilled workforce that will seize opportunities for localised components supply and manufacturing.

INTERNATIONAL EXPERIENCE

Vietnam recognised the importance of Foreign Direct Investment (FDI) and its role in skills development during industrialisation, as technology transfer from FDI firms would play a pivotal role in this development (Mori et al, 2009). Furthermore, the interaction between FDI firms and TVET institutions was a significant factor in localised skills development, ensuring high productivity levels as well as manufacturing value addition activities within the country. Vietnam found that successful industrialisation requires industrial human resources that perform beyond standard tasks, but those who can initiate and manage improvement of production (Mori et al, 2009). In addition, government needed to play a coordination role and not enforce collaboration between TVETs and FDI firms in development of skills for industrialisation.

In Malaysia, the transformation towards knowledge intensive economy and the subsequent move from the middle-income trap to high-income economy forced policy makers to adopt programs that included educational upgrading as central to further industrialisation and growth. In adopting a knowledge-based economy, a concerted effort to invest in education and training to match demand and supply saw an expansion in both private and public tertiary institutions. In the down side, the current state support policy has created further mismatch in demand and supply due to the type of preferred disciplines by eligible native students (Fleming and Soborg, 2012).

Furthermore, Malaysia industrialized the chemical industry as a cluster comprising petrochemical and pharmaceutical sectors (import substitution and foreign investment driven), with firms forming partnerships³ and strong links⁴ (MITI, 1996), adopting new management operational strategy⁵ (Sarmidi, 2001). A continued engagement between industries players, public policy officials and higher education institutions is important in ensuring technological exchanges. A Malaysia Incorporated policy emphasised the importance of public-private partnerships in the industry success, with (Mustapha and Greenan, 2002) emphasising a balanced and proactive curricula that require participation between public-private sectors.

³ through collaborative value-added activities, drew upon a common labor pool, which served to diffuse new knowledge and related skills rapidly throughout the cluster

⁴ with domestic R&D institutions, including universities, to strengthen product development design as well as marketing and distribution capabilities

⁵ that would foster collaboration, inter-firm cooperation, strategic alliances, and 'smart' partnership

The Thailand government identified as mandatory moving the country to high-income status and higher levels in global value chains. Upgrading industrial sophistication and increasing domestic value addition in exports will achieve the mandate through, among others, elevating workers skills and their industrial relevance and enhancing R&D. Thai experience acknowledges that quality workforce demand quality education, and achieving the latter requires an effective higher education budget, raise industry relevance of higher education (and research) to align with evolving industry needs, high salaries that attract quality teachers across foundation institutions, including improved maths and science teaching among others (adb.org, 2015).

Korea, by following the Confucius⁶ (551–479 BC), ensured that the level of education and training in the country became of the highest order such to ensure that development and growth are driven by the most educated in the government and society at large. For moral force and authority to be effective, education and learning was pivotal as few mistakes in saying and doing will result. Education was seen to provide basis for deep thinking as well as strong moral sense, which play role in development of new processes and products through innovation and research. In targeting the development of Korea, Park Chung Hee⁷ set a goal that in order for industrialisation to thrive advancing the levels of education and skilled manpower is significant to transform the country towards prosperity, strength and self-reliance.

In China, the government formulated a strategy to develop human resources through the Outline of the National Plan for Medium- and Long-term Scientific and Technological Development (2006-2020), the Outline of the National Plan for Medium- and Long-term Human Resources Development (2010-2020). The state further implemented a number of skills programs⁸ to not only meet demands for an innovative nation, but the needs of industrialisation, including the skilling of countryside residents (Ma, OECD, 2012).

LABOUR MARKET

The IPAP9 iteration highlights a number of successes, and the need for beneficiation within the different primary industries. However, it remains unclear as how the required skills are to be developed and sourced for operations. Special Economic Zones operations and management capacity building in collaboration with China indicates a need to localise and empower institutions for relativity.

R&D and Innovation is significant to development and to ensure middle-income countries avoid middle-income traps, and countries such as Korea, China and India intensified R&D to build successful economies as reported by OECD (2012). The research skills aligned to development and innovation constantly evolve, and countries that innovate have elevated jobs that allow absorption of new job entrants and expansion of job opportunities. In raising efforts for innovation, inclusivity

⁶ belief that the government of the state should be entrusted only to a moral and properly-educated elite, and it was the nature of that education rather than some accident of birth that should allow access to political power

⁷ President after military coup of 1961

⁸ National High-tech R&D Program (863 Program), National Key Basic Research Program (973 Program), National Key Technology R&D Program and the National Natural Science Foundation

must be considered to ensure previously marginalised groups participate in the job market to sustain industrialisation.

Since the identification of Aquaculture as a potential job driver and the Aquaculture Operation Phakisa, DAFF has been able to secure the service of an aquaculture vet who was trained outside the country. (Keagan Halley, DAFF). Currently, the Aquaculture Development Bill is being developed and will incorporate the need to develop curriculum for local institution to train aqua vets. As it stands, leading South African institutes of higher learning do not have qualification in aqua vets needed to support sustainable and localised growth in the aquaculture industry.

EDUCATION and SKILLS DEVELOPMENT POLICY

It is important to identify the plan target for qualified workforce in relation to the Industrialisation plan for the country. This allows the possibility of taking baseline information on the current qualified workforce and what policy directive is needed in order to address resulting gaps where needed. The current need for aqua vets in conjunction with the Aquaculture program needs a directive within the policy to clarify how and who must provide the curricular, including plan on when the first locally trained graduates are expected.

