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Peer Review

Review of: "Disruption, Diversity, and Due Diligence: Charting the Course for Coffee's Future—Key Takeaways from the International Coffee Convention 2024 (ICC2024)"

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There is a need for summaries/overviews for each 4.x section. I suggest a table as follows.

Maybe the table can be further developed.

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Sections	Key Findings	Methods/Technologies Employed	Implications & Recommendations
4.1 Future Landscape of Multiple Coffee Species	- Genetic diversity is vital for adapting coffee cultivation to climate change.	Historical analysis; genomic approaches; “Coffee Genetic Discovery” project	Expand gene pools by tapping into wild species, improve genetic resource management, and comply with regulations (e.g., Nagoya Protocol) to build climate resilience.
	- Historical exchanges (from Ethiopian Arabica to modern varieties like Gesha) laid the groundwork.		
	- Alternative species (e.g., C. liberica, C. dewevrei, C. stenophylla) show promise.		
	- Genomic analyses reveal 130+ species with adaptive traits (e.g., drought tolerance in Madagascar’s Baracoffea alliance).		
	- Discrepancies in cultivar identification indicate a need for sector professionalization.		
4.2 Coffee Production’s Environmental Footprint and EUDR	- Emphasis on detecting and monitoring deforestation via AI and remote sensing.	Remote sensing; artificial intelligence/machine learning; satellite imagery; risk assessment tools	Standardize and integrate technological solutions to monitor deforestation and ensure EU Deforestation Regulation compliance, benefiting both large-scale and smallholder producers.
	- Development of compliance tools (EUDR Coffee Check and DROP).		

	- Broader initiatives address sustainable practices and climate adaptation.		
4.3 Advancements in Coffee Preparation and Business	- Post-roast maturation alters sensory profiles with a preference for mature coffee among many consumers. - Community initiatives (e.g., Coffee Grower's Laboratory) enhance farmer profitability and value addition. - Regional studies reveal significant cultural differences in coffee preferences.	Sensory testing (triangle tests, hedonic tests); participatory methodologies; historical-cultural analysis	Re-evaluate traditional processing methods, optimize maturation protocols, and adopt innovative business models to increase product quality and improve socioeconomic outcomes.
4.4 Coffee and Health	- Coffee's bioactive compounds offer protective benefits against several diseases. - Studies have shown effects on brain-gut interactions, cholesterol metabolism, and bioaccessibility of acrylamide. - Regulatory gaps exist, especially regarding unsubstantiated health claims.	Epidemiological and clinical studies; metabolomics; bioaccessibility assessments; regulatory reviews	Enhance farm and industry practices to maximize beneficial compounds and reduce contaminants. Improve public health messaging and regulatory oversight to substantiate health claims.

4.5 Coffee in Transition	- The industry faces disruption from external forces (regulatory shifts, market dynamics, and technological changes). - Findings include challenges to traditional brewing methods (e.g., temperature preferences) and evolving supply chain strategies.	Business model analysis; market dynamics evaluation; sensory trials	Embrace radical innovation and disruption across the value chain. Businesses must adapt to regulatory demands and shifting consumer preferences to remain competitive.
4.6 CEO Think Tank: "Brewing the Future"	- Integration of insights from coffee machine manufacturers and roasters. - Cross-sector dialogue highlights the need to combine technical innovation with strategic business planning.	Roundtable discussions; interactive panels integrating scientific and business perspectives	Foster collaboration across industry segments. Leverage combined expertise to drive disruptive innovations that address market challenges and future trends.
4.7 Sustainable Utilization of Coffee By-Products	- Innovative approaches demonstrate valorization potential (e.g., cascara powder, coffee cherry flour, fruit spreads). - Coffee leaves and grounds possess bioactive compounds with health and environmental benefits. - Regulatory aspects (e.g., EU novel food labeling) are	5S methodology; product formulation studies; metabolomic analysis; regulatory assessments	Develop sustainable, value-added products from by-products to minimize waste, add revenue streams, and comply with food safety/regulation requirements.

	critical for market acceptance.		
4.8 Advancing Fermentation Techniques & Processing Methods	- Fermentation strategies (controlled versus spontaneous) affect coffee's volatile profiles and overall quality. - New post-harvest processes reduce water use and effluent emissions. - Studies on decaffeination and caffeine migration inform safety and sensory outcomes.	Controlled fermentation experiments; post-harvest processing innovations; residue analysis; UV-Vis spectroscopy	Enhance coffee quality and sustainability through process optimization while ensuring environmental benefits and consumer safety through standardized methods.
4.9 Coffee Research: Screening Methods to Sensory Profiles	- Advanced analytical methods reveal detailed coffee chemistry and sensory markers. - Studies track compound changes during processing (e.g., roasting, fermentation) and energy consumption. - Unique research contributions include in-depth profiles of Turkish-style coffee.	Mass spectrometry; non-target screening; multi-omics approaches; energy efficiency evaluations; NMR spectroscopy	Use state-of-the-art analytical techniques for quality control, authenticity verification, and process optimization. Results can inform tailored roasting and processing strategies to meet diverse market preferences.

How far the debates are scientifically evident is a black box. Here I suggest confronting the various arguments with scientific papers to better understand the evidence of what is presented and argued. Of

course, then it's not a summary of the conference, but I think the added value for the readers would be very helpful.

Declarations

Potential competing interests: No potential competing interests to declare.