Ribeirão Preto´s Beer: Craft Brewing Innovation and Geographical Indication as Catalysts for Economic and Cultural Development

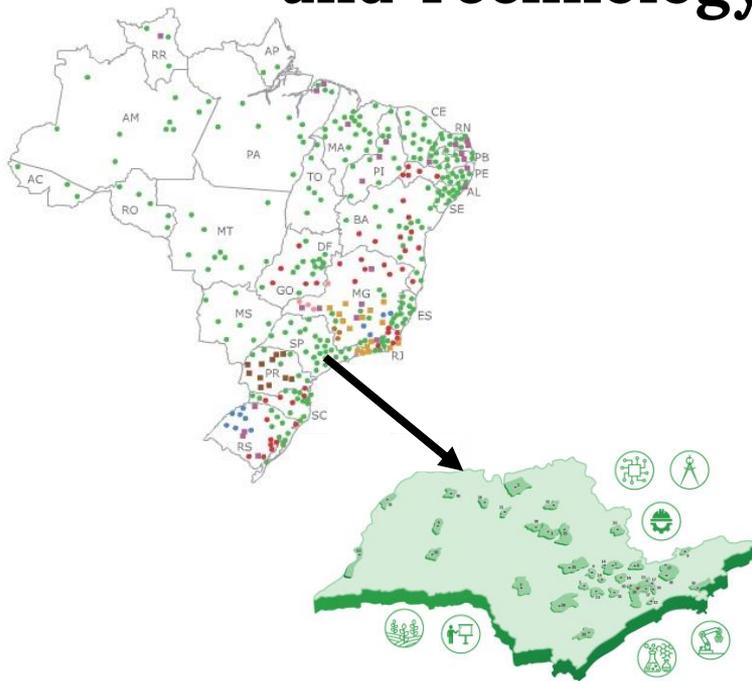*Sergio Limongi, André Dias, Jean Da Silva*

Session 4a: Research and Development
Sub-theme 3: Balancing tradition and innovation in GIs

Federal Institute of Education, Science and Technology of São Paulo - IFSP

Figure 1. Federal Network of Technological Education in Brazil and São Paulo state.
Dots indicates Federal Institute campuses. Ministry of Education, Brazil.

- 37 campuses in the São Paulo (SP) state
- Part of Federal Network of Technological Education with more than 660 units in Brazil
- Offers professional qualification, technical, undergraduate and postgraduate courses – public and free of charge
- Research, development, innovation and extension projects
- Focus on regional characteristics and close relationship with society's demands
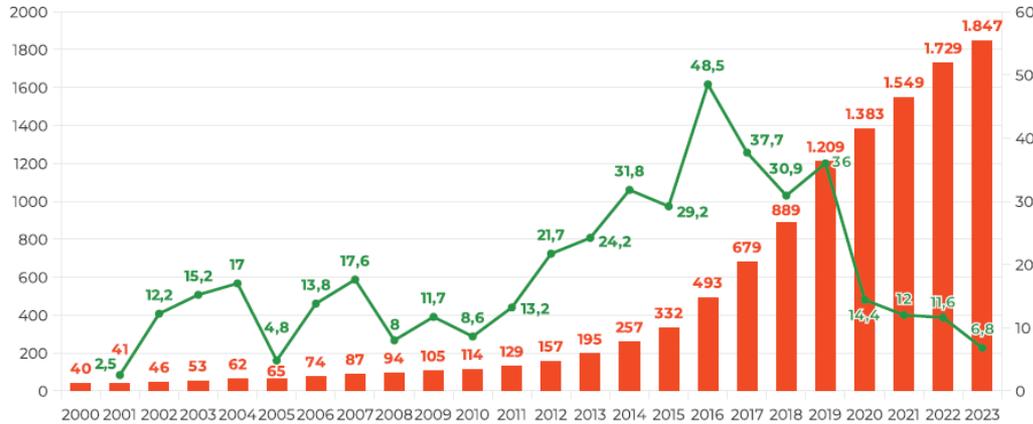
The Brazilian Beer Scenario

Figure 2. Beer Market in Brazil. Growth rate (green line) and number of breweries (red columns) in Brazil. Beer Yearbook 2023. Ministry of Agriculture, Brazil.

