

RESULT 2: OPEN PLATFORM FOR SHARING KNOWLEDGE

WP 1: Learning Environment for SMEs

CASE STUDIES DEVELOPMENT

APPLICATION OF FERMENTATION TECHNOLOGY IN WINERY

Part 1: General information for the enterprise

1. Name: Petőcz Winery (Petőcz Ltd.)
2. Location: Aszár, Hungary
3. Subject of activity: Winery, viticulture, wine tasting, wine cellar tour, venue
4. Legal status: Private Enterprise Ltd.
5. Management
 - a. Gender: **Male** / Female / Other
 - b. Age: up to 35 / 36-45 / **46-55** / 56-65 / over 65
 - c. Education: primary / secondary / **higher**
6. Farm size
 - a. 5.5 ha land in Aszar and Keréktelek

Year of foundation	2015
Area	5.5 ha
Number of bottles per year	10000
Traditional winery	

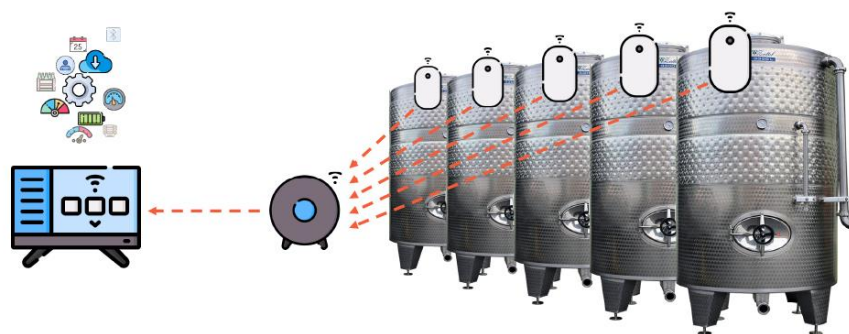


Neszmély wine region

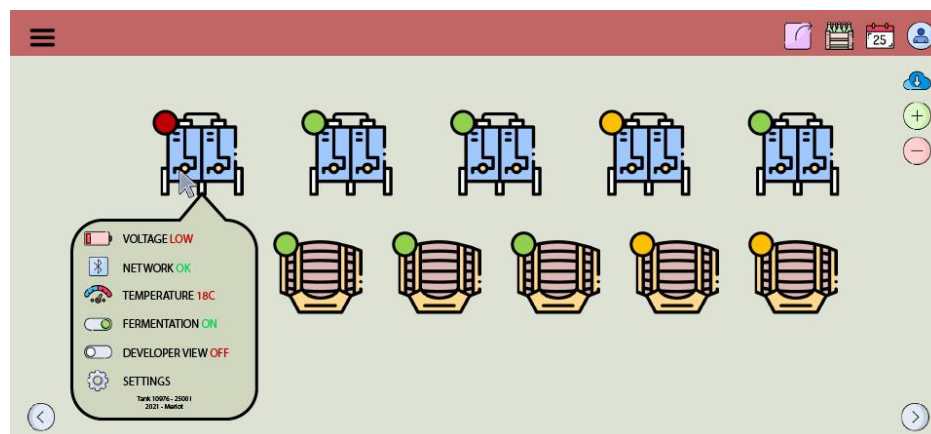
Part 2: Smart technologies used on the farm

What smart technologies does the farm have? When and where are they applied? Is the accumulated data used and how?