The future of industries under Industrial Revolution 4 (IR4) will demand a pronounced direction towards skills evolution into technology, internet, automated manufacturing and big data analytics. A focus area should be development of Higher Education Institutions, whereby the current qualifications framework is aligned to workplace demands. Programs that bridge the gap after qualification has been acquired indicate inefficiency in policy alignment. The current efforts should be taken to bridge the gap within the qualification phase and not after in order to address the current structural problem in unemployment. In addition, investigation into costs by firms to re-orientate newly employed workforce (specifically graduates) through extended internal programs may uncover levels of skills mismatch, unnecessary costs and lack of partnerships.

In addition, the Economist (free exchange, 2014) asserts that industrial revolution growth is advanced by upper-tail knowledge (top engineers/technicians/entrepreneurs) and not the skills of average human capital. Therefore, policy must incentivise acquisition of this upper-tail knowledge beyond secondary education.

The current model in skills development that includes SETAs needs a review as the country still exhibit skills mismatch while SETAs have been tasked with expert identification and bridging skills gap within industries and the economy at large as enshrined within the Skills Development Act (SDA, 1998). Furthermore, the Human Resource Development⁹ is one of the strategies employed to address the skills base in the economy. However, it emphasises similar content in relation to Skills Development Plan (in SETAs), and it is important to eliminate duplications in skills development drive and concentrate efforts and resources to achieve the goal.

⁹ Formal and explicit activities that will enhance the ability of all individuals to reach their full potential by enhancing the skills, knowledge and abilities of individuals, HRD serves to improve the productivity of people in their areas of work – whether these are in formal or informal settings.

DISCUSSION

The Industrial Policy was adopted during the 3rd Industrial Revolution, extending into the beginning of the 4th Industrial Revolution. It is important to identify and sharpen the level of skills and research needed to align and make an impact within the current revolution. In addition, much of the interventions within the current iteration of IPAP involve beneficiation of resources within diverse industries and this is such that the country shares in the benefits within global value chains. It is therefore vital for the country to develop skills that will not only benefit the beneficiation goal, but skills that will expand beneficiation within the 4th Industrial Revolution.

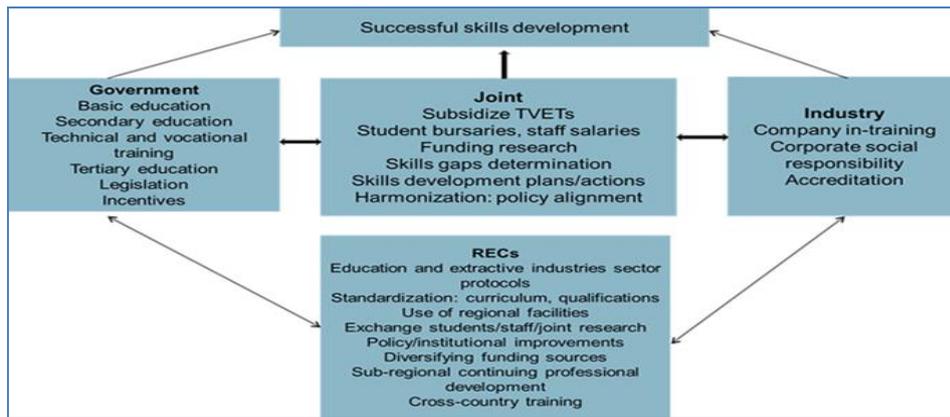
IPAP 2011- 2013 identified lack of demand-driven, industry-specific skills, highlighting the prevalence of the contrary¹⁰ that has not achieved eradication of the structural problem of unemployment in SA. The National Skills Development Strategy III, introduced in 2011 as an overarching skills development strategic guide within industries, needs to be evaluated to address skills shortage and mismatch still prevalent in the economy, as identified by the latest IPAP iteration.

Pursuing the UN Developmental Goals of 4 and 8, policy must look at education and skills development that not only advance growth, but that which fosters societal resilience in the midst of technological revolution. The future is different and the education system must align with this anticipated future. Future products and processes demand a different level of research engagements between public and private partnerships, including new and better skills to bring the future into reality.

In identifying skills needs for an industry, attention should be taken to draft an integrated skills development plan that includes skills needs for sectors in the upstream and downstream. The stimulation of an export sector for example, means development of value chain (OECD, 2012), and skills development to support exports stimulus demands skills development within the entire chain in order to maintain competitiveness.

Developing market signals for job demand is important for continued engagements between all role players in skills development chain, ensuring that systems are put in place to identify obsolete skills, a need for up-scaling and new skills to meet evolving industry needs as asserted by Jagannathan (OECD, 2012). These partnerships further safeguard firms from unnecessary costs associated with possible skills mismatch. Also, the engagements are vital for anticipating evolving skills demand to ensure industries are in the forefront of innovation supporting skills. The graph below shows a flow in terms of the roles of various stakeholders in skills development.

¹⁰ A supply-driven approach to skills planning and delivery, as well as the poor interpretation and measurement of medium-to-long term skills demand, have persisted under the National Skills Development Strategy for 2005 – 2011 and the decentralised skills delivery system, through the Skills Education and Training Authorities (SETAs)



Source: www.afdb.org/en/blogs,

CONCLUSION

Successful industrialization driven by IPAP in support of NDP 2030 demands a comprehensive strategy that includes quality research, education and skills development plan. International experiences allow the country to imitate some of the strategies by industrialised economies. A lot can be improved in relation to policy on education and skills development. Furthermore, current levels of skills mismatch expose the need to improve public and private partnerships and this will assist in developing demand driven, industry-specific skills. The Fourth Industrial Revolution (IR4) is already here, and this requires building and skilling industries that are innovative and competitive for the country to fully benefit within the global value chains.

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