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**RESEARCH & DEVELOPMENT
INDUSTRY IN PAKISTAN**

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There is a misconception that natural resources and low-value added commodities, such as textile products, constitute world trade. On the contrary, world trade is increasingly dominated by the increasing prominence of capital and consumer goods that are dependent on knowledge-intensive production processes. There is an increasing role of research and development activities on global manufacturing output. One of the biggest advantages of the movement in capital goods and industrial inputs across borders is the transfer of technology that is likely to be embedded in the imported product. Unfortunately, Pakistan has been stuck in the vicious cycle of producing relatively low-value added goods.

The import composition of Pakistan has changed tremendously in the recent years in favor of capital goods as a result of the advent of CPEC. Several projects related to the development and the upgrading of the infrastructure fall under the ambit of CPEC. It is crucial to determine the benefits of such projects to all its stakeholders, which not only include the private sector and the government but also the general public. As Pakistan undertakes investments primarily to improve the existing infrastructure of motorways and power plants, there is likely to be a 'spillover effect' into all sectors of the economy. One of the benefits of having an efficient transportation system is that it reduces the travel time not only between the ports and the commercial and industrial centers, but also between agricultural lands and their markets. Further, it also reduces the transit time for labor that commutes within the cities, increasing their productivity levels as more time can be allotted to both work and leisure activities. Therefore, the role of research institutions is essential in not only determining the costs and benefits of investment projects at the micro-level but also recommending policies that increase the productivity levels of the workforce and the capital employed. The World Development Indicators provides information on the research and development expenditures as a percentage of GDP. Interestingly, the world average has remained consistently between 1.99 in 1996 and 2.13 in 2012. Pakistan peaked at 0.63 in 2007. On the other hand, the value for China has consistently increased, from 0.57 in 1996 to 2.02 in 2013. The Global Innovation Index (GII) ranks Pakistan at 113 out of 127 countries, below Ivory Coast, Ethiopia and Madagascar. On the other hand, India is ranked 60 and China is ranked 22. The Atlas of Economic Complexity by the Center for International Development at Harvard University ranks Pakistan at 100 out of 124 countries,

below Zambia, Cameroon and Uzbekistan. This index is calculated by considering the diversity in the number of products and its ubiquity, which is the number of other countries that can produce the same product range as Pakistan.

The indicators on human capital and research present a grim picture of the research and development activities within Pakistan. The Pakistan State of Future Index indicates research and development expenditures to equal 0.479 per cent of the GDP in 2027 (Graph and Forecasted Data Annexed). An optimistic outlook should increase research and development expenditures as a percentage of GDP to 0.6, while a more plausible outlook suggests a value ranging between 0.3 and 0.4. The following are some recommendations to increase the research and development as a percentage of GDP to its optimistic outlook of 0.6.

First, the Higher Education Commission (HEC), which regulates the quality of higher education and stresses on the importance of better research output in universities, must provide greater incentives to researchers who focus on issues related to Pakistan. For instance, universities with strong industry linkages must be rewarded particularly if their research output is relevant to the stakeholders across all economic sectors. Investments by the private sector organizations, think tanks, and trade bodies and associations must be encouraged in developing specific research funds and avenues for research collaborations.

Second, HEC must focus on applied research and experimental development (as defined in WDI), rather than on basic research to create new knowledge that is not only likely to be flawed due to the poor quality of educational and research institutions but also risk being irrelevant to other researchers and the society in Pakistan. Applied research and experimental development that is Pakistan-specific, even if it replicates research ideas developed in more advanced countries, must be encouraged and provided monetary incentives. This will also likely increase the percentage of research and development expenditures to GDP.

Lastly, the undergraduate-level university education must include courses on the improvement of writing and analytical skills as well as courses that introduce students to major issues being faced by the Pakistani society. HEC and the relevant accreditation bodies must design a curriculum that does not solely concentrate on their specialization courses. For instance, engineering

and medical programs must include courses that improve the writing and analytical skills of young researchers as well as introduce them to courses that discuss the most important issues faced by the society in Pakistan. This will help develop research ideas in their respective fields that are more meaningful to the Pakistani society and increase the returns on research and development expenditures.