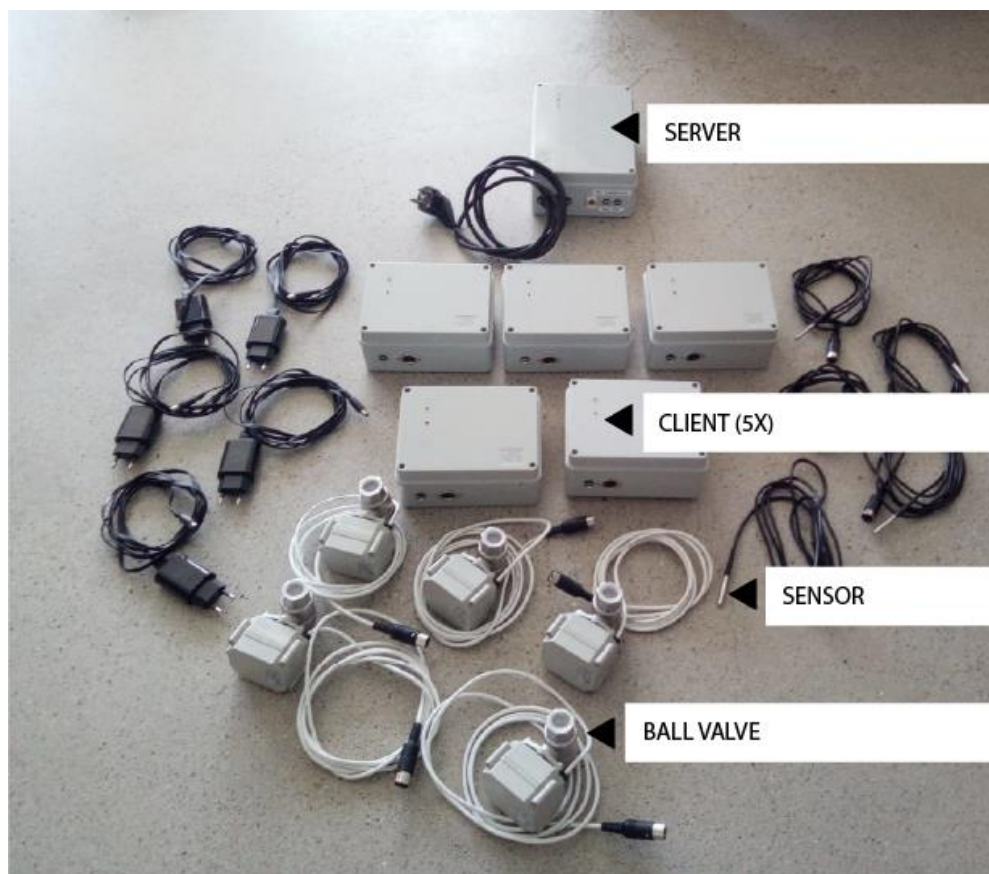
The Winery has been using BORDO Technology since 2021, a cooling and heating system, which controls the fermentation process remotely. The technology is used in all of the Winery's 10 wine fermentation tanks, producing 10000 liters of wine each year.



It provides real time information about the cooling and heating of the system, and all of the features are available from mobile or from web.



BORDO Technology makes it possible to monitor and automatically control the temperature of the fermentation process. The system is modular, it comes with data loggers, sensor clients, multiple sensor variations.



In sum, BORDO Technology monitors, controls and manages the entire fermentation process, sending warnings and alerts in case of problems. Temperature cycles can be adapted to a programmed specification, and it also collects data for fine-tuning the fermentation process.

Part 3: Owners' satisfaction with the use of smart technologies

1. Utility assessment

Is the farm manager satisfied with the smart technologies used? What benefits and advantages have they brought him?

According to the owner, the BORDO Technology has been a game-changer for Petőcz Winery. This computer-driven system has been serving as a cooling and heating system with remote controlled management. It allows them to monitor and control the temperature of the grape must during fermentation, ensuring a controlled and high-quality process.

“The virtual capabilities of BORDO Technology have been particularly valuable to us. In today's world, it's often impossible for us to be physically present at the winery at all times. However, with BORDO, we can remotely manage the cooling and heating system, ensuring that our wine-making process remains on track, even when we are away. This has saved us from potential issues that could have resulted in significant financial losses.” – said Mr. Petőcz.

The owner can access information through a mobile app, allowing him to monitor the temperature and make necessary adjustments as needed. The hardware components of BORDO Technology include

temperature monitoring devices for fermentation and storage tanks. These devices monitor the entire fermentation process, providing warnings and alerts in case of any issues. They also control and run the fermentation cycle, ensuring that the temperature cycles align with the programmed recipe for each wine. Additionally, the system collects data, which enhances fine-tuning in winemaking process. This data allows the owner to analyze and evaluate different aspects of the fermentation and adjust our practices if necessary.

