UI/UX-CENTRIC DESIGN OF IN-THE-FIELD AGRICULTURAL DATA ACQUISITION SYSTEM

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Abstract—**The design of an In-the-Field Agricultural Data Acquisition System with a strong focus on user interface (UI) and user experience (UX) principles is essential to enhance the efficiency and productivity of modern agriculture. This research explores the development of a user-centered system that empowers farmers and agricultural professionals to seamlessly collect, manage, and analyze crucial data while working in the field. By incorporating intuitive and visually appealing interfaces, the system aims to improve data accuracy, reduce human error, and streamline decision-making processes in agriculture. The abstract design of this system takes into consideration the unique needs and challenges of agricultural settings, providing a user-friendly tool that promotes sustainable farming practices and drives innovation in the agricultural industry.**

Keywords— **UI/UX, User experience, Good Design, Equity Design, Responsiveness**

I. INTRODUCTION

Evaluating the association between milk production and various other factors requires lots of data from farms. In the past, data is acquired using data collection forms and questionnaires. Government needs to send their officers into fields to conduct the surveys, which consumes high transportation cost, long respond time and lots of man-hour efforts. More importantly, the benefits of data collection is only clear to the government, but invisible to the farmers themselves. Concern regarding privacy, security and ownership (e.g. personal information such as tax, data lost to competitors) also creates reluctance in sharing data by farmers. The key problem lies in the fact that data collection system is designed based on government's requirements and assume that the farmers would cooperate. This often leads to "no input data" systems. The design of an In-the-Field Agricultural Data Acquisition System with a strong focus on user interface (UI) and user experience (UX) principles is essential to enhance the efficiency and productivity of modern agriculture. This research explores the development of a user-centred system that empowers farmers and agricultural professionals to seamlessly collect, manage, and analyse crucial data while working in the field. By incorporating intuitive and visually appealing interfaces, the system aims to improve data accuracy, reduce human error, and streamline decision-making processes in agriculture. The abstract design of this system takes into consideration the unique needs and challenges of agricultural settings, providing a user-friendly tool that promotes sustainable farming practices and drives innovation in the agricultural industry. In the ever-evolving landscape of digital applications, "Cow Log" emerges as a pioneering project that transcends the boundaries of traditional farming practices by placing the power of data-driven decision-making in the hands of cattle farmers. Cow Log represents a revolutionary fusion of advanced technology and user-centric design principles, providing an exceptional user interface (UI) and user experience (UX) that reimagines the way cattle farming is managed. Cattle farming is an age-old profession, deeply rooted in tradition and expertise. However, with the advent of modern technology and data analytics, there's a transformative opportunity to enhance productivity, animal welfare, and overall farm management. The "Cow Log" app aims to bridge this gap by introducing an intuitive, visually appealing, and efficient solution for cattle farmers to log and monitor critical data related to their livestock. The heart of "Cow Log" beats in its dedication to user-centric design, ensuring that even those with limited technical expertise can harness the power of this application. The carefully crafted UI/UX elements of "Cow Log" empower farmers to effortlessly record and access data about their cows, including health records, feeding schedules, and breeding information, among others. This user-friendly approach allows farmers to make data-informed.

II. PROPOSED ALGORITHM

A. **Methodology –**

On-farm, several activities such as milking, heat detection, insemination and pregnancy examination, are carried each day. These activities differ from cow to cow and with large number of cows in farm, it is hard for farmers to keep track. Cow log is a software system which computes precisely the daily activities for each cow in farm and notifies the farmer of these activities. Atypical lost in production is caused by missing insemination. Oestrus cycle of a cow is around 21

days. Missed insemination means another 21 days wait before the cow comes into heat again. In the old case model represented in fig. 1, the farmer only had the accessibility to fill the data which then was used by the surveyor for further functions. But in the new protype described in fig. 2, the farmer can fill the data, after consulting the veterinarian and also had the liberty to access and monitor the same. Here, the famer will fetch the data as per the requirements
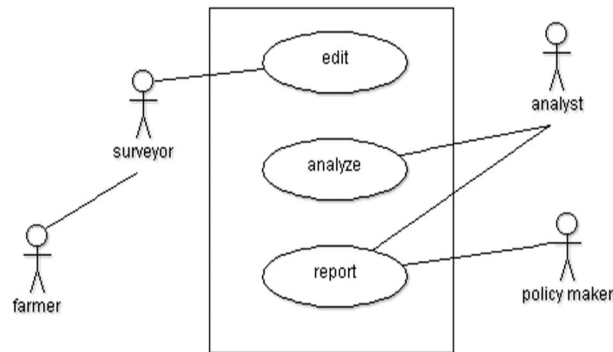

