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Climate-smart Arakuscape: Developing regenerative coffee value-chain in Andhra Pradesh, India

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Abstract

Arakuscape is a unique coffee landscape located in the Eastern Ghats mountain range of Andhra Pradesh, India with an average altitude of 900 meters above sea level, average annual rainfall of 118 cm where coffee is grown with layered model of agroforestry intertwined with climate-smart farming practices following universal principles of Natural Farming (NF). Although Coffee is considered as one of the favourite go-to beverages for decades, coffee production is hardly studied through the lens of climate emergency specifically in India. On the one hand, it is estimated that land suitable for coffee production will be decreased by 50 % by 2050 and the demand will be threefold on the other by that time. Besides, the climate crisis will impact coffee fruit development, productivity and yield with an outbreak of pests and disease including changing pattern of pollinator diversity and populations. Employing a comprehensive methodology of ValueLinks2.0 (developed by GIZ, Germany), Growth Matrix and Lean Six Sigma principles with the sample of 160 regenerative coffee growers from 5 villages and one cooperative society, M. Nittaputtu MACS Limited, this study implies the development of coffee value-chain analysis focusing on re-engineering market suitability through forward linkages and product quality enhancement. Central to this market innovation is the pioneering application of refractometer technology for brix-percentage measurement (20–22 %), enabling precise fruit grading and differential pricing systems that reward quality. By applying Lean Six Sigma's DMAIC (Define-Measure-Analyze-Improve-Control) principles to post-harvest processes, the initiative has standardised operations from selective harvesting through controlled processing through eco-pulping unit and solar hybrid drier. This scientific approach has yielded an 18.56 % improvement in cup quality scores, reaching SCA 83.35 with distinctive flavor notes of dark chocolate, citrus, and roasted nuts. Farmer-Producer Organisations serve as critical market intermediaries, eliminating exploitative middlemen while building entrepreneurial capacity among tribal communities. The resulting Araku Kaapi brand stands out in specialty markets. This study offers valuable insights for policy design that simultaneously addresses ecological sustainability and economic viability challenges while honoring indigenous knowledge systems in coffee value chain and market linkages.

Keywords: Araku kaapi, arakuscape, coffee value-chain, forward linkages, market innovation