Results and Discussion

Questionnaire:

Reliability (4)

Questions	WM	SD	VI
Faultlessness			
1. The system generates alerts and notifications in a timely manner and with a high degree of accuracy, minimizing false positives."	4.3	0.43	Strongly Agree
Availability			
1. The system demonstrates minimal downtime, ensuring compliance with availability requirements.	3.8	0.62	Agree
Fault Tolerance			
1. The system exhibits fault tolerance, continuing to operate correctly despite minor errors.	4.2	0.48	Very High
Recoverability			
1. The system can recover quickly after unexpected failures	3.9	0.53	High

The overall results show that the intelligent system solution for piggery farm operations was rated positively, with weighted mean scores between 3.8 and 4.3. The statistics show that the system works well most of the time, especially when it comes to producing accurate results, reducing operational errors, and keeping things stable. The standard deviations, which range from 0.43 to 0.62, are relatively low. This shows that the participants' responses were consistent, which means that users have similar ideas about how well the system works.

The system's ability to send timely and accurate alerts with few false positives (WM = 4.3, SD = 0.43) got the highest score of the four items tested. The system's ability to keep working correctly even when there are small mistakes (WM = 4.2, SD = 0.48) was a close second. These results show that the smart system is reliable and strong, which means that farm operations will always have support. The system's ability to reduce downtime (WM = 3.8, SD = 0.62) got the lowest score, while its ability to recover quickly after failures (WM = 3.9, SD = 0.53) got a slightly higher score. Both of these areas could use some work.

The results are corroborated by previous research on intelligent farming technologies. Li et al. (2021) stressed that the accuracy and timeliness of automated alerts are very important for making decisions and making livestock management more efficient. Karthikeyan and Kumar (2020) also found that system resilience, or the ability to handle small mistakes, is important for smart farming to keep working. Sharma and Singh (2022) also pointed out that having things available and being able to recover quickly are important for keeping farm operations going without a hitch, which is in line with the current findings that these are areas that need to be improved.

In conclusion, the intelligent system solution for piggery farm operations works very well in terms of accuracy, reliability, and error resilience, making it very useful for everyday farm use. The slightly lower ratings for downtime reduction and recovery speed, on the other hand, show that the system's availability and restoration mechanisms need to be better. Preventive maintenance, redundancy, and faster recovery protocols can help improve these areas even more and make sure that piggery farm management can keep running smoothly for a long time.

Based on the table 1 result, Faultlessness received the highest mean score of 4.3, indicating that the system generates alerts and notifications accurately and in a timely manner, with minimal false positives. Fault Tolerance followed closely with a mean of 4.2, suggesting that the system continues to function correctly even in the presence of minor errors, reflecting strong error-handling capability. Recoverability obtained a mean score of 3.9, which shows that the system is generally capable of recovering from unexpected failures within an acceptable time, though there is room for improvement. Availability received the lowest mean rating of 3.8, indicating that while downtime is minimal, the system's continuous accessibility remains slightly less reliable compared to other quality dimensions.

Discussion

The findings suggest that the intelligent system demonstrates a high degree of faultlessness and fault tolerance, which are critical in ensuring consistent and reliable performance in automated piggery farm operations. The system's ability to minimize false alarms enhances trust among farm operators, while fault-tolerant mechanisms ensure that minor errors do not disrupt essential processes such as feeding, climate control, or health monitoring.

However, the slightly lower ratings for availability (3.8) and recoverability (3.9) highlight potential areas for optimization. Occasional downtime or slower recovery from failures may impact critical farm operations, especially during time-sensitive tasks such as automated feeding schedules. Enhancements in system redundancy, robust backup procedures, and faster recovery protocols could further improve operational continuity.

Overall, the results indicate that the system is performing effectively in terms of accuracy, error resilience, and stability, but its availability and recovery mechanisms require further strengthening to achieve a fully reliable and seamless farm management solution.