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Proposal of a Digital Maturity Model to Assess the Impact of Agriculture 4.0 Technologies on Small- and Medium-Sized Rural Properties: A Case Study in the Agrotechnological District (DAT) of Caconde (Brazil)

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INTRODUCTION & AIM

Technological modernization in rural areas has the potential to boost productivity, sustainability, and resilience in the agri-food sector, especially through the adoption of technologies associated with Agriculture 4.0. However, small- and medium-sized producers still face significant challenges in effectively incorporating these innovations, particularly in contexts such as **Agrotechnological Districts** (**DATs**), which aim to foster local innovation ecosystems. In Brazil, **DATs** are being implemented in several regions as part of a public strategy to promote digital inclusion and technological modernization in rural territories, with a strong emphasis on family farming and regional vocations. *This study proposes a digital maturity model to assess the impact of emerging Agriculture 4.0 technologies in these territories, focusing on small and medium rural properties.*

METHOD

The methodology includes a systematic literature review to identify key dimensions of digital maturity in agriculture; semi-structured interviews with 15 experts from academia, public agencies, and technical assistance institutions; and empirical validation through a case study of the Caconde DAT (São Paulo, Brazil), known for its digital innovation initiatives in family farming and coffee production.

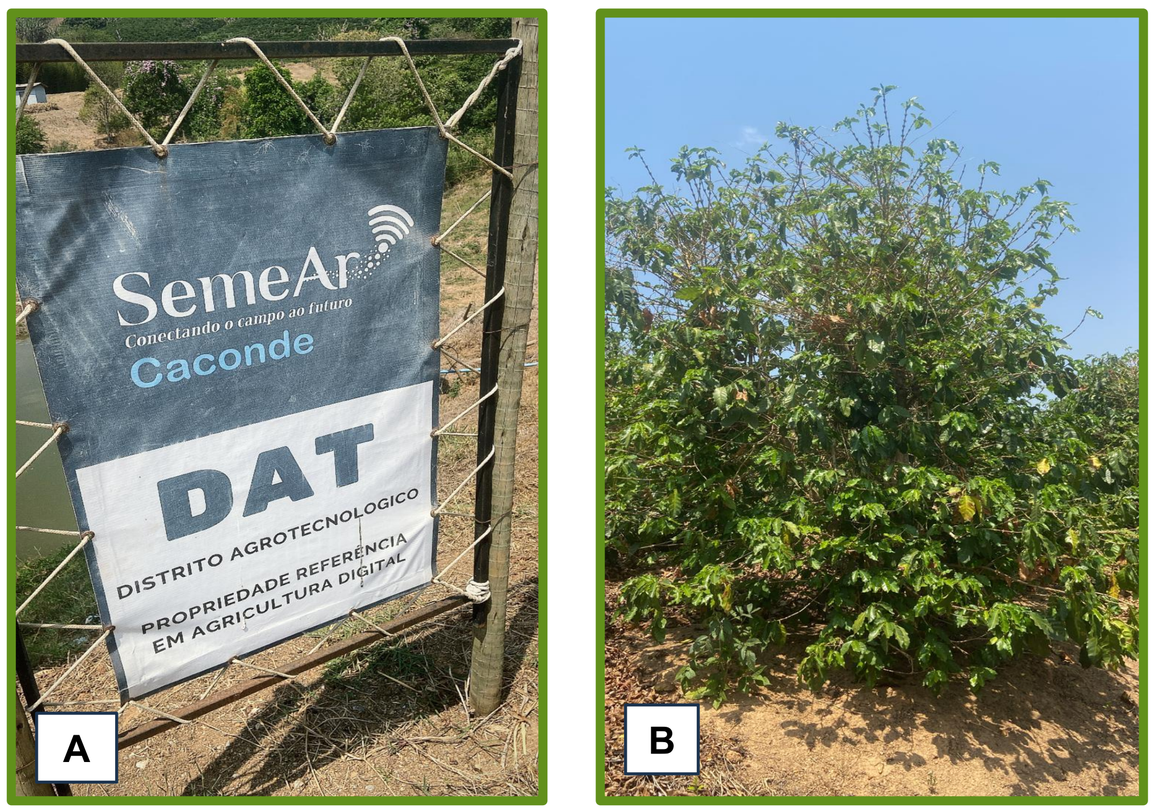

Figure 1. A) Caconde – São Paulo, Brazil. **B)** Coffee.

