

DOCTORAL PROGRAMME

IMPLICATIONS OF EMERGING TECHNOLOGIES ON THE INDIAN
INFORMATION TECHNOLOGY SECTOR AND BEYOND

By

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Abstract

Most organizations within the Indian Information Technology (IT) sector are service-based and known for delivering high-quality custom software (SW) and business process management (BPM) services to clients worldwide. They primarily relied on engineers produced by the Indian engineering colleges to deliver such services. A majority of these engineering colleges have little or no academic autonomy and have mushroomed in parallel to the growth of the Indian IT sector starting from the 1980s. Organizations within the Indian IT sector also built work structures that pushed engineers, irrespective of their specializations, to equip themselves with generic software programming and communication skills crucial for delivering SW-BPM services. Today, these service-based IT companies and non-autonomous engineering colleges face a rapid rise of emerging technologies such as Artificial Intelligence (AI), Cloud, Big Data, and so on. As the Indian IT sector gears up to provide emerging technology solutions to clients for their digital transformation needs, it is also causing a significant rise in demand for engineering talent skilled in these new-age technologies.

The objective of this thesis is to shed light on the implications of emerging technologies on the Indian IT sector, its accompanying organizational field, i.e., the Indian Engineering education, and the social mobility prospects of engineers or prospective engineers, in general. We rely on two related ethnographies – one conducted in an AI research unit of a service-based IT organization situated in Bengaluru, and the other conducted in a non-autonomous private engineering college located in the outskirts of this city. Based on our ethnography in a service-based

IT organization, we attempt to understand the influence of emerging technologies, particularly AI, on such organizations within the Indian IT sector and the mobility prospects of their workforce – mainly the engineers from diverse specializations. Based on our ethnography in a non-autonomous engineering college, we attempt to illustrate the response of such colleges to the market forces in general and the IT sector in particular. We also study the impact of such a response on the mobility prospects of its prospective engineers from diverse engineering streams and socio-economic backgrounds, especially in the times of emerging technologies. Choice of theoretical frames to address different aspects of our research objectives were motivated by the ontological basis provided by Critical Realism, mainly the need to analytically separate structure and agency to analyze any phenomenon occurring within social systems. Following this meta-theoretical framework, we first look at the structural aspects in both our research contexts and then focus on agentic aspects of individuals from different backgrounds who while navigating such structures, face different mobility prospects.

In Part-I of this thesis we explore the structural aspects concerning the AI research unit of a service-based IT organization. We highlight, a) the peculiar challenges posed by extant organizational structures of service-based IT organizations while undertaking AI projects in an offshoring context, b) the socio-technical context within which the participants of such AI research units work and the coordination challenges they faced when their co-located work shifted to distributed team environments owing to an unplanned disruption caused by the recent pandemic induced work from home, and c) a newly evolving client-vendor relationship that is now manifesting through this AI research unit and its impact on the traditional operations of its parent service-based IT organization. Our findings indicated that the work processes actualized by this unit were heavily influenced by the traditional workflows and practices of the organization's mainstream SW-BPM projects meant for its long-standing clients. In the absence of AI compatible workflows, and with co-located work, we find that informal communication channels between participants

were particularly important for beginner roles within this unit to carry out their work effectively. AI compatible workflows could also be crucial for the members of this unit to avoid coordination disruption problems when the work shifts from co-located settings to distributed team settings. Since the AI projects delivered by the AI unit of this organization were intended to augment the mainstream SW-BPM projects meant for its clients, we observe that the evolving client-vendor relationship could potentially impact the workforce engaged in traditional BPM projects within the parent IT organization, and stymie innovative potential of such organizations in the AI space. But, on a positive note, these projects also seem to be offering promising possibilities for such organizations to establish their position as customer-centric AI services providers and stay ahead in the AI services value chain.

In Part-II of this thesis we first highlight the relevance of IT sector in the context of students' jobs placements within the non-autonomous engineering college, and then illustrate the social mobility prospects of prospective engineers in this engineering college and of engineers working in the AI research unit of the service-based IT organization. Our findings indicated that the organizational structure of this college, in aligning to the expectations of the market, prepared students irrespective of their engineering streams predominantly for the IT sector. More importantly, it enabled social mobility by providing flexibility to students of non-IT engineering streams, from various socio-economic backgrounds, to overcome the otherwise formal and rigid inter-stream boundaries and prepare themselves for IT jobs. This, however, has resulted in several non-IT stream students having to leave behind their specialized stream-specific knowledge, which is important for realizing their 'core' engineering potential. Observing the mobility prospects of engineers in the AI research unit of an IT organization, we see that these inter-stream boundaries that were blurred while preparing students for IT jobs have now become salient. While the traditional IT-BPM sector moulded engineers irrespective of their specializations into generic software engineers, the AI projects required a mix of IT skills along with the engineers' stream-specific knowledge. But, here again, we find that the non-IT

engineers occupying beginner roles in the AI space struggled with the organizational workflows and hence found themselves at a disadvantage in transitioning to senior work roles in the AI space.

Given these findings, our study reaffirms the need for policy to pay attention to the role played by organizational structures in enabling or constraining social mobility. In the Indian context where the IT sector is a predominant mobility ladder for engineers, our study points to the importance of incorporating IT and emerging technologies substantively within the curriculum of non-IT engineering streams, especially as this sector transitions into the emerging technology space.