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Intellectual capital of South Africa: a comparison with Poland and Romania

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Abstract

Purpose – The purpose of this paper is to uncover the national intellectual capital (NIC) of South Africa by making comparisons with Poland and Romania.

Design/methodology/approach – Based on a database of an NIC measurement model spanning 2001-2015, this study plotted the development trend of the NIC and its component capitals – human, market, process and renewal capitals. Their correlations with GDP per capita (ppp) (GDP hereinafter) were also presented.

Findings – The NIC of South Africa is lower than that of both Poland and Romania. Except for the increase of its human capital together with its GDP, the other capitals have lower relevance. Poland experienced highly correlated growth for its NIC and GDP, shedding light for South Africa. The qualitative findings are also reported.

Research limitations/implications – The IMD database carries South African data only for the African continent. Therefore, this paper cannot cover other countries from the continent.

Practical implications – There are three implications from both the quantitative and qualitative analyses: initiate national transformation from the two core issues of education and health; invite and provide attractive incentives for South African returnees from abroad and members of local private sectors to take part in the national transformation efforts; and learn from the NIC development pattern of Poland and Romania by investing in market capital and process capital as soon as possible for faster results.

Social implications – The research findings of this paper unveil the root of the social problems in South Africa, including education, health, high unemployment and so on. Suggestions are provided for mid-term and long-term potential solutions.

Originality/value – This paper demonstrates the value of an NIC in the economically successful Poland whose growth and GDP growth occurred at a similar pace.

Keywords South Africa, Poland, Emerging markets, Economic development, Intellectual capital, Romania

Paper type Research paper

Introduction

In 2016, reports on South Africa were dismal. Real GDP growth declined from 1.5 percent in 2014 to 1.3 percent in 2015 and was estimated to decline further to 0.7 percent in 2016 (Kumo *et al.*, 2016). Unemployment remained high at 25.3 percent, with unemployment among youth at 52.5 percent in 2015. The legacies of apartheid, poor service delivery and widespread poverty characterized sociopolitical discourse throughout 2015 (Kumo *et al.*, 2016).

South Africa was colonized by Dutch and English settlers over several centuries, followed by more than four decades (1948-1991) of apartheid (West, 2006). In 1994, South Africa held its first universal elections and became a democratic nation. Afterwards, the country experienced good economic growth until it was severely affected by the 2008 global financial crisis. Its GDP contracted by 18 percent in 2009 as the international demand for mining commodities receded and investors shied away from emerging markets (Neil, 2010).

Not long after the end of apartheid, Crouch (1997) warned that South Africa had less human capital (HC) than physical capital relative to its competitors. Scholars advocated for greater investment in education, health and services improvement for capacity-building and growth (Booyesen, 2007). However, until 2007, a large number of professionals continued to leave the country for better jobs in advanced economies, and the basic needs were still unfulfilled for substantial proportions of the black majority that make up approximately



78 percent of the total population (Moller, 2007b). Moreover, the HIV/AIDS pandemic, which had infected an estimated 5 million individuals, undid the development gains achieved (Moller, 2007b).

What happened? Why did other emerging economies have a successful economic transformation and recover from the global financial crisis, but not South Africa? Do intangible assets play a role in facilitating economic growth? Can other emerging economies provide some guidelines for South Africa to emulate?

Different from past studies focusing more on physical assets for economic development, this paper takes the intangible intellectual capital viewpoint to examine the national performance of South Africa. In addition, we compare two East European countries – Poland and Romania – with a rationale. These two countries were under the control of the Soviet Union for more than four decades (1946-1989) within the similar time frame as the apartheid (1948-1991) in South Africa. A majority of citizens in all three countries did not enjoy full civil rights and economic development was stagnant within those four decades. Right after the time of oppression, their starting points were somewhat similar, yet their development became quite disparate over the last 25 years.

Assuming that intangible intellectual capital plays a role in explaining their differences, this paper aims to compare the national intellectual capital (NIC) of the three countries using a panel data spanning the years from 2001 to 2015. Potential contributions of this research are threefold. First, it unveils the increasingly important intangible assets in three emerging economies. Second, it identifies specific areas of improvement for South Africa. Third, it offers some guidelines for South Africa's economic development by making comparisons with two compatible emerging economies.

This paper first reviews the national profile of the three countries, then introduces NIC, afterwards compares the NIC of the three countries, and finalizes with suggestions and implications of the study.

National profiles

Since South Africa became a genuine democracy in 1994 and the African National Congress came to power, there has been a clear encouragement of "Africanness," a determination to build the country on Afro-centric rather than Euro-centric principles (West, 2006). Although its economy showed improvement, the pace of transformation was not fast enough and South Africa continues to lag behind other emerging economies in various aspects.

Table I shows the general profile of South Africa, Poland and Romania. History tells that during the period from 1946/1948 to 1989/1991, South Africa was under apartheid and the other two countries were dominated by the Soviet Union. In terms of total area, South Africa is about four times/five times that of Poland and Romania. In terms of population, South Africa is about 1.4 times/2.5 times that of Poland and Romania, respectively. With a median age of only 26.8 years, South Africa has a human resources advantage over the other two countries. Very likely due to the HIV/AIDS prevalence rate of about 1/5 of the adult population, the life expectancy of South Africa is only a little bit over 60 years. The health expenditure of 8.8 percent GDP is higher than for the other two countries, yet its life expectancy is more than 10 years lower. The education expenditure of 6.1 percent GDP is higher than that of the other two countries, yet the unemployment rate is much higher than that of the other two countries. Population below the poverty line is over 1/3 and GDP of South Africa is only about half that of Poland and the volume of exports/imports is also about half that of Poland. The Gini index is the second highest in the world. In addition, a total of 7.7 million people are without electricity, whereas the other two countries have 100 percent electricity access.

Figure 1 shows the trend of *Global Competitiveness* published by the World Economic Forum from 2001 to 2015. In 2001, South Africa's global competitiveness ranking was 34th, ahead of both Poland and Romania, yet it dropped to 49th in 2015 and was surpassed by

