Indian IT industry: Future competitiveness demands increased R&D spending[*]

Recent quarterly earnings reports of two of India's largest information technology (IT) firms have raised concerns about the future prospects of the IT industry in India. These concerns have been compounded by emerging trends that are likely to remain in place for some time to come, namely - increased competition from multi-national firms, the slowing of business outsourced by the global banking and finance sector, as well as constantly evolving technologies in artificial intelligence (AI), automation and cloud computing. If the IT industry in India has to reinvent itself, it would require Indian IT firms to invest a significant amount more in research & development (R&D) than they currently do – with a focus on high end services as well as products where it is easier to differentiate themselves from competition.

An industry that first came to the world's attention when Indian firms were contracted to fix the Y2K bug, that at its peak in the year 2000 employed up to 100,000 engineers a year, and has attracted USD 21 billion in Foreign Direct Investment between FY2001 and FY2016[1], now faces questions on its ability to adapt to the changing landscape of the global software and computer services industry. AI, automation, and cloud computing, collectively labeled as 'digital' technologies have the ability to eliminate the labour arbitrage that Indian IT services firms have traditionally enjoyed, thus posing a threat not only to existing revenue models but to employment as well. As per the latest strategic review report by NASSCOM, the IT-BPM industry in India currently employs around 3.7 million people directly.[2]

While in the past the Indian IT industry has shown itself to be adept at capitalizing on changing global trends, it is now perceived to be a laggard in the pursuit of the various game changing technologies that are being spoken about. The annual reports of some India's top IT firms however reveal that these firms are already working on technologies and in areas such as mobility and pervasive computing, big data, cloud computing, AI and robotics. The question therefore is – are they doing enough? If the IT industry in India has to reinvent itself, it will have

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[1] Factsheet on Foreign Direct Investment (FDI) from April,2000 to March, 2016
http://dipp.nic.in/English/Publications/FDI_Statistics/2016/FDI_FactSheet_JanuaryFebruaryMarch2016.pdf

[2] The IT-BPM Sector in India: Strategic Review 2016, www.nasscom.in/download/summary_file/fid/124730

to move up the value chain by investing heavily in providing high end services through the use of 'digital' technologies and/or by diversifying into product development. This would require Indian firms to spend a significant amount more on R&D than they currently do (see Table 1 below).

Table 1: Comparison of top Global and Indian IT firms

Country	Company	R&D expenditure (USD million)	Sales (USD million)	R&D as a percent of Sales
Global	MICROSOFT	9922	77078	12.9
	IBM	4336	76429	5.7
	GOOGLE	8098	54362	14.9
	FUJITSU	1384	32452	4.3
	ORACLE	4550	31485	14.5
	NEC	916	20042	4.6
	SAP	2307	17560	13.1
	TENCENT	934	10625	8.8
	CAP GEMINI	20	10573	0.2
	FACEBOOK	2196	10268	21.4
India	TATA CONSULTANCY SERVICES LTD.	145	15106	1.0
	WIPRO	40	7547	0.5
	INFOSYS LTD.	96	7422	1.3
	H C L TECHNOLOGIES LTD.	29	2735	1.1
	LARSEN & TOUBRO INFOTECH LTD	9	771	1.2
	ORACLE FINANCIAL SERVICES SOFTWARE	48	678	7.1
	ROLTA INDIA LTD.	33	583	5.6
	MINDTREE LTD.	3	581	0.6
	POLARIS CONSULTING & SERVICES LTD.	2	267	0.6
	3I INFOTECH LTD.	1	216	0.4

Source: EU Industrial R&D Investment Scoreboard (2015). Figures in Euros were converted to Dollars using the EUR-USD exchange rate of 1.21 as at 31 December 2014 and as mentioned in the EU Industrial R&D Investment Scoreboard.

It is evident from the table above, that the R&D intensity or the expenditure on R&D as a percent of sales for Indian companies is way lower than the global average R&D intensity of the software & computer services industry (around 10.0%). This can perhaps be explained by the fact that Indian IT firms have thus far been predominantly services focused. Their low level of expenditure on R&D over the past decade or more has coincided with a period of significant

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profitability for the industry – when in fact they could have increased their spending on building new capabilities.

Microsoft, a commonly cited example of a firm that has seen its fortunes turn around for the better, has consistently been one of the top spenders on R&D globally. The firm's expenditure on R&D as a percent of sales was around 13.0%, while its total expenditure on R&D was around USD 12 billion in 2014-15. To put the latter figure into perspective, Microsoft spends nearly twice the amount of India's overall industrial R&D spending, and matches India's public spending on R&D. Microsoft has been able to diversify its business away from being Windows-centric and into other products and services. It has been investing significantly in artificial intelligence including through acquisitions of AI startups (eg. Genee), and its recent performance (Microsoft stock touched an all-time high in October 2016) has been attributed to increased revenue from its cloud business.

