

A report of Malawi's innovation capital

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Abstract. Innovation capital is a key for national progress, especially for those categorized as developing countries. This paper reports multi-indicators and measures of innovation capital of Malawi and offer multiple year trend analysis. Collecting data from secondary, objective data bases, our results demonstrated that, public and large-scale surveys are needed for collecting information about business R&D investment, the industry-academic collaboration, as well as intellectual property management – these data are somewhat neglected. Positively, the results observe gradual growth in the aspects of research personnel and scientific publication, which enrich the country's innovation capability. These results shed lights on the policy making and business practices.

Keywords. Innovation capital, National wealth, Intangible assets, Economic growth.
JEL. M10, M11, M14.

1. Introduction

Tangible assets were the most valuable assets of a 20th-century company. The most valuable asset of a 21st-century institution will be its knowledge workers and their productivity. In many of the members of the Economic Co-operation and Development (OECD) countries, such as US, UK, Australia, France, and Japan, there has been an increasing investment in intangible assets. Then again, what are intangible assets and why are they so important? Only recently, the recognition of intangibles assets is seen as an important source of wealth and progress, thus creating an increase need to study intellectual capital. Measuring intangible assets are important to private enterprises, public sectors, regions and nations because they assist in analyzing competences, capabilities, policies and good practices. According to Wikipedia, these are assets that lack physical substance and usually are very hard to evaluate. It includes patents, copyrights, franchises, goodwill, trademarks and trade names. It has been argued to be one possible contributor to the disparity between company values as per their accounting records, and company value as per their market capitalization. These assets have been identified to be fundamental sources of wealth, progress and represent a major concern for business firms and their stakeholders ([Garcia-Ayuso, 2003](#)).

However, intangible assets are not operated in a vacuum. They rely on supportive forms of resources and resource construction processes to embody their benefits into real innovation and performance. That is why Economics and Business scholars contribute their hard work in investigating the intellectual capital of a nation, which include both more static (e.g., knowledge, patent, law) and dynamic forms (e.g., innovation capability) of capitals for wisdom generation. The intellectual capital report allows readers a cohesive picture of a nation's potential development in competitiveness and productivity ([Pasher & Shachar, 2007](#)). National intellectual capital mainly consists of five types of component capital –

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human capital, market capital, process capital, renewal capital, and financial capital (Malhotra, 2003; Pasher & Shachar, 2007). The scope of each component capital is described in further details in Chapter 3. By exhibiting the research findings of Malawi, we can examine the components of national attraction from the viewpoint of foreign investment.

Knowing this, however, there has been little empirical research conducted for the latter (the innovation capital) at the national level, because it is still quite a new concept and a lot of efforts need to be invested in data collection, which raises a gap in research. Thus, specifying innovation capital at a national level can provide a direction for nations to make decisions concerning which investment is effective in gaining national economic growth, human development, and quality of life as they are the sources of competencies and capabilities in the development in the era of the knowledge economy (Lin & Edvinsson, 2011; Malhotra, 2003). In recent research, there has just been few countries that had had their intellectual capital measured in Africa (e.g., South Africa). This clearly indicates the gap in research and knowledge, and is the fundamental reason for this study. There are so many developing countries in Africa that needs attention and investment and with the aid of this research, it can paint a clearer picture of the types of areas that needs the most attention.

2. Design and Report

Formally, innovation capital is defined as the future intellectual wealth, with the two key factors; R&D and patents being the backbone of a nation's competitive advantage (Bontis, 2004). By selecting business R&D spending, basic research, R&D spending as a percentage of GDP, R&D researchers, cooperation between universities and enterprises, scientific articles, and patents per capita – United States Patent and Trademark Office and European Patent Office (USPTO + EPO) as the indicators for this capital type.

Secondary were collected and proxy measure for the innovation capital were adopted, because of lack of availability of data that can correspond exactly to the most important scholarly measurement model for national innovation capital. The collected data were accumulated through the World Bank database. Definitions and measurement indicators are shown in Table 1.