	South Africa	Poland	Romania
History	Apartheid – a system of institutionalized racial segregation and discrimination in South Africa between 1948 and 1991	Poland was a satellite state of the Soviet Union from 1946 until 1989 when Poland's Communist government was overthrown	After the Second World War, Romania became a socialist republic until the 1989 revolution when it began a transition back toward democracy and a capitalist market economy
Areas	1,219,090 km ²	312,685 km ²	238,391 km ²
Population	54,300,704	38,523,261 (July 2016 est.)	21,599,736 (July 2016 est.)
Median age	26.8 years	40.3 years	40.7 years
Urban population	64.8% of total population (2015)	60.5% of total population (2015)	54.6% of total population (2015)
Life expectancy	63.1 years	77.6 years	75.1 years
Health expenditure	8.8% of GDP (2014)	6.4% of GDP (2014)	5.6% of GDP (2014)
HIV/AIDS – adult prevalence rate	19.2% (2015 est.)	0.07% (2014 est.)	0.11% (2013 est.)
Obesity – adult prevalence rate	25.6% (2014)	27% (2014)	23.4% (2014)
Education expenditure	6.1% of GDP (2014)	4.8% of GDP (2012)	2.9% of GDP (2012)
Unemployment – total/15-24 age	25.4% (2015 est.)/51.3%	10.5% (2015 est.)/23.9%	6.8% (2015 est.)/24%
Population below poverty line	35.9% (2012 est.)	17.3% (2012 est.)	22.4% (2012 est.)
GDP per capita (ppp)	\$13,200 (2015 est.)	\$26,500 (2015 est.)	\$20,900 (2015 est.)
GDP (ppp)	\$725.9 billion (2015 est.) (#31)	\$1.007 trillion (2015 est.)	\$414.7 billion (2015 est.)
GDP real growth	1.3% (2015 est.)	3.7% (2015 est.)	3.8% (2015 est.)
Gini index	62.5 (2013 est.) (#2)	32.4 (2012)(#108)	27.3 (2012) (#132)
Public debt	44.4% of GDP (2015 est.)	45% of GDP (2015 est.)	38.4% of GDP (2015 est.)
Current account balance	–\$13.67 billion (2015 est.)	–\$1.117 billion (2015 est.)	–\$2.032 billion (2015 est.)
Exports/imports	\$81.63 billion/\$84.33 billion (2015 est.)	\$190.8 billion/\$188.4 billion (2015 est.)	\$54.52 billion/\$63.12 billion (2015 est.)
#1 exports/imports partner	China 11.3%/China 17.6%	Germany 27.1%/Germany 27.6%	Germany 19.8%/Germany 19.8%
Reserves of foreign exchange and gold	\$45.91 billion (31 December 2015 est.)	\$94.91 billion (31 December 2015 est.)	\$38.71 billion (31 December 2015 est.)
Population without electricity	7,700,000	0, 100% access (2016)	0, 100% access (2016)
Mobile phone subscription per 100 habitants	159	147	107 (July 2015 est.)
internet user % population	51.9% (July 2015 est.)	68% (July 2015 est.)	55.8% (July 2015 est.)

Table I.
Comparisons of
South Africa, Poland
and Romania

Note: Remark: #, world ranking
Source: CIA 2016 Factbook

Poland, with Romania following close behind. Figure 2 is the progression of GDP. In 2001, the GDP of South Africa was close to that of Romania. Over the years, the disparity became wider and wider, with South Africa lagging far behind the other two countries in 2015.

In summary, South Africa possesses more resources in terms of territory and people than Poland and Romania as the basis for further development. Apparently, South Africa did not effectively and efficiently utilize its abundant resources and its high percentage of GDP spending on education and health resulted in slow development, decreasing competitiveness and many problems still waiting to be resolved.

In spite of the above pessimistic views, a previous study (Lin *et al.*, 2014, p. 19) on South Africa includes some positive reports:

Since its turn towards democracy in 1994, South Africa has improved its reputation as the leading economic power in Africa and has increasingly attracted global investors (Draper *et al.*, 2009). [...], despite South Africa's economy having been hard hit by the global financial crisis, no exchange rate shock or "sudden stop" was experienced. (Draper *et al.*, 2009)

Furthermore, irrespective of the 2008 global financial crisis, South Africa still sponsored international soccer's 2010 World Cup. At least US\$1.5bn was invested in improving the transportation systems (Neil, 2010). In hindsight, the overall rating of the World Cup was positive. According to Jacobs (2013), there was universal praise for South Africa's warm hospitality, high modernist stadiums, tight security, sound event management, adequate accommodation, good transportation, and functional telecommunication networks. The event added luster to the "Brand South Africa" and fostered genuine patriotic unity for a short while (Jacobs, 2013). Neil (2010) further commented that the World Cup could benefit South Africa in more intangible ways in the long run, through strengthening national cohesion and the country's image throughout Africa and in the world as a whole. This World Cup event also demonstrated how important intangibles are to South Africa. The next section introduces the basic concept of intangible intellectual capital.

Intellectual capital

As mentioned earlier, Table I shows that South Africa, despite its larger population, larger territory and higher tangible investments in health care and education than Poland and Romania, lagged behind the other two countries in performance. Thus, this study attempts

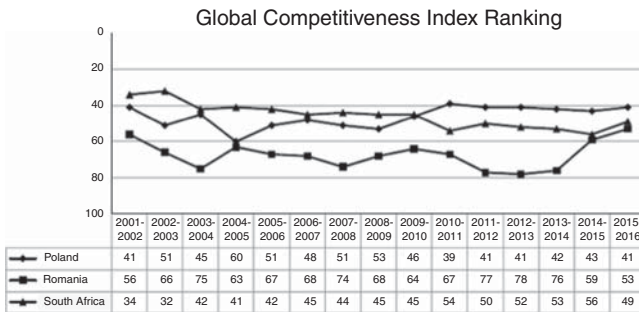


Figure 1.
Global
competitiveness
index ranking
published by the
world economic forum

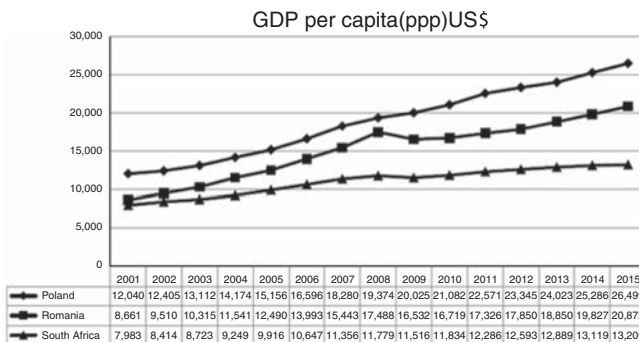


Figure 2.
GDP per capita (ppp)
for South Africa,
Poland and Romania
from 2001 to 2015

to examine South Africa from the perspective of intangible intellectual capital to look into the values as well as the weak points of South Africa.

Intellectual capital is a concept spawned at the organizational level and is defined as “intellectual material – knowledge, information, intellectual property, experience – that can be put to use to create wealth” (Stewart, 1997). It is also considered as the difference between the market value and the book value of a firm. Given the intense globalized competition, there is a widespread recognition that intellectual capital is a critical force that drives economic growth. Abdel-Aziz *et al.* (2010) stated that to derive the maximum benefits from the concept of intellectual capital, it should be considered at four levels: individual, group, organization and country. This study takes the country-level intellectual capital viewpoint.

NIC is comprised of the knowledge, wisdom, capability, and expertise that provide a country with a competitive advantage over other countries and determine its potential for future growth. For instance, advanced countries create the national value through the service innovation, R&D, or improved GDP per hour worked (Lin and Edvinsson, 2011). Those countries rich in knowledge-intensive activities will be the winners in terms of future wealth creation (Bounfour and Edvinsson, 2004; Stähle and Pöyhönen, 2005).

Based on Lin and Edvinsson (2011), an NIC mainly consists of HC, market capital (MC), process capital (PC), and renewal capital (RC), described hereunder.

HC includes knowledge, wisdom, expertise, intuition, and the ability of individuals to realize national tasks and goals. This focal area also includes the values encompassed within the culture and philosophy of the nation. HC constitutes a population's total capabilities as reflected in education, knowledge, health, experience, motivation, intuition, entrepreneurship and expertise; in addition, a highly skilled labor force, the availability of scientists and engineers, a female labor force, and health (life expectancy, physicians) are also good indicators. HC provides the resources for the development and cultivation of other areas of intellectual assets such as R&D and training, as the human factor is the most important link in the process of value creation.