- Brazil: 1847 breweries
- São Paulo state: 410 breweries (the state with the greatest number of breweries in Brazil)
- Metropolitan Region of Ribeirao Preto: 48 breweries
- Important beer cluster
- Tradition and reputation for producing high-quality beers

Starting

Figure 3. Geographical Indication bottom line. Meetings between members of associations, academia governments about Geographical Indications.
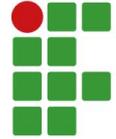

- 2017: relationship with brewers starts with a call of IFSP Innovation Agency's about **Geographical Indications**

- Meetings and discussions about GI potential and research into the region's brewing history and culture

Results

Start

19th century: the Italian immigrants Quarto Bertoldi and Salvatore Livi were the first to win a national award for their beer

Big Industries period

Installation of large breweries. Contribution for economic development and important architectural works. After 2000: rearrangement of factories due to creation of AMBEV (currently AB InBev).

Craft beer moviment

Formation of a cluster of microbreweries in the 21st century

Results

Figure 4. Knowledge consolidation.
Masterclass of Technical Brewing Course at IFSP.

- Strengthening the association and expanding network between companies, universities and public agents
- Start of the technical course in brewery at IFSP in 2020
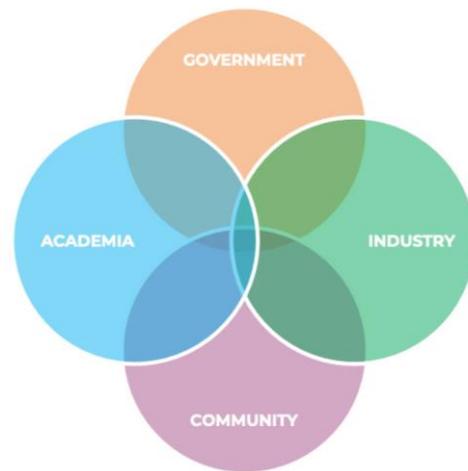- Approval of funding by São Paulo State Government with a partnership project between breweries and IFSP (2022)

Figure 5: The Quadruple Helix representation.
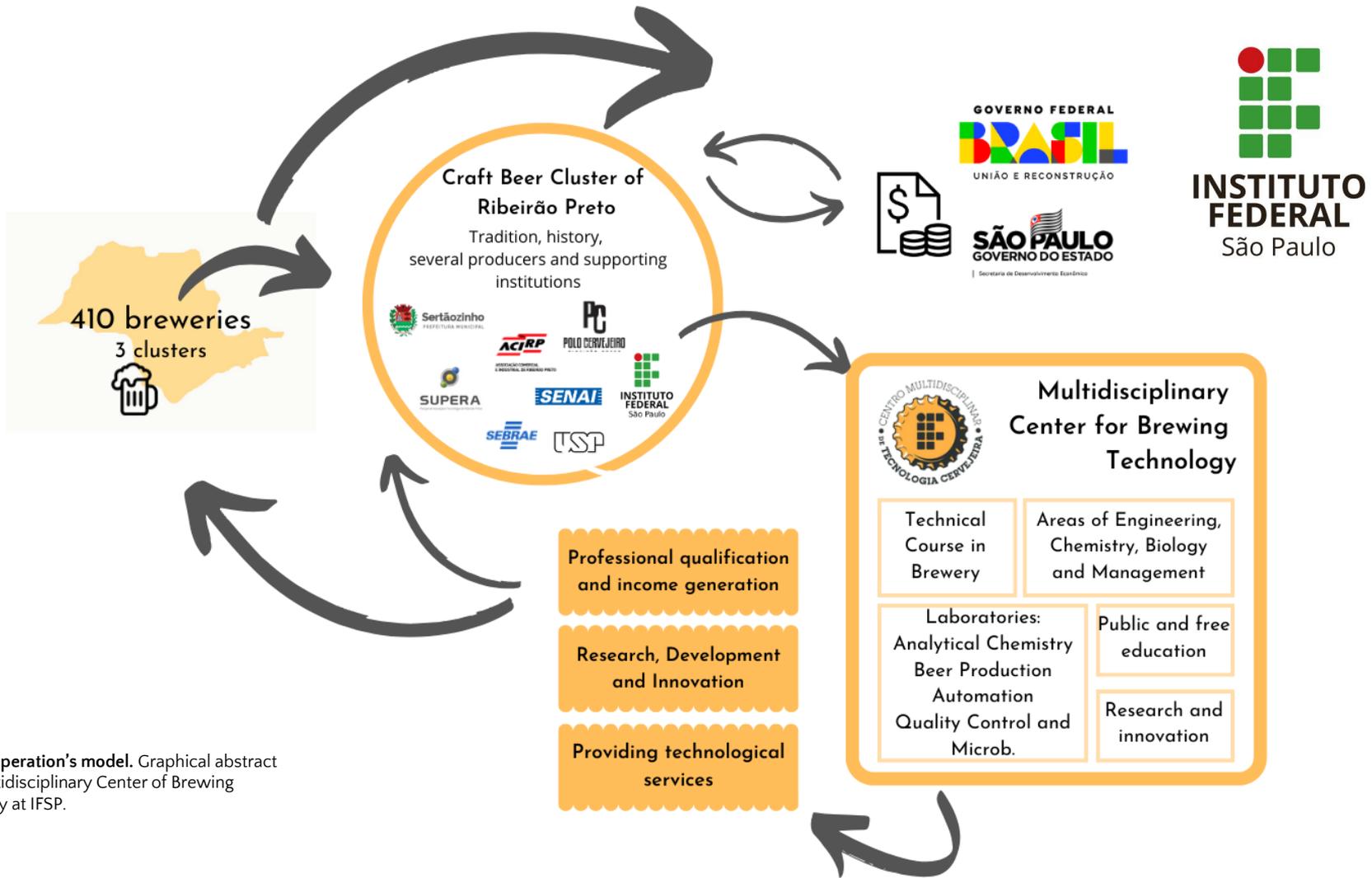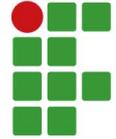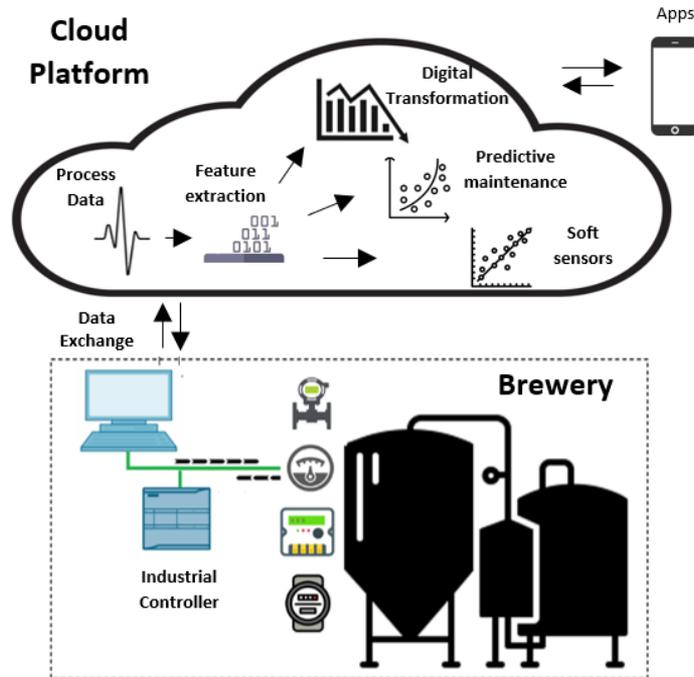GRRIP Project <https://grrip.eu/why-is-quadruple-helix-engagement-so-important/>

