

## **IARIW-ESCoE Conference**

### **“Measuring Intangible Assets and Their Contribution to Growth”**

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#### **Intangible Capital and India’s Economic Growth Since Liberalisation**

*Ratan Kumar Ghosal, University of Calcutta, India, ratankumarghsl@gmail.com*

It is not to be denied that we are now living in a digital age dominated by knowledge capital such that it is manifested by a revolutionary change in the production structure of the economies, living standard of the people of the countries across the globe. The dynamics of this change has been marked by widespread revolution in ICT and AI so that the global economy is overwhelmingly being transformed into knowledge based economy and its production structure has also been witnessing an increasing dominance of investment in knowledge capital (i.e the intangible capital viz computerized database ,R&D, design, brand equity, firm specific training, intellectual property, organizational efficiency etc. ) instead of being solely dependent on conventional fixed capital , labour and technology. Further the liberalization of trade ,investment and finance has led to a tremendous acceleration in the cross-country flow technology and knowledge capital such that the global production process has been fragmented across countries and industries. Consequently there has been an increasing and inexorable cross country and cross industry flow of knowledge capital in the global value chain since beginning of the 21st century which has integrated the developed, developing and low income countries with the global economy (Chen, Gouma, Los and Timmer, November 2017). Unfortunately the contribution of the intangible capital has not yet been taken into account in the National Income and Product Accounts of the countries in the globe because of the problem of measurement of its contribution. This non –inclusion of the contribution of the intangible capital to the GDP and its growth across the countries has resulted into an underestimation and mis -measurement of GDP, productivity / contribution of capital, labor, TFP, and MFP and their growth across the countries.

The growth economics literature has also ignored the role of the intangible capital / knowledge capital on the growth accounting process of the economies till the last decade excepting the consideration of contribution of TFP. Robert Solow aptly remarked in 1987 that “ you can see the computer age everywhere but in the productivity statistics”. The recent World Intellectual Property Report of 2019 has also documented that the tremendous rise of the global value chain has gone hand in hand with the growing importance of intangible assets in economic activities. Accordingly intangible capital accounts for a higher share (more than double of the tangible assets) of value added through its various stages viz distribution, final assembly and other stages.

There has been a growing literature on the measurement of the intangible investment in its various forms (i.e. computerized information, innovative property and economic competencies) and its shares to GDP of several developed countries by using the neo-classical growth accounting approach and its extended form (Corrado, Hulten and Sichel (2005,2009); Corrado,Goodridge and Haskel (2011); Hulten and Hao(2012);ArkBart,Hao, Janet, Corrado,Hulten and Charles(2009); Goodridge and Haskel (2016); Chen et al (2017);Felix Roth(2019);Goldin Ian et al

(2020);McGrattan (2020) ; Haskel and Westlake (2018), Chen et al (2017)etc. However the pioneering work in this area has been done by Corrado, Hulten and Sichel (2005,2009) and most of the later works have followed the same methodology of estimation with some variations in some cases especially in those studies which are industry specific and sector specific (Bart van Ark and Jager(2010). Most of the studies are of the view that the non-inclusion of intangible investment in the national income and product accounts understate the actual change in the total output of the economies . Interestingly the study Corrado et al (2016) on the role of tangible and intangible investment in accounting for the growth of 18 European countries and the US in pre and post recession of 2008 found that capital deepening including tangible and intangibles have been the main drivers of growth .

However there is hardly any study on the measurement of the intangible investment and its share in the GDP of India notwithstanding the fact that India has been experiencing a tremendous service sector revolution since liberalization such that service sector contributes around 60 per cent of its GDP while the manufacturing and agriculture contribute 26 per cent and 14 per cent of GDP respectively. Moreover India has ranked 12th position in IP filing activity by origin in 2018 and India has been a major exporter of software and also a major partner in the global ICT revolution. However there are few studies on the measurement of industry specific and sector specific total factor productivity and its growth (Gulati Sarthak et al(2020, RBI Occasional paper, 41(1));Das ,D.K et al (2014,2019), Goldar ,B et al (2017), Krishna,K.L , Goldar ,B et al (2018) etc).

Under this backdrop we will measure the sector specific intangible investments in India and its share in the GDP since beginning of the 21st century and also the impact of this investment on the productivity of labor input, tangible capital and total factor productivity. We will also measure the contribution of the intangible investment , tangible investments and TFP as well as multi factor productivity to the productivity growth of Indian economy by following the neoclassical growth accounting method with the inclusion of intangible capital. To this end we will strictly follow the methodology used by Corrado, Hulten and Sichel (2005,2009), and Corrado et al (2016). We will also apply the Schumpeterian multi sector growth accounting approach and compare our estimates. We will use the INDIA KLEMS data base, National Account statistics of CSO, RBI on-line data base, World Development Indicators 2020 database, Penn World Tables, CMIE data base, and the productivity estimates of the authors cited above.