MC refers to the general assets embodied in the nation's relationship with the international market. It is the aggregate of a country's capabilities and successes in providing an attractive, competitive solution to the needs of its international clients, a country's investment and achievements in foreign relations, coupled with its exports of quality products and services (Bontis, 2004). The assets in this focal point include customer or national loyalty, openness to globalization, flexibility and adaptability, resilience of economy, as well as the satisfaction expressed by strategic customers and national trading partners.

PC is the cooperation and flow of knowledge that require structural intellectual assets, such as information systems, hardware, software, databases, laboratories, and national infrastructure, including transportation, information technology skills, communications and computerization, technological readiness and telecom services, personal computers, cellular subscribers, cyber security, quality scientific research institutions, knowledge transfer, a legal environment for entrepreneurship, a minimum number of days to start a business, a quality management system, and agricultural productivity. Such structural intellectual assets sustain and increase the output of HC.

RC refers to a nation's capabilities and real investments made in an effort to increase its competitive strength in future markets, which, in turn, encourages future growth. Renewal and development assets include investments in research and development, patents, trademarks, start-up companies, the number of scientific publications, the number of patents registered in the US, EPO patent applications, total expenditure on R&D, and capacity for innovation.

NIC of the three countries

This section covers data and methods, the NIC profile of the three countries, correlations of HC, MC, PC, RC with GDP per capita (ppp), and qualitative findings.

Data and methods

The intellectual capital of a nation requires the articulation of a comprehensive system of variables to help uncover and manage that nation's invisible wealth (Lin and Edvinsson, 2011). As a result, an NIC measurement model was developed and a database of 40 countries was built by Lin and Edvinsson (2008, 2011). The data source was the annual IMD World Competitiveness Yearbook

Based on the NIC model, this study utilized its revised version – ELSS (Edvinsson, Lin, Stahle and Stahle) model (Stahle *et al.*, 2015) with expanded indicators (48 vs 28) and countries (59 vs 40) to reflect current concerns, such as gender equality and environmental issues. Descriptions of the 48 indicators of the ELSS model are presented in Table II, readers can also refer to the website bimac.fi.

In the database, there are two different types of data: data with an absolute value, such as “patents per capita,” and data with a qualitative rating based on a scale of 1 to 10, such as “image of country.” Although subjective, qualitative rating on the degree or magnitude of certain variables is unavoidable, as evaluating intangible assets cannot be fully represented by merely adding up absolute numbers. For a meaningful integration of the quantitative score and qualitative rating, the ratio of the absolute value relative to the highest value of each quantitative variable was calculated and multiplied by 10 to transform the number into a 1-to-10 score. The data transformation procedures have been repeated for all numerical indicators of HC, MC, PC and RC. The score of each component capital is the average of the 12 indicators and the overall NIC is the sum of the four component capitals.

The following three countries comparison is the primary descriptive analysis based on the 48 indicators ELSS model. A more in-depth ELSS production function calculation (Stahle *et al.*, 2015) is very complicated and requires a separate paper to report it.

NIC profile of the three countries

Figures 3-7 show the trend of overall NIC, HC, MC, PC and RC of the three countries. Figure 3 indicates that the overall NIC of South Africa did not make much progress, whereas that of Poland and Romania improved. The NIC of South Africa was the lowest among the three countries in 2015.

Figure 4 shows that the HC of South Africa started as the lowest and remained the lowest in 2015 among the three countries. HC has a great deal to do with education. Moller (2007a) reported that, although South Africa has made large investments in education by most international standards, it has failed to produce the skills needed for South Africa to compete in the global economy. The statement agrees with the higher educational spending than that of Poland and Romania shown in Table I, yet it has higher unemployment rate and more people under the poverty line.

Figure 5 shows that the MC of South Africa started out as the highest, yet regressed to the lowest in 2015 among the three countries. Table I indicates that the exports/imports of South Africa are only half that of Poland.

Figure 6 shows that the PC of South Africa started out as the highest (although not much); however, it became the lowest in 2015 with a wide disparity from the other two countries. PC mainly denotes the infrastructure of a nation. Apparently, the one-time 2010 World Cup event did not add too much value to the total infrastructure of South Africa as its PC score declined a little from 2011. The country needs to pay more attention to building a facilitating infrastructure for business and for overall national growth.

Figure 7 shows that the RC of South Africa also started out as the highest, yet regressed to become the lowest in 2015 among the three countries. RC is mainly related to innovation

	Scores (1-10) S.A.	Human Capital		GDP	
		South Africa	Poland/Romania	South Africa	Poland/Romania
Human Capital index					
1. Skilled labor*	3.019				
2. Employee training*	6.022				
3. Higher education achievement	2.501		4 (0.83)		2 (0.80)
4. Pupil-teacher ratio	4.323	#5 (0.79)##	2 (0.86)	4 (0.81)	
5. Public expenditure on education	7.557	1 (0.92)			
6. 15-64 years old population	7.774			1 (-0.96)	3 (-0.75)
7. Qualified engineers*	4.766				
8. Students PISA performance	none	none	3 (0.85)		
9. Human development index	6.560	2 (0.90)	5 (0.77)	3 (0.85)	1 (0.90)
10. Gender equality	6.414	3 (0.88)		5 (0.78)	
11. Years of education	6.557				5 (0.60)
12. R&D researchers	0.576	4 (0.82)	1 (0.90)	2 (0.91)	4 (0.68)
		Process Capital		GDP	
Process capital index	Scores (1-10) S.A.	South Africa	Poland/Romania	South Africa	Poland/Romania
1. Business competition environment*	6.473		3 (0.85)		5 (0.85)
2. Government efficiency*	2.453	2 (0.64)			
3. Computer per capita + Mobile subscribers	3.125		5 (0.82)	2 (0.91)	3 (0.92)
4. Internet subscribers + Broadband subscribers	1.612		1 (0.95)	3 (0.77)	1 (0.95)
5. Convenience of establishing new firms + start up days*	6.717				
6. Goods and services distribution efficiency*	6.065	1 (0.82)	2 (0.92)		4 (0.89)
7. Overall productivity	8.879				
8. Unemployment % + Youth unemployment %	0.577				
9. Consumer price inflation	7.827				
10. Health & environment	5.103			1 (-0.93)	
11. Corruption	4.553	3 (-0.57)	4 (0.84)		2 (0.93)
12. Freedom of speech	8.587			4 (0.72)	
		Market Capital		GDP	
Market capital index	Scores (1-10) S.A.	South Africa	Poland/Romania	South Africa	Poland/Romania
1. Corporate tax encouragement*	5.447		4 (0.74)		3 (0.694)
2. Cross-border venture*	6.858		5 (0.65)	3 (-0.66)	
3. Openness of culture*	6.595			2 (-0.756)	
4. Transparency of government policies*	4.741	1 (0.742)		1 (-0.76)	
5. Image of your country*	4.245	2 (0.74)			
6. Capital availability*	3.853		1 (0.79)		1 (0.83)
7. Trade to GDP ratio (exports + imports)	1.497				
8. Current account balance %GDP	2.419	3 (0.70)		4 (-0.57)	
9. Investment flows %GDP	1.529				
10. Country credit rating	6.256		3 (0.77)		4 (0.691)
11. Investment risk	6.241		2 (0.78)		2 (0.71)
12. Globalization index	6.103	4 (0.66)			