Fig. 1. Old use case diagram

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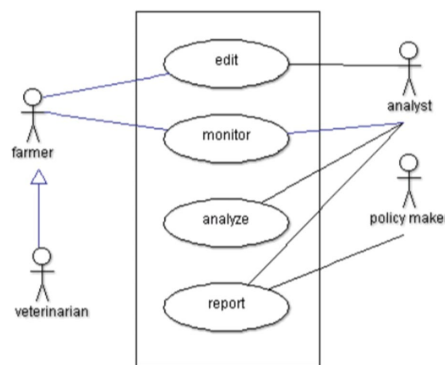

Fig. 2. New use case diagram

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B. Working Interface –
In this journey of UI/UX-centric innovation, "Cow Log" transcends mere data collection; it becomes a tool for improving the livelihoods of cattle farmers and contributes to sustainable and responsible agriculture practices. This

introduction sets the stage for an exploration of "Cow Log," a groundbreaking app where the worlds of agriculture and technology converge, delivering an experience that not only

benefits cattle farmers but also exemplifies the potential of UI/UX design in transforming traditional industries
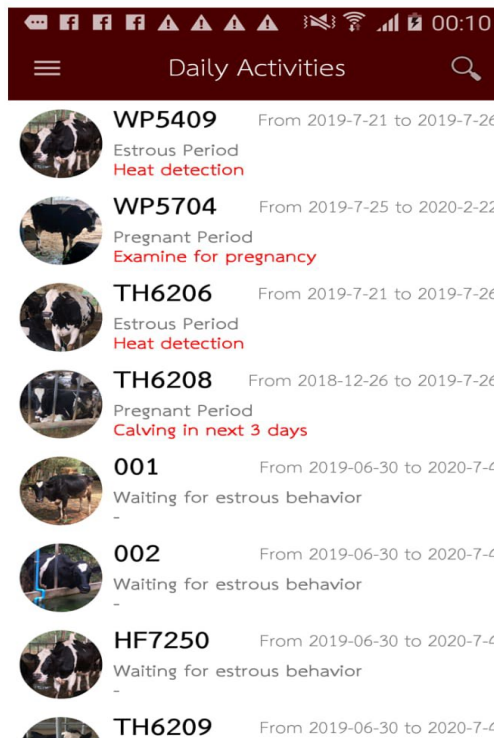

Fig. 1.   Interface

TABLE I
NUMBER OF DAYS OPEN

Farm	Days open (days)	
	Before	After
1	171.46 ± 22.16	79.90 ± 25.88
2	195.44 ± 28.61	115.00 ± 49.55
3	147.29 ± 32.44	80.50 ± 42.91
4	200.92 ± 23.80	96.30 ± 15.67
5	385.20 ± 38.38	111.86 ± 22.94

TABLE II
CALVING INTERVAL

Farm	Calving interval (days)	
	Before	After
1	478.67 ± 25.79	354.73 ± 32.97
2	432.00 ± 27.35	394.67 ± 63.16
3	424.56 ± 36.47	343.75 ± 54.70
4	481.38 ± 30.34	365.47 ± 19.97
5	638.80 ± 48.92	384.07 ± 28.25

TABLE III
SERVICE PER CONCEPTION

Farm	Service per conception (times)	
	Before	After
1	1.80 ± 0.46	1.20 ± 0.33
2	3.00 ± 0.80	1.60 ± 0.46
3	1.17 ± 0.73	1.11 ± 0.41
4	2.67 ± 1.03	2.16 ± 0.24
5	NA	NA

The UI/UX-centric design of an In-the-Field Agricultural Data Acquisition System is not only a technological advancement but a pivotal step in the modernization of agriculture. It empowers farmers, enhances their decision-making capabilities, and contributes to the sustainability of the agricultural industry by leveraging the principles of user-centric design. It's a crucial bridge between traditional farming and the digital age, offering immense potential for growth and progress in the sector.

III. EXPERIMENT AND RESULT

The Dairy Farming Promotion Organization (DPO). The users mainly use Cow log for activities such as checking heat, calculating oestrous period, and predicting calving date. Altogether, 2,221 dairy cattle had been recorded into the system. We had collected 21,725 milk records, 2,160 breeding records and 2,184 calving records. On average, the number of days open is reduced by 169 days; the calving interval is reduced by 122 days; and the number of service per conception is reduced by 0.5 times. Prior to Cow log, the participating farms did not perform many jobs punctually. Notifications from Cow log had helped them to avoid missing essential activities.