As the owner emphasized, the shift towards digitized, computer- and data-driven wineries represents a significant departure from the traditional, old-fashioned hand-made winemaking methods. While both approaches have their merits, there are several key differences that set them apart. One of the primary distinctions lies in the level of control and precision that digitized wineries offer. With computer-driven systems, they can monitor and regulate various parameters with greater accuracy, such as temperature, humidity, and fermentation processes. This level of control enables them to consistently produce wines with specific characteristics, ensuring a reliable and standardized product, especially in a context of climate change which really exposes wineries to unforeseen weather conditions (humidity, temperature, etc). In contrast, traditional hand-made wineries often rely on more intuitive and experiential approaches, which can lead to natural variations from batch to batch.

Another significant difference Mr. Petócz has outlined is the utilization of data and analytics in digitized wineries. By collecting and analyzing data on various aspects of the winemaking process, such as grape maturity, fermentation conditions, and sensory evaluations, they can gain valuable insights that inform decision-making and quality control. This data-driven approach allows for more precise adjustments and optimizations, resulting in wines that meet specific taste profiles and market demands. In contrast, old-fashioned wineries may rely more on the expertise and intuition of the winemakers, which can introduce a certain degree of variability.

2. Observed difficulties and problems

What difficulties have they encountered or are encountering in using the new technologies? How did they learn to work with them? Do they have maintenance and consumables issues?

One of the main concerns of the owner is the reliance on technology itself. As with any computer-driven system, there is always a possibility of technical glitches or system failures. If the system were to experience a malfunction, it could disrupt operations and potentially impact the quality of our wines. Furthermore, the initial implementation and integration of BORDO Technology required some adjustments and a learning curve. The Winery needed to train the staff to effectively use the system and ensure its smooth functioning. While this was a temporary challenge, it did require some time and effort to familiarize with the technology. As Mr. Petócz emphasizes, in a production that requires so much attention, human labor cannot be spared.

“While digitized wineries offer numerous advantages, they may lack the unique charm, character, and personal touch found in old-fashioned, hand-made wineries. The human touch, intimate knowledge of the vineyards, and the artistry of the winemaker can contribute to the creation of wines that possess a distinct personality and a sense of terroir. These qualities are often cherished by wine enthusiasts who appreciate the craftsmanship and tradition associated with hand-made

wines.” – said Mr. Petőcz, and emphasized the importance of getting the right balance between technology and artisan work.

Another consideration is the need for consistent internet connectivity. As BORDO Technology operates through remote control and real-time monitoring, a stable and reliable internet connection is essential. Any interruptions in connectivity could hinder our ability to manage the system remotely and potentially cause delays or inconsistencies in the wine-making process. In Hungary, Internet coverage is particularly good, but topography often causes gaps in coverage, a problem to which the Aszár wine region is highly exposed.

3. Potential risks

Are they worried about issues such as post-warranty service, integration with next-generation technology, and being tied to a specific supplier or brand?

There is a level of dependency on external technical support for the maintenance and troubleshooting of the system. While the Winery had a positive experience working with the IoT company that developed BORDO, there can still be potential delays or challenges in resolving technical issues promptly, especially if they require on-site assistance. Concerning post-warranty service and support: as with any complex system, there is a possibility of encountering issues or requiring assistance once the warranty period expires. To mitigate this concern, the Winery has established strong relationships with their technology providers. Integration with next-generation technology is another consideration. As technology evolves, there is always the possibility of new and improved solutions becoming available. To address this, the Winery remains vigilant in monitoring the market for advancements and engaging in discussions with various technology providers. Flexibility and adaptability are crucial to ensure that we can leverage the latest innovations without being tied to outdated technologies.

Part 4: Financing the investment in smart technologies

How is the purchase of the new technologies financially secured - own funds, bank loan, financing under a particular program? Do they think that the prices of these technologies are beyond the means of most farmers? Do they feel that the decision to purchase their devices was astute and effective?

The owner primarily relied on a combination of his own resources and bank loans to secure the necessary funds. The Winery is also successful in applying for state funds (like Kiszaludy Program) however, they haven't found one yet which would have supported and funded digitalization in their sector.

The prices of advanced winemaking equipment, computer-driven systems, and associated software is a substantial investment. However, these technologies can improve efficiency, enhance quality control, and potentially increase production capacity. While they may require a significant initial investment, the potential return on investment, both financially and in terms of improved winemaking capabilities, can make them a worthwhile expenditure.