Table II.
Key indicators for each component capital and GDP per capita (ppp) for South Africa, Poland/Romania

	Scores (1-10) S.A.	Renewal Capital		GDP	
		South Africa	Poland/Romania	South Africa	Poland/Romania
Renewal capital index					
1. Business R&D spending	0.169				3 (0.807)

(continued)

2. Basic research*	4.711	3 (0.81)		3 (-0.77)	
3. R&D spending/GDP	1.849				5 (0.78)
4. R&D US\$ per capita	0.236			5 (0.62)	2 (0.81)
5. IP right protection*	6.457			1 (0.87)	
6. Utility Patents/R&D expenditure	0.837				
7. Cooperation between corporations and university*	4.092				
8. Scientific articles	0.599			4 (0.64)	2 (0.83)
9. Patents per capita (USTPO+EPO)	0.072	4 (0.69)			5 (-0.69)
10. Entrepreneurship*	5.011	1 (0.90)		2 (0.84)	1 (0.91)
11. Development & application of technology*	6.032	2 (0.88)			1 (-0.84)
12. Venture capital*	4.32	5 (0.687)		3 (0.78)	4 (-0.70)

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capital of
South Africa

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Notes: Remarks: *, qualitative rating; #, ranking; ##, coefficient; bold underlined numbers, warning for South Africa; bold italic numbers, practices of Poland/Romania for South Africa's reference

Table II.

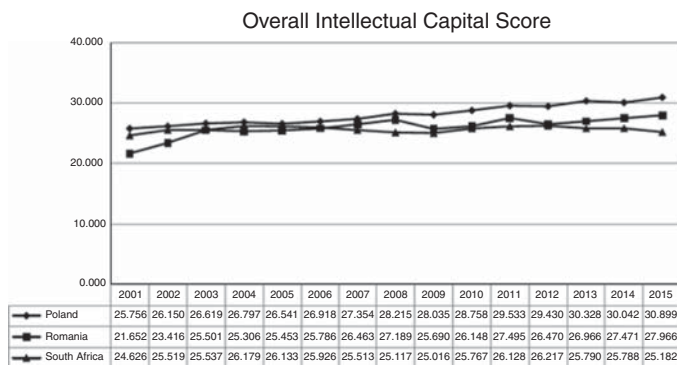


Figure 3.
Overall intellectual
capital scores of South
Africa, Poland and
Romania from
2001 to 2015

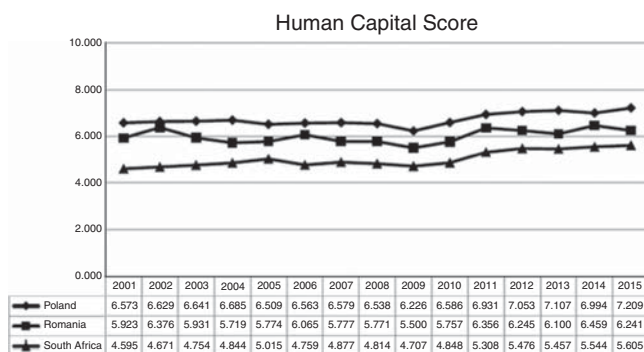


Figure 4.
Human capital scores
of South Africa,
Poland and Romania
from 2001 to 2015

and R&D. Olupot and Maharaj (2010) found a low degree of higher education invention transfer in South Africa, very likely because successful innovation rests largely on quality infrastructure and the availability of highly skilled and creative researchers, which the country sorely lacks.

Correlations of HC, MC, PC, RC with GDP per capita (ppp)

Figures 8-12 show the relationship of GDP with overall NIC, HC, MC, PC and RC, respectively. Figure 8 shows the high correlation between NIC and GDP. In other words, the higher the NIC is, the higher the GDP and vice versa. South Africa lags behind Poland and Romania in terms of NIC development and GDP growth. From the graph, the slope of almost one for Poland is the best development pattern in that NIC growth and GDP growth proceed

Figure 5.
Market capital scores of South Africa, Poland and Romania from 2001 to 2015

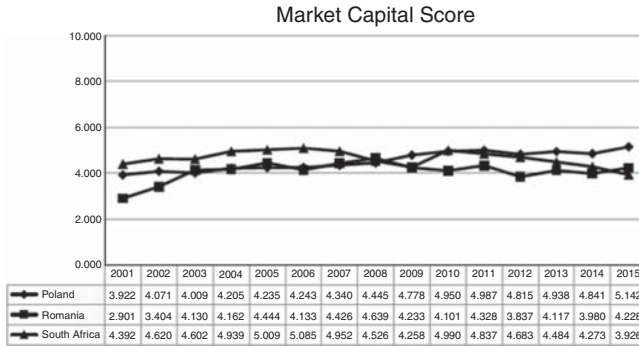


Figure 6.
Process capital scores of South Africa, Poland and Romania from 2001 to 2015

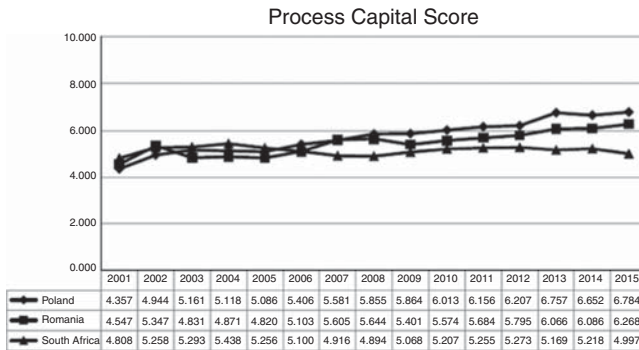
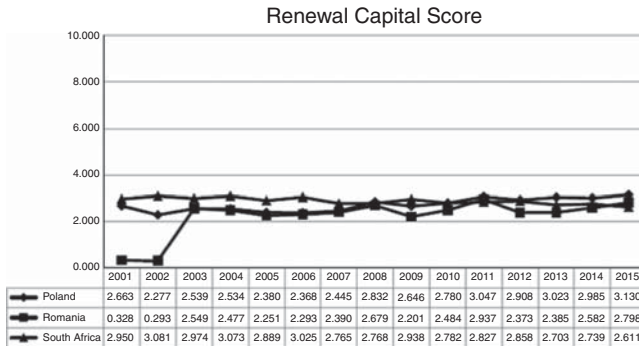
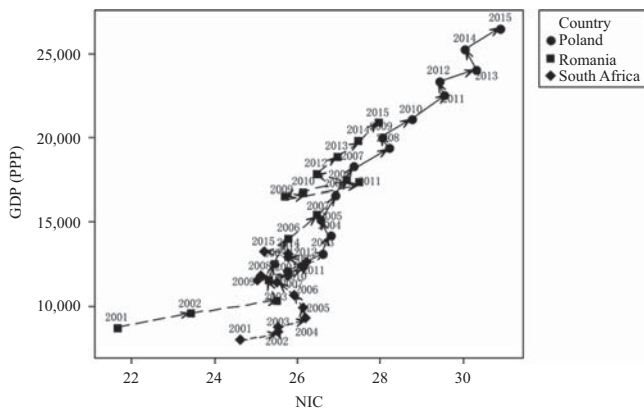