Figure 6. Operation's model. Graphical abstract about Multidisciplinary Center of Brewing Technology at IFSP.

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Ongoing research projects

Figure 7. Interdisciplinary research.
Graphical abstract about Digital Transformation in Microbreweries Project.

- Digital Transformation in Microbreweries to Promote Sustainability
- Use of non-conventional raw materials for beer production (native mushrooms, açaí and other native fruits, cassava, etc.)

Figure 8. Stages of Manipueira wild beer production.
Fases: cassava juice; initial fermentation; one year
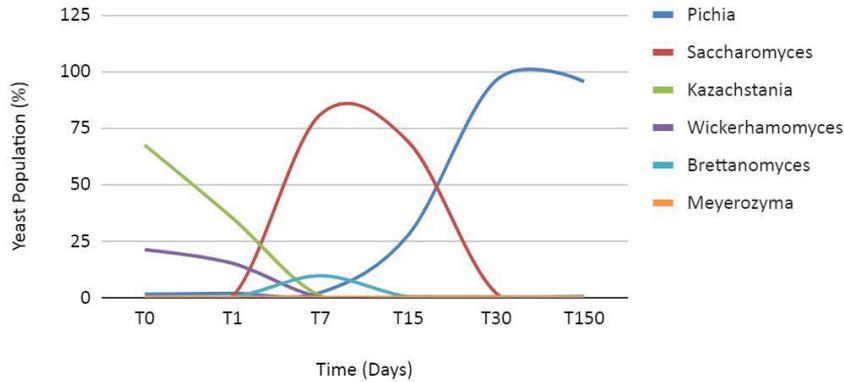wood barrel fermentation; Manipueira bottle beer.
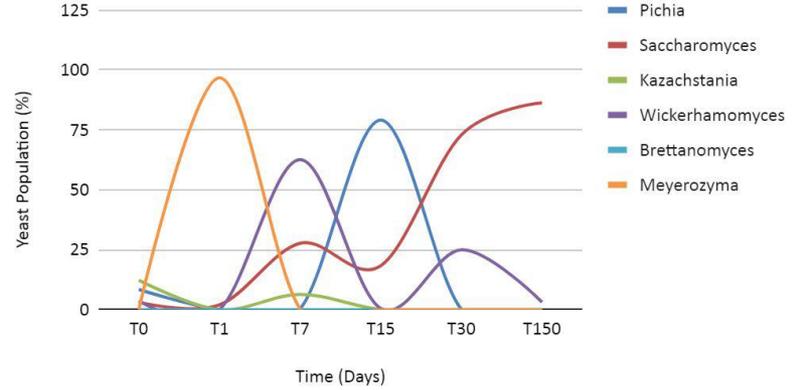
The Manipueira Project