As the Indian IT industry embarks on a new journey of playing 'technology' catch up with its global counterparts, the challenges and the competition it will face will be immense. The global software and computer services industry spends around US$ 80 billion on R&D[3], and is the fourth largest industry in terms of R&D expenditure globally. There are around 275 global software & computer services firms in the top 2500 global R&D spenders, of which 161 are from the US, 32 are from China and *only* 5 from India[4] – clearly highlighting that India's IT industry has a long way to go.

Companies like IBM and Accenture that have R&D intensities of 5.7% and 2% respectively and are international rivals to the Indian IT companies have reinvented themselves by investing significantly in new, high-end services. Focusing increasingly on products is another way for the IT industry to reinvent itself. Table 1 above has already captured the top 10 global IT firms – many of which are product focused - and their R&D expenditure. In this regard, it may also be instructive to look at the top 10 Chinese IT firms and their R&D expenditure (Table 2), again many of which are product focused. What is interesting is that the top Chinese firms are recording sales that are comparable to that of the top Indian firms, but their expenditure on R&D is significantly higher. This R&D trend in Chinese software firms exists despite relatively decreased competition from the likes of Google and Facebook (that are among the top 10 worldwide R&D spenders) being banned in China. Indian IT firms would definitely need to bulk up their spending on R&D if they choose to focus on products and are to remain competitive in the future.

As a start, a major thrust by the IT industry in India could perhaps be given to addressing the needs in other sectors such as healthcare and automobiles & parts. Research into high end

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[3] EU Industrial R&D Investment Scoreboard (2015)
[4] EU Industrial R&D Investment Scoreboard (2015)

services and software products that specifically target areas like data analytics in healthcare and embedded software and connected cars in the automobile industry for example, would also

Table 2: Top 10 Chinese software firms

Country	Company	R&D expenditure (USD million)	Sales (USD million)	R&D as a percent of Sales
China	TENCENT	1,131	12856	8.8
	BAIDU	1,137	7989	14.2
	NETEASE.COM	216	1908	11.3
	QIHOO 360 TECHNOLOGY	405	1386	29.2
	LESHI INTERNET INFORMATION & TECHNOLOGY CORPORATION	131	1101	11.9
	SHANGHAI BAOSIGHT SOFTWARE	78	659	11.8
	PERFECT WORLD	178	626	28.4
	KINGSOFT	155	546	28.3
	CHEETAH MOBILE	71	287	24.8
	IFLYTEK	83	284	29.3

Source: EU Industrial R&D Investment Scoreboard (2015). Figures in Euros were converted to Dollars using the EUR-USD exchange rate of 1.21 as at 31 December 2014 and as mentioned in the EU Industrial R&D Investment Scoreboard; Annual Reports (2014-15) of Indian companies; Figures in Indian Rupees converted to Dollars using the USD-INR exchange rate of 62.7 as at 31 December 2014 according to Federal Reserve Bank of St Louis; Centre for Technology, Innovation and Economic Research (CTIER).

have direct implications for technological deepening within India's healthcare as well as the automobile industry. For example, India has a competitive pharmaceutical industry, but it lacks a meaningful R&D presence in the healthcare equipment & services sector. High end services and software products could also be developed to address needs in other priority areas such as e-governance, defence, cyber security and smart grids for better energy management.

The Indian IT industry has no dearth of quality leadership to rise up to the challenges it currently faces. Dr. Vishal Sikka, CEO & MD, Infosys, for example, was brought on board with an impressive track record as Chief Technology Officer at his previous company SAP (a products company). Given his background, Infosys is clearly well positioned to move up the technology value chain. Many top Indian IT firms are now also understood to have an innovation evangelization layer – which essentially serves as a listening function for market needs and strategy, and is meant to bind together people in research, development and innovation. There have also been initiatives to incubate startups and integrate technologies like Artificial Intelligence (eg. TCS Ignio, Infosys Mana and Wipro Holmes) within their service offerings. The industry clearly also has access to a well-educated and technically skilled workforce. It would thus appear that the only missing piece in the puzzle is the lack of bold measures to ramp up

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expenditures on R&D and on acquiring companies and technologies that can take the existing initiatives to the next level. If the Indian IT industry is to truly become more competitive and move up the value chain, firms would need to increase their R&D expenditure on average by 8 to 10 times more than what they currently spend.

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