Figure 7.
Renewal capital scores of South Africa, Poland and Romania from 2001 to 2015





Intellectual capital of South Africa

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Figure 8. NIC vs GDP per capita (ppp) of South Africa, Poland and Romania

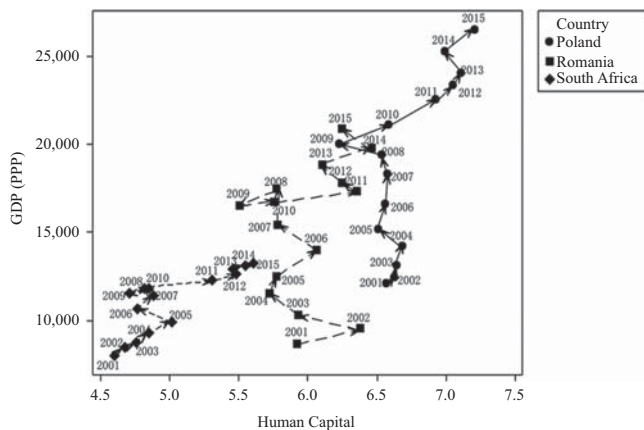


Figure 9. Human capital vs GDP per capita (ppp) of South Africa, Poland and Romania

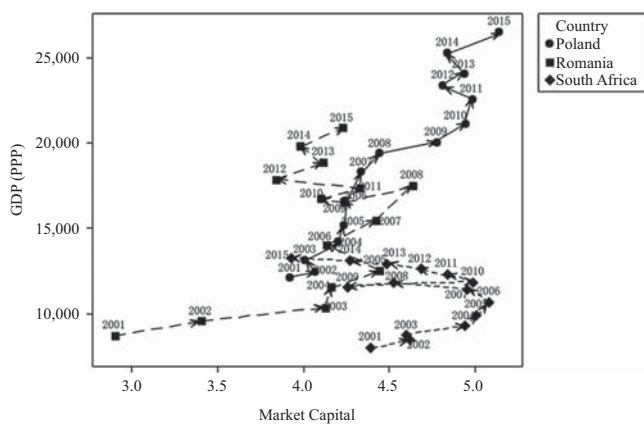


Figure 10. Market capital vs GDP per capita (ppp) of South Africa, Poland and Romania

Figure 11.
Process capital vs
GDP per capita (ppp)
of South Africa,
Poland and Romania

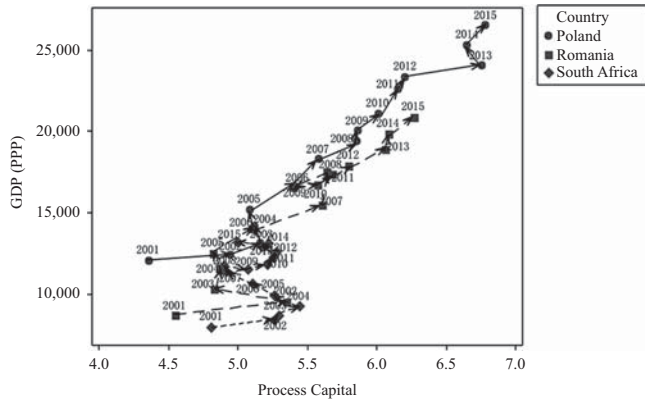
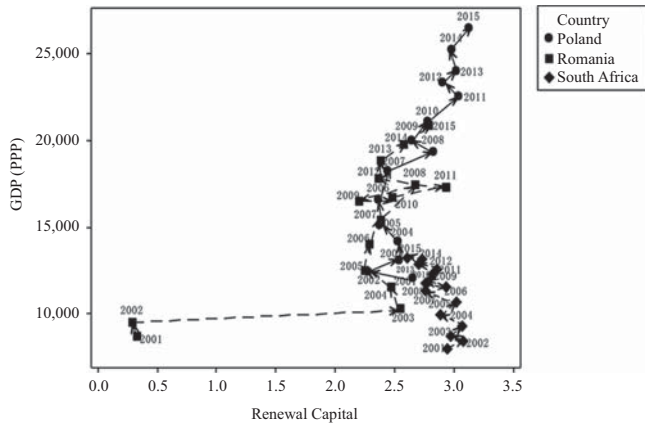


Figure 12.
Renewal capital vs
GDP per capita (ppp)
of South Africa,
Poland and Romania



at almost the same pace. Romania also shows a similar pattern, yet at a middle part of the graph. South Africa has the lowest NIC and GDP among the three countries; even though there was GDP increase over the years its NIC did not make much improvement between 2001 and 2015. In summary, Romania started with lower HC than South Africa in 2001, yet it progressed well in 15 years and surpassed South Africa in both NIC and GDP. Poland had the best performance among the three countries.

Figure 9 shows the correlation between HC and GDP. From 2001 to 2005, the HC of South Africa advanced together with its GDP growth. However, it regressed afterwards until 2011, when it shows progress once again in both HC and GDP. The HC of Romania did not make much progress from 2001 to 2010, even though its GDP improved quite a lot. After significant advancement from 2010 to 2011, the HC of Romania underwent ups and downs. However, its GDP saw constant improvement. The HC of Poland did not make much progress from 2001 to 2010, even though its GDP continuously advanced. From 2010 to 2015, the HC and GDP of Poland progressed at a uniform pace. Although occupying the lowest bottom corner, over the period of 15 years South Africa's HC increased along with its GDP growth. That is, HC and GDP grew together in South Africa. For both Poland and Romania, the HC of the first ten years was not commensurate with its GDP growth until 2010 and afterwards.

Figure 10 shows the correlation between MC and GDP. Even with GDP growth, the MC of South Africa regressed when comparing 2001 with 2015. Poland has a good growth pattern for both MC and GDP with their high correlation. For Romania, from 2003, MC shows a zig-zag pattern going back and forth. Even though Romania enjoyed good GDP growth over the 15 years, its 2015 MC did not increase significantly when comparing 2003 and 2015.

Figure 11 shows the correlation between PC and GDP. South Africa did not make much progress in PC over the 15 years. The PC of Romania had a high correlation with its GDP growth starting from 2005. In other words, its PC increase was accompanied by GDP growth and vice versa. The PC of Poland was the lowest among the three nations in 2001, yet it made great progress over the 15 years and was significantly ahead of the other two nations by 2015. It had a beautiful growth pattern for both PC and GDP, from 2005 onwards.

Figure 12 shows the correlation between RC and GDP. As with the previous graphs, the RC of South Africa was the lowest of the three countries. It did not make progress, but instead regressed over the 15 years. Romania started with very low RC in the first-two years and advanced notably in 2003. Ever since, it has not made much progress in RC, even though its GDP almost doubled. The RC of Poland did not make much improvement from 2001 to 2007; however, its increase has been accompanied with GDP growth ever since. Poland is the only country among the three that showed a high correlation between RC and GDP growth.

In summary, the NIC and the four component capitals of South Africa were the lowest, followed by Romania. Poland stands out as the best performer in terms of NIC, the four component capitals and GDP. Except for HC, overall NIC and other component capitals had a weak relationship with GDP in South Africa. On the contrary, the NIC of Poland had a high correlation with its GDP growth. This finding indicates that the development of an NIC in Poland can serve as a guideline for South Africa.