- More than 50 breweries in Brazil
- Supported by the Brazilian Association of Craft Breweries – ABRACERVA
- Objective: production of new Brazilian beer style using manipueira (broth extracted from cassava)

Figure 9. Metagenomic analysis of Manipueira beer fermentation. Manipueira beer from three different Brazilian regions were submitted to species identification during the process.
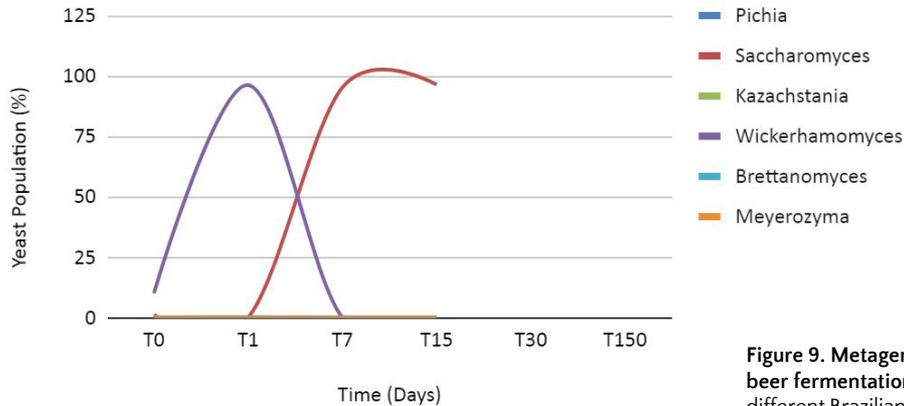
The Manipueira Project

◉ Metagenomic analyses: different microbial compositions

Publications

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RIBEIRÃO PRETO'S BEER HISTORY: FROM THE CAPITAL OF THE DRAFT BEER TO THE CRAFT BEER POLO

HISTÓRIA DA CERVEJA DE RIBEIRÃO PRETO: DA CAPITAL DO CHOPE À POLO DE CERVEJA ARTESANAL

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Flow Measurement and Instrumentation

journal homepage: www.elsevier.com/locate/flowmeasinst

Edge-based intelligent fault diagnosis for centrifugal pumps in microbreweries

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A R T I C L E   I N F O

Keywords:
Intelligent Fault Diagnosis
Centrifugal pumps
Cavitation
Dry running
SVM
1D-CNN
PROFINET

A B S T R A C T

The beer sector is a significant market worldwide and the number of small breweries is increasing. Centrifugal pumps are essential components for the proper functioning of the production system. However, failures in these equipment can be detected early by Intelligent Fault Diagnosis (IFD) Systems. In this context, this article aims to develop an IFD capable of detecting cavitation and dry-running faults. The proposed method explored the use of data provided by centrifugal pump drives, such as current, torque, and power factor. It was investigated two approaches: using the Shapley value as a feature selector and the Support Vector Machine (SVM) as the classifier, and applying the raw signal data to 1D Convolutional Neural Networks (CNN). The SVM-based model presented better results, with an accuracy of 100% for dry running and 99.3% for cavitation. The CNN-based model presented 97.4% and 80.2% respectively. It is also identified that torque is the most relevant variable.

CERVEJARIA COMO ESPAÇO EDUCADOR: UMA PERSPECTIVA INTERDISCIPLINAR PARA A EDUCAÇÃO PROFISSIONAL E TECNOLÓGICA

Brewery as an educating space: an interdisciplinary perspective for professional and technological education

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Proposal for digital transformation in production processes of microbreweries: a Brazilian market approach

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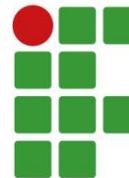Sertãozinho, Brazil
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Thank you!

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