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Potential Impact of Artificial Intelligence on India's Manufacturing and Services Sector

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Background and Scope for Research:

Empirical analysis of India's growth trajectory finds that capital deepening was at the core of India's increasing GDP in the twenty first century. However, one-third growth was estimated to come from improvements in Total Factor Productivity (TFP). Further, decomposition of TFP growth found higher productivity gains in services versus the manufacturing sector. Satpathy, Chatterjee and Mahakud found that embodied and disembodied technology play a crucial role in the determination of productivity, at least for manufacturing and its sub sectors in India.

Advancements in new technologies such as Artificial Intelligence (AI) and its application to a variety of industry sectors make it necessary to understand its potential to transform businesses and trigger growth in the future. AI's transformational potential stems from its ability to lend itself to a diverse range of applications across a range of sectors. One can witness AI based applications in manufacturing, transforming quality control, production lines, and supply chain management, and in services creating personalized product offerings and high-quality customer engagement. AI, with its pervasive implications on economic welfare can be understood to belong to the class of General Purpose Technologies (GPT) such as the steam engine, electricity, computers, semi-conductors, and more recently the Internet.

Historically, the economic impacts of GPTs have not been immediate but follow after its diffusion across the economy, i.e. over a period of time. Similarly, for AI, any empirical research means confronting the challenge of measurement. Estimates on the economic impact of AI are bound to be imprecise because data on AI adoption is not available or adequately reflected in the data used to compute economic growth, at least not yet. Measuring the economic impact of AI is also difficult because of the magnitude of indirect effects on productivity that GPTs trigger. It is not therefore uncommon that studies on GPTs, while attempting to estimate their economic impacts, also engage in in-depth case studies and historical analysis of its impacts.

Despite the paucity of systematic data on the use of AI, there have been attempts to present high-level findings on the impacts of AI using empirical methods. The research that exists are either derived from past technologies (such as factory robots) that capture only part of the economic reach of AI or have attempted to measure the impact of AI using case studies or modeling AI through proxy variables. Recent research by McKinsey Global Institute (2018) used 400 case study across 19 sectors to assess the practical applications and economic impacts of advanced AI techniques across industries and business function. Accenture (2018) used proxy variables to assess the impact of AI as a factor of production on major developed economies. However, no paper so far has uniquely focused on the growth impacts of AI in India. This paper will capture the growth potential of AI in India's manufacturing and services sectors.

Data and Methodology

This paper will attempt to understand the implications of AI on the Indian industry distinguishing between its contribution to the manufacturing and service sectors in India using both quantitative and qualitative methods. Several IT services companies in India have developed AI platforms and virtual assistants for process management. AI solutions are also helping banks and credit lenders approve loans and assist the underwriting process. Within manufacturing, automobiles, electronics, and heavy electrical production units have also progressed in deploying AI, both in the process of manufacturing - including through smart factories, and the end product. The primary objective of the econometric specification will be to identify firm-specific determinants of TFP growth, of which AI, as an efficiency enhancing GPT would be considered as one of the explanatory variables. In the absence of a direct measure of AI at the firm-level, we will extend the idea from other studies to use investment in software, databases and computer machinery and other related technologies as a proxy of AI. We will leverage firm-level data available on the CMIE database for Indian corporates for this estimation.

We will also engage with stakeholders to understand and explain the AI potential of firms across manufacturing and services in the form of case studies. The case studies will illustrate how enterprises adopt and adapt to AI based applications in their business processes and its implications on skilling, human resources, firm efficiency and profits. This will also illustrate the types of sectors and firms within those sectors that are likely to be flag bearers of the new technology and those that will follow in the future. The limitations to AI diffusion and adoption will also be highlighted in the process.