In order to identify which individual indicator correlates better to its respective construct (HC, MC, PC, RC) and GDP, we prepared Table AI which shows various correlations for South Africa and a combined Poland/Romania. To more efficiently interpret the correlation coefficients, Table II with its indicator descriptions was constructed for ease of reference. Under the assumption that some indicators have a higher correlation with their respective component capital and GDP than others, we displayed the first 3-5 key indicators for each component capital. If the key indicators are fewer than five, it means the coefficient gap is huge. For example, there are only four selected key indicators for the MC of South Africa, because the fifth one has a coefficient of 0.47 with a wide gap as compared to the fourth one of 0.66. Furthermore, we underlined and bold faced numbers to indicate a warning for South Africa and bold italic indicators/numbers to highlight the key indicators of Poland/Romania for South Africa's reference.

In general, there are fewer key indicators and with lower coefficients for the MC and PC of South Africa compared to those of Poland/Romania. This finding tallies with the progression of these two capitals in Figures 10 and 11. All the warnings with underlined numbers for South Africa are negative coefficients relating to GDP. Negative coefficients indicate a deficiency. The 1-10 scores of South Africa exhibited in Table II show that the scores of the indicators underlined numbers are relatively low in a database of 59 countries. For the HC of South Africa, the 15-64 year-old populations have the highest correlation with GDP, yet it is negative. A possible explanation is the lower productivity of this cohort. According to the CIA (2016) report, the increasing proportion of working-age South Africans has been unable to achieve a demographic dividend due to persistent high unemployment and the prevalence of HIV/AIDS.

For the MC of South Africa, cross-border ventures, openness to culture, transparent government policies and current account balance %GDP are all very important, yet they are

all deficient. For PC, health and environment are important, yet they are deficient as well. HIV/AIDS continues to be a serious public health threat in South Africa, even though awareness-raising campaigns were implemented (CIA, 2016).

For RC, the basic research, patent per capita, development and application of technology and venture capital are important for innovation and national renewal, yet they are deficient in South Africa. One of the reasons is that qualified personnel have tended to move to developed countries, which has aggravated the country's shortage of skills (Moller, 2007a). In addition, inadequately trained and underpaid personnel are poorly equipped to provide essential services (Moller, 2007a). Besides, efforts to develop entrepreneurship have borne little fruit in the past decade (Moller, 2007a). Furthermore, research funds are scarce and academics are so poorly paid that they use their spare time for a second job. Where research is carried out, there is little time for fieldwork, and graduate supervision and publication activities are neglected (Mama, 2007).

In Table II, the indicators/numbers of Poland/Romania in bold italic are key indicators that are highly correlated with both their respective component capital and GDP. In other words, these are good representative indicators in explaining the increase of both their component capital and GDP, and provide good references for South Africa. For HC, higher education achievement has a high correlation and is positive. For market capital, corporate tax encouragement, capital availability, favorable country credit rating and favorable investment risk rating are key indicators of these two countries. For PC, favorable business competition environment, goods and services distribution efficiency and low corruption are key indicators. For RC, R&D US\$ per capita is important with a high correlation.

Lin and Edvinsson (2011, p. 324) reported that HC and RC are long-term oriented and take time to accumulate. What developing countries can immediately do to obtain quick results is to allocate funds to improve MC and PC. Table II clearly shows the key indicators adopted by Poland and Romania, which was reflected in the good performance of the two countries, as seen in Figures 10 and 11. Booyesen (2007) stated that the two largest growth opportunities in Africa are infrastructure investment in the short-term and retail growth in the long-term. Investing in infrastructure builds PC and can reap positive outcomes in a relatively short time. Booyesen (2007) also suggested establishing a dynamic relationship with countries outside the continent, which is a form of MC building, explaining thereby that South Africa needs to strengthen cross-border venture and openness of culture as indicated in Table II.

Qualitative findings

To supplement the above data analyses, this section reports the qualitative findings which are more directly related to economic development based on the literature review. These can be summarized with respect to the strengths and weaknesses of South Africa.

Strengths of South Africa. Africa is a continent rich in natural and mineral resources where labor is plentiful but underdeveloped (Booyesen, 2007). With the most advanced, broad-based economy in Africa, South Africa offers investors a diverse and mature economy with vibrant financial and other service sectors (US Department of State, 2015). In general, South Africa is a gateway to developing markets throughout Sub-Saharan Africa (Hall, 2017).

In addition, the government of South Africa is open to foreign investment as a means to drive economic growth, improve international competitiveness, and access foreign markets. Except for a limited number of industries, no government approval is required to make investments, and there are few restrictions on the form or extent of foreign investment (US Department of State, 2015). South Africa also provides various grants and incentives for

a five-year period to newly-established businesses and those relocating to designated areas (Hall, 2017). Besides, the standards in South Africa are generally similar to those in most developed economies, US investors find local courts generally fair and consistent, and infrastructure is relatively well developed. South Africa's democracy is well established with transparent and contested elections, and an appreciation for the rule of law. In short, South Africa has the following strengths:

- (1) rich natural resources;
- (2) a gateway to Sub-Saharan African markets;
- (3) open to foreign investment while providing incentives;
- (4) standards are similar to those in developed economies;
- (5) local courts are generally fair and consistent; and
- (6) democratic with an appreciation for the rule of law.

Weaknesses of South Africa. Although South Africa has much strength, the challenges are numerous as well. The following weaknesses may lead to economic policies for remedial measures.

Opinion polls identify poverty and inequality as the key challenges facing South Africa in the current era (Moller, 2007b). Statistics (Table I) show that almost four out of ten South Africans live in the poverty (Higgs, 2007). In particular, the country's increasing urban poverty stemming from the high unemployment rate needs immediate attention. In total, 14 percent of households in Cape Town have no income and 37 percent receive social grants (Philander and Karriem, 2016). Throughout the country, 21 percent of the population still experience difficulty in accessing nutritional and sufficient food and 8 percent of the population rely on social grants for their only source of income (Philander and Karriem, 2016). As indicated in Table I, the HIV/AIDS adult prevalence rate is 19.2 percent; that is, about one out of five South African adults are afflicted with the disease. Such a condition reduces the productivity and competitiveness of South Africa.

Labor strikes have increased in recent years. According to the US Department of State (2015), 131 working days were lost due to work stoppages per 1,000 working South Africans in 2013. The mining industry suffered 28 percent of all days lost; the platinum mining sector was paralyzed by a five-month long strike in the first half of 2014; and an additional month long strike in July 2014 by the National Union of Metalworkers South Africa further damaged the economy.

Access to electricity posits a great challenge and has become a significant concern with the advent at the end of 2014 of "load shedding" (planned, limited brownouts of a city's sectors), shaving one percent off estimates for economic growth (Moller, 2007a).

Job creation is a national priority (Higgs, 2007). Unemployment is high, averaging 25 percent and exceeding 50 percent among youth (Table I); high-skilled labor, however, is in short supply. Minimum wage legislation has resulted in many farm workers being forced off farms and domestic workers being dismissed from the kitchens and gardens of suburbia. Employers of small firms have laid off workers to minimize the additional paperwork and larger employers have replaced permanent staff with contract workers (Moller, 2007a).