Part 5: Future intentions towards smart technologies

Do they intend to continue using new technologies? Do they plan to purchase new types, and if so, what kinds? What are their intentions with the devices they own - do they plan to replace them with more recent generations as they become available?

The owner believes that technological advancements have tremendous potential to further enhance the wine-making industry. One area that he finds particularly intriguing is the application of artificial intelligence (AI) and machine learning. These technologies have the capacity to analyze vast amounts of data and provide valuable insights that can optimize various aspects of the winemaking process.

“For instance, AI algorithms could help us predict and manage the impact of weather conditions on grape production, allowing us to adjust cultivation practices accordingly. This level of precision and foresight would be immensely beneficial in ensuring consistent grape quality and minimizing the risk of unforeseen challenges, especially in the global context of climate change.” – said Mr. Petőcz.

Additionally, he emphasized the importance of advancements in sensor technologies that could provide them with even more detailed and real-time data on various parameters, such as soil moisture, nutrient levels, and microclimate conditions. Integrating these sensors into their winemaking process could enable them to fine-tune their practices and create an even more tailored approach to grape cultivation and wine production.

Part 6: Some photos



Petőcz Winery tanks



Temperature sensor installed to barrel



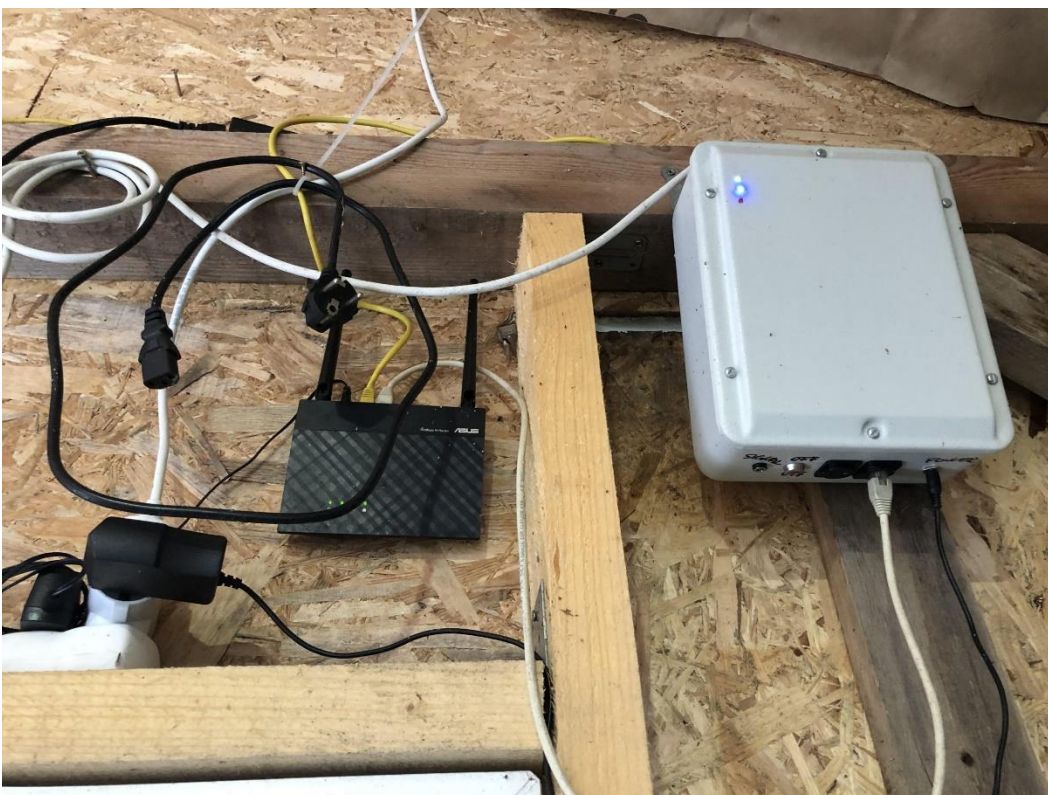
Servo valve installed into cooling system



Smart client after 2 years of use



Smart client installed to ceiling



Local server network



Temperature sensor