(a) Cow Staus Ratio   (b) Milking Cow Ratio

(c) Milk Production

(d) Daily Milk Production
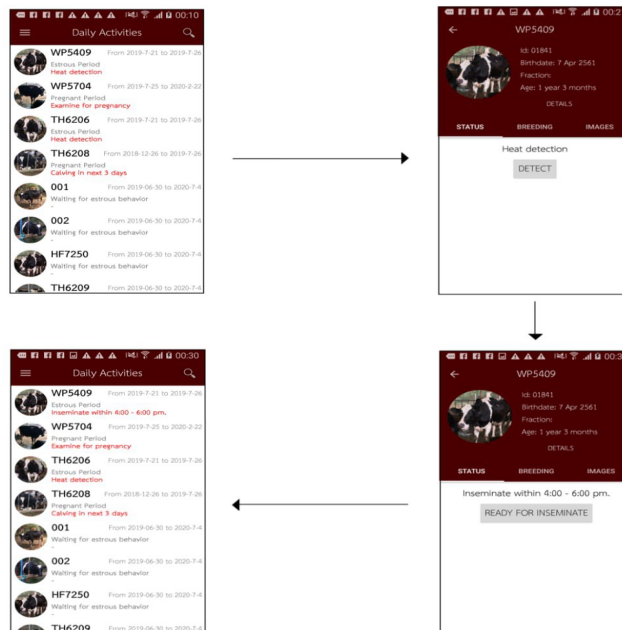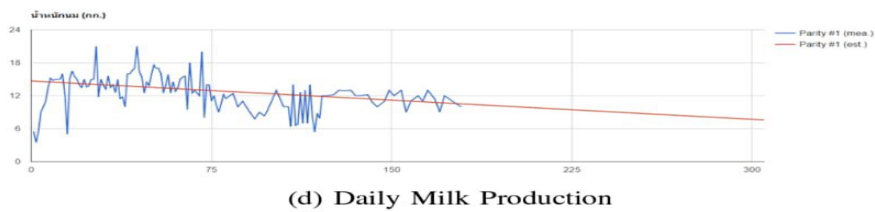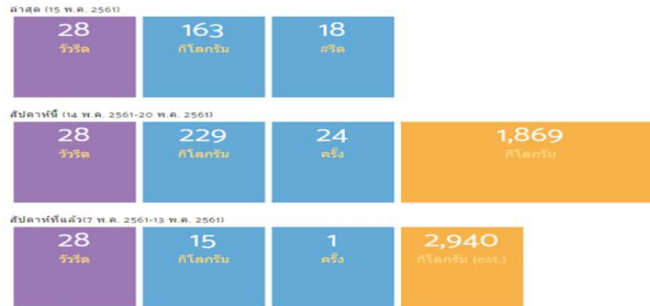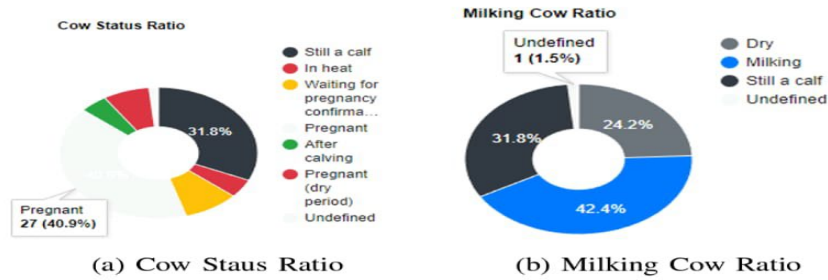
(a)Workflow of the Application

The heart of "Cow Log" beats in its dedication to user-centric design, ensuring that even those with limited technical expertise can harness the power of this application.

IV.CONCLUSION

The design of an In-the-Field Agricultural Data Acquisition System with a strong focus on user interface (UI) and user experience (UX) principles is essential to enhance the efficiency and productivity of modern agriculture. This research explores the development of a user-centred system that empowers farmers and agricultural professionals to seamlessly collect, manage, and analyse crucial data while working in the field. By incorporating intuitive and visually appealing interfaces, the system aims to improve data accuracy, reduce human error, and streamline decision-making processes in agriculture. The abstract design of this system takes into consideration the unique needs and challenges of agricultural settings, providing a user-friendly tool that promotes sustainable farming practices and drives innovation in the agricultural industry.

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