Violent crime and corruption remain widespread. Security and corruption are the concerns of investors. Basic infrastructure gaps and poor government service delivery in low-income areas have increased the incidence of protest and crime in recent years (US Department of State, 2015). The exponential increase in internet broadband has resulted

in an increase in security threats (van Vuuren *et al.*, 2006). In short, the weaknesses of South Africa can be summarized as follows:

- (1) poverty;
- (2) inequality;
- (3) HIV/AIDS pandemic;
- (4) labor strikes;
- (5) inadequate access to electricity;
- (6) high unemployment with high-skilled labor in short supply; and
- (7) security and corruption.

Suggestions and implications

Suggestions

Based on the above described research findings, this paper proposed a framework for the short- to mid-term economic development in South Africa. Figure 13 indicates the centric concern is education and health.

Table I shows that South Africa made large investments (6.1 percent GDP in 2014) in education by most international standards, yet it has failed to produce the skills needed for South Africa to compete in the global economy and has higher unemployment rate and more people under the poverty line than Poland and Romania. This paper unveils that the low scores of higher education achievement, skilled labor supply, productivity, R&D performance, employment and equal opportunity particularly are the areas highly related to education and should be more efficiently and effectively dealt with. That is, the successful transformation of the educational system in South Africa will lead to higher education achievement. An increase in the skilled labor supply is badly needed for industries and would help increase employment opportunities. Better education should result in better human resources and R&D performance, which would lead to increased employment opportunities as well. Educating the general public about equal opportunity can help reduce inequality problems.

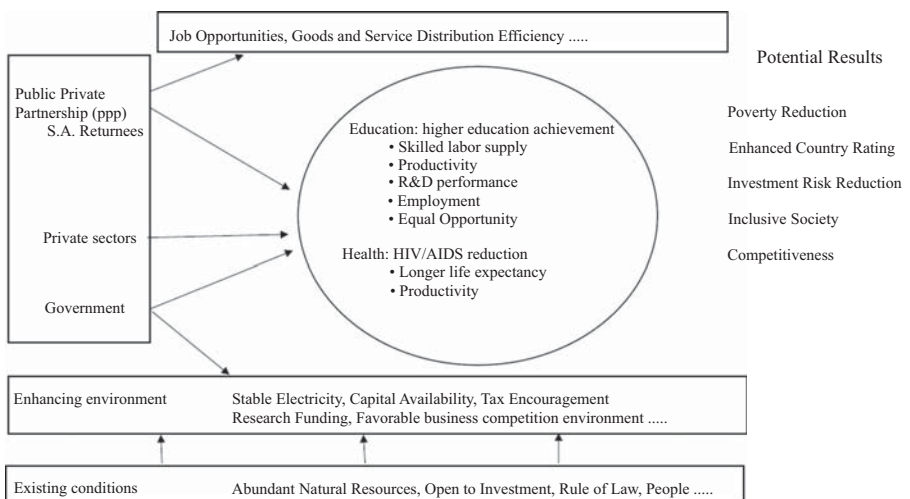


Figure 13.
Proposed framework
for a short- to
mid-term economic
development in
South Africa

According to Crouch (1997), the history of South Africa's educational allocations has been marked by waste, bureaucratic mismanagement, justified student protest, and unjustified school disruption. He further attested that South African educators cost the state, on average, four to five times more than GDP per capita. That is, educator salaries plus fringe benefits are 300 percent to 400 percent higher than per capita income. In addition, South African educators earn about 60 percent more, on average, than their employed fellow citizens, meaning a large proportion of the nation's educators are not working as much as they could or are not engaged in the most productive work possible. Crouch (1997) advocated that South African education ought to be prioritized as an investment strategy. Unfortunately, past efforts overemphasized investment and redistribution in material goods, with little discussion of how knowledge or ideas would be created and redistributed throughout the educational system. Educational reform in South Africa needs to address the above-mentioned issues.

Table I also shows that the health expenditure is 8.8 percent GDP (2014) in South Africa, comparing to 6.4 percent/5.6 percent of Poland/Romania, yet the life expectancy of its people is more than 10 years lower than the other two countries. In addition, the HIV/AIDS prevalence rate of its adults is 19.2 percent (2015), comparing to around 0.1 percent of the other two countries. Attending to the health issue will lead to reduced incidence of HIV/AIDS, longer life expectancy and increased labor productivity. Although South African has invested a greater percentage of GDP on education and health than Poland and Romania (Table I), the effect was questionable. Apparently, past practices need to be re-examined.

This study proposes a public private partnership effort in dealing with these two core issues. Specifically, skillful and talented South Africans currently living abroad should be invited to return and help with national transformation. Of course, attractive incentives have to be provided. In addition, local private companies are also viable partners. Various types of incentives, including tax reduction or subsidies, have to be in place as well. Returnees and local private sectors can assist in upgrading or transforming the educational and health care systems. They can also help to enhance the environment as stated in Figure 13, by:

- (1) building good infrastructure for a stable supply of electricity;
- (2) increasing capital availability with better government financial system and banking system, designing functional tax encouragement policies;
- (3) allocating research funding wisely; and
- (4) constructing a better business competition environment;

The government can use the strengths of South Africa, such as its abundant natural resources, investment incentives and large population to design attractive incentives for the returnees and private sectors to join the efforts.

Once the public private partnership system is formed to undertake national transformation, their involvement can hopefully bring about job opportunities and enhance the efficiency of goods and services distribution. When such an eco-system has been established, the results are likely to include poverty reduction, enhanced country rating, investment risk reduction, and an inclusive society which will eventually lead to national competitiveness.

Understandably, economic problems in South Africa are much more complicated than those described in Figure 13. However, under time and resources constraints, decision makers need to set priorities for stage by stage development. Education and health are the two centric concerns that need to be dealt with as soon as possible, as they are linked more with other issues. For example, better education will upgrade the quality of human resources, increase employment opportunities and very likely decrease labor strikes.

Implications

Summarized from the above suggestions and quantitative and qualitative analyses, we proposed the following three implications:

- (1) initiate national transformation from the two core issues of education and health;
- (2) invite and provide attractive incentives for the South African returnees from abroad and members of local private sectors to take part in the national transformation efforts; and
- (3) learn from the NIC development pattern of Poland and Romania by investing in MC and PC for faster results.

Although educational and health care system reform takes time and effort to see positive outcomes, it is better to start sooner than later for they are very fundamental problems in South Africa. Hopefully, the proposed framework in Figure 13 highlights some key points for decision makers to contemplate.

One of the limitations of this study is that the IMD database carries South African data only for the African continent. As a result, this paper has to limit itself to the study of this one African country. Second, due to the nature of a national level study, the sample size is too small for more advanced statistically analyses, such as regression. Third, this paper examines the relationship between NIC and GDP per capita (ppp) only; however, bearing in mind that other domestic and global drivers may also affect GDP growth. Fourth, due to space limitation, this paper did not go deep into the ELSS production function calculation. However, we believe that in-depth analyses with descriptive statistics can also generate valuable results for the reference of relevant parties.

Conclusion

South Africa is the entry point to the African continent. Despite policy uncertainty, it is a destination conducive to foreign investment and offers ample opportunities from which to gain access to the rest of the continent (US Department of State, 2015). It can also significantly assist in bringing about development in the region (Kayuni and Tambulasi, 2012).