RESULTS & DISCUSSION

The study seeks to identify indicators for assessing digital maturity-such as infrastructure, digital skills, technological adoption, and institutional support-and to classify properties into different levels of maturity, mapping the main barriers and enablers for each stage. The Caconde case will serve to test and refine the model, allowing for the observation of best practices and ongoing challenges in the local context.

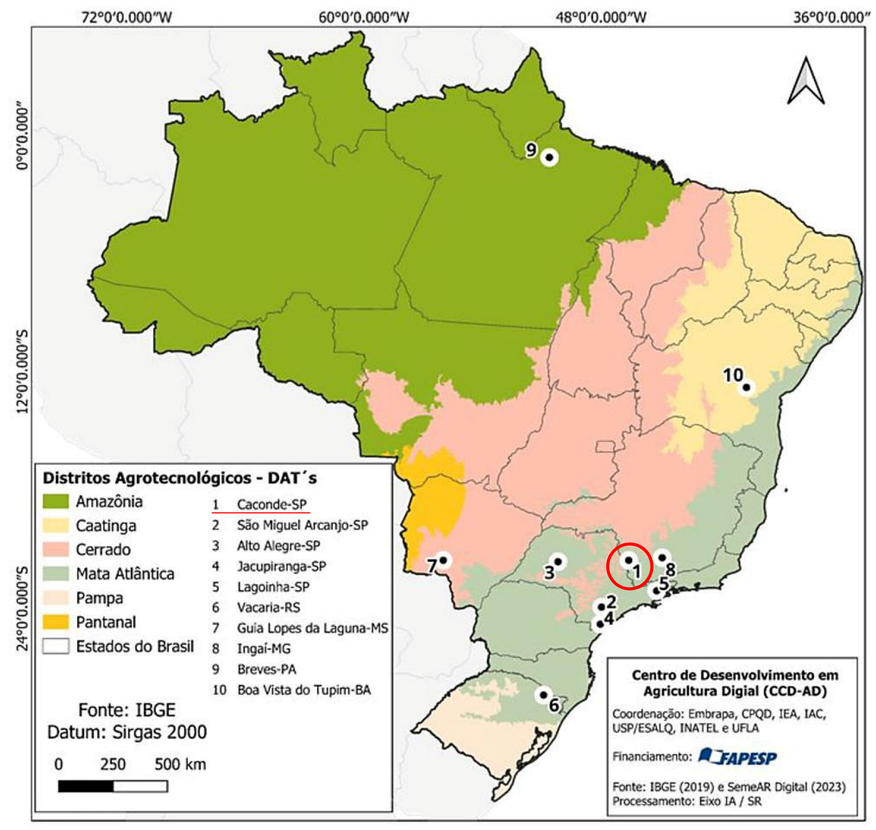

Figure 2. Brazil – DAT's. Link: https://www.semear-digital.cnptia.embrapa.br/dats/

CONCLUSION

The expected result is a tool capable of supporting public managers, technical assistance organizations, and producers in designing effective strategies for inclusive and sustainable rural digital transformation. Moreover, the model's broader application across different DATs may generate a multiplier effect, strengthen innovation networks and promote regional development in rural areas.

FUTURE WORK / REFERENCES

Future studies should explore the expansion of the digital maturity model in different Agrotechnological Districts, identifying innovation pathways and proposing strategies for an inclusive digital transformation in rural areas.

***Da Silveira, F.**, Smania, G.S., Landaverde, R., Osiro, L., Bolfe, É.L., Romani, L.A.S., Barbedo, J.G.A., 2026. Exploring the drivers of responsible scaling of Agriculture 4.0 technologies for transformative impact in the modern agri-food ecosystem: An ISM-based analysis. Agricultural Systems. 231, 104508. https://doi.org/10.1016/j.agsy.2025.104508*

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