Table 4. Definitions and measurement indicators

Indicators	Definition
Business R&D spending	Business expenditure on R&D (per capita)
Basic research [#]	Whether basic research enhances long-term economic development
R&D spending/GDP	Total expenditure on R&D (percentage of GDP)
R&D researchers	Total R&D personnel nationwide per capital (Full-time work equivalent per 1,000 people)
Cooperation between universities and enterprises [#]	Whether knowledge transfer is highly developed between universities and companies
Scientific articles	Scientific articles published by origin of author (per capita)
Patents per capita (USPTO+EPO)	USPTO and EPO total patents granted (per capita)

The following tables 2 further compares the theindicators used with their own definitions in this study and the NICI40 indicators model. Fortunately, the structure is in line with the important NIC40 model (Lin & Edvinsson, 2011).

Table 2. Proxy Indicator for Renewal Capital

	NICI40	RC-MW
1	Business R&D spending	Same
2	Basic research #	Same
3	R&D spending/GDP	Same
4	R&D researchers	Same
5	Cooperation between universities & enterprises #	Same
6	Scientific articles	Same
7	Patents per capita	Same

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Tables 3 are illustrations of the data in an organized format with the estimated missing values (highlighted in yellow). With raw data being collected then standardized, with the span period from 2005 to 2014 (10 years), the data now display trends for each of the indicators from the five capitals.

Table 3. *Estimated Missing Value for Renewal Capital*

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
X21										
X22										
X23										
X24			3.000	3.950	3.950	4.900				
X25										
X26	0.812	0.846	1.284	1.454	1.176	1.480	1.709	1.703	1.565	
X27										

Figure 1 indicates the trends of renewal capital in Malawi with R&D researchers having the highest score (4.900) and the lowest score from Scientific articles (0.812).

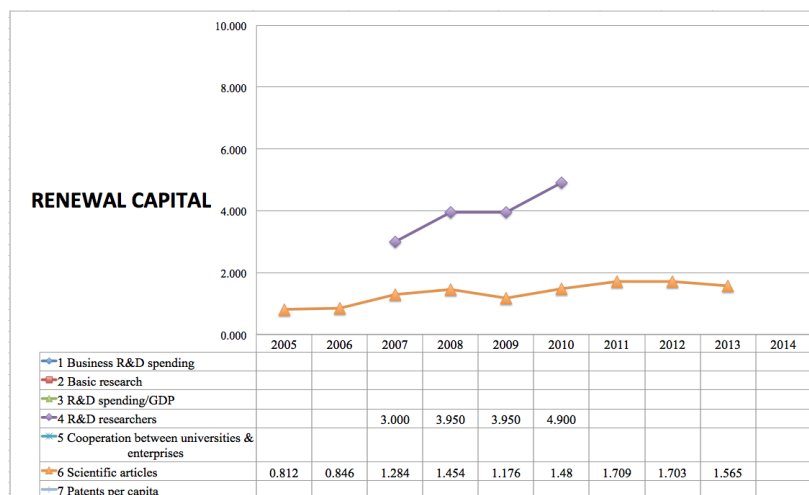


Figure 1. *Trends of Innovation Capital in Malawi*

Five of the seven indicators' data are missing (Business R&D spending, Basic research, R&D spending, Cooperation between universities & enterprises, and Patents per capita), thus allowing the trend of R&D researchers to demonstrate a good potential for renewal capital as the scores in each year are the highest of all the indicators. According to the Southern African Regional Universities Association (SARUA), it was mentioned that in May 2007, the Malawian president has merged education, and science and technology under a single ministry ([Saruaorg, 2016](#)). Thus, the explanation of why the data collected only started from 2007. Lastly, Scientific articles demonstrate the lowest scores. Nevertheless, both indicators' scores show a positive trend (increase).

3. Conclusion and Suggestions

With the aid of this study, it paints a clearer picture into which indicator(s) have potential improvement in the hopes of gaining national economic growth, human development, and quality of life, as they are the sources of competencies and capabilities. In addition, with the mentioning of which indicators showing the lowest scores; this allows a specific direction for any person who holds interest in the results to conduct more research in finding ways to increase the score.

It is important to note that not every dimension of innovation capital can be measured because of the insufficient data that can be collected. There may be the lack of resources in poorer country to carry out the research. In additional, not all

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indicators can be used by other countries. The two main implications of this study are: firstly to bring forth the markers in knowing what areas needs improving; and secondly, this study could move the research program into a more convergent form to provide an additional research into thenational structural capital.

The limitations of this research include the following: 1. limited by the availability of published data; 2. value of the results relies heavily on the quality of the raw data from sources (World Bank); and 3. proxy measurements was used because of limited data.

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