However, the weaknesses of South Africa described in the previous section cast a shadow on its economic development. These weaknesses include high unemployment yet a shortage of skilled labor, labor strikes and access to stable electricity. To solve the problems, South Africa and South Africans need to take responsibility and ownership for their own development and cannot rely on the support of world organizations and social welfare income. The government can learn from the NIC development pattern of Poland and Romania, which also experienced four decades of slow development. Starting from a similar level of GDP per capita (ppp) and NIC in 2001 (Figures 2 and 3), South Africa lagged behind the other two countries in both tangible GDP and intangible NIC development over the past 15 years. Policy makers in South Africa should ask themselves, if Poland and Romania can, why cannot South Africa?

Figure 9 reveals that the HC grows together with GDP in South Africa. The government can invest more in HC development to ascertain potential economic growth. On the other hand, GDP growth facilitates the increase of HC, which is required for national development. In addition, the educational system can educate the general public in South Africa that they need to earn their own living. Citizens should demand a quality education that makes them employable with market required skills, rather than relying heavily on social welfare income. As Moller (2007a) put it, as long as government transfers remain the most important source of household income and the means of survival, it is foreseeable that the poor will continue to be dependent on state handouts. Therefore, better policies need to be stipulated to encourage job participation. In addition, employees need to realize that working jointly

together with employers to improve working conditions is more constructive than having labor strikes that keep investors away and reduce employment opportunities. Employers should also realize the value of public private partnership. By providing better working environment for the employees help stabilize the society for increasing national competitiveness, which in turn for the benefits of their own business.

Booyesen (2007) advocated that for sustainable economic development, African countries should invest the profits from increased demand for their natural resources in education, health care, and infrastructure. A majority of the concerns are intangibles, which fits Chase's (2002) report that what is at risk nowadays are intangible assets, not just tangible ones. Consequently, regularly measuring and reporting national intangible assets is recommended. At the firm level, managers need to report information on intellectual capital so that investors can actually use it in making decisions regarding the actual worth of a company (Soriya and Narwal, 2012). It is also important for investors to know the actual NIC of South Africa for the purpose of making wise investment decisions. Besides, as distinct from the firm-level concept that a company's HC cannot be owned and controlled by firms (Edvinsson and Malone 1997), national HC can be owned mainly by a country as long as no brain drain occurs. In other words, all four components of an NIC can be owned by a country. Therefore, investing in building an NIC should merit a good payoff. Furthermore, as intellectual capital is a crucial resource for firms in generating future profits (Ariff *et al.*, 2016), in parallel fashion, NIC is also a crucial resource for countries to generate GDP growth in the future and vice versa for mutually reinforcing effect.

South Africa's socioeconomic and sociopolitical landscape is undergoing transformation at an ever-increasing pace (de Jongh, 2004). In total, 20 years of post-apartheid life have opened up the previously isolated regime to the rest of the continent and the world (Hofmeyr, 2013). In projecting the 2017 economic outlook for South Africa, the OECD (2016) reported that the macroeconomic situation is still difficult due to weak growth and inflation above the central bank's target. Unless growth accelerates, unemployment and inequality will remain very high. In concluding, a major challenge for the new democracy in South Africa continues to be the pace and scope of transformation (Moller, 2007a). Definitely, the intangible NIC will play an important role in the transformation process.

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	South Africa <i>n</i> = 15	Poland and Romania <i>n</i> = 30	South Africa <i>n</i> = 15	Poland and Romania <i>n</i> = 30	South Africa <i>n</i> = 15	Poland and Romania <i>n</i> = 30	South Africa <i>n</i> = 15	Poland and Romania <i>n</i> = 30	
	HC		GDP		MC		GDP		
hc1	-0.1999	0.5626*	-0.6624*	0.1949	mc1	0.0324	0.7354*	0.3753	0.6941*
hc2	-0.6606*	-0.2698	-0.5407*	0.0178	mc2	0.4218	0.6544*	-0.6636*	0.4915*
hc3	-0.4988	0.8337*	-0.5262*	0.8017*	mc3	0.4272	0.2855	-0.7564*	0.2138
hc4	0.7904*	0.8614*	0.8141*	0.5413*	mc4	0.7415*	0.5152*	-0.7615*	0.4020*
hc5	0.9177*	0.7013*	0.7717*	0.4018*	mc5	0.7399*	0.4841*	0.2144	0.3938*
hc6	-0.6551*	-0.0014	-0.9563*	-0.7457*	mc6	0.3728	0.7896*	0.3374	0.8342*
hc7	0.2636	0.4518*	-0.2543	-0.0619	mc7	-0.4773	-0.0749	-0.1562	0.1297
hc8	.	0.8506*	.	0.4014*	mc8	0.6959*	0.1041	-0.5749*	0.0662
hc9	0.8996*	0.7741*	0.8544*	0.9038*	mc9	0.4106	0.0653	-0.0524	-0.271
hc10	0.8786*	0.5877*	0.7844*	0.3790*	mc10	0.4708	0.7676*	0.4793	0.6912*
hc11	-0.5365	0.5405*	-0.4077	0.5972*	mc11	0.3135	0.7834*	0.3377	0.7079*
hc12	0.8164*	0.9011*	0.9087*	0.6765*	mc12	0.6617*	-0.1803	-0.2007	-0.4710*
	PC		GDP		RC		GDP		
pc1	0.4059	0.8471*	0.2019	0.8499*	rc1	0.1628	0.5301*	-0.0912	0.8071*
pc2	0.6380*	0.5722*	-0.5422*	0.5031*	rc2	0.8068*	-0.2904	-0.7679*	-0.6021*
pc3	0.0473	0.8213*	0.9135*	0.9205*	rc3	0.217	0.5730*	-0.0072	0.7765*
pc4	-0.0855	0.9452*	0.7732*	0.9482*	rc4	0.012	0.6207*	0.1502	0.8123*
pc5	0.4221	-0.1047	-0.1532	-0.3625	rc5	0.0338	0.8697*	0.1185	0.5990*
pc6	0.8228*	0.9231*	-0.1248	0.8853*	rc6	0.1098	0.1913	-0.3057	0.4501*
pc7	0.0171	0.6253*	0.2066	0.7629*	rc7	-0.0346	0.0241	0.2117	-0.0734
pc8	0.4275	0.1325	-0.3529	-0.0446	rc8	-0.6715*	0.6411*	0.8335*	0.8043*
pc9	0.2598	0.6274*	0.0252	0.7068*	rc9	0.6933*	0.5462*	-0.6881*	0.9148*
pc10	0.2683	-0.6247*	-0.9261*	-0.5462*	rc10	0.8987*	0.8437*	-0.6201*	0.6025*
pc11	-0.5666*	0.8442*	-0.4278	0.9322*	rc11	0.8790*	0.5355*	-0.8435*	0.4565*
pc12	0.2936	-0.229	-0.7174*	-0.131	rc12	0.6867*	0.7822*	-0.7036*	0.5179*

Table A1.
Correlation of each individual indicator with respective construct (HC, MC, PC, RC) and GDP

Notes: #South: Africa hc8 = PISA no data; *correlation coefficient is statistically significant

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