4-2016

Wet Grain Delivery Advice: A Previously Impossible Extension Challenge Solved Through App Technology

Joseph S. Dvorak
University of Kentucky, joe.dvorak@uky.edu

Sam McNeill
University of Kentucky, sam.mcneill@uky.edu

Clint Hardy
University of Kentucky, chardy@uky.edu

Wet Grain Delivery Advice: A Previously Impossible Extension Challenge Solved Through App Technology

Notes/Citation Information
Published in *Journal of Extension*, v. 54, no. 2, article no. 2IAW1, p. 1-5.

Journal of Extension
www.joe.org

April 2016
Volume 54
Number 2
Article # 2IAW1
Ideas at Work

Wet Grain Delivery Advice: A Previously Impossible Extension Challenge Solved Through App Technology

Abstract

The delivery of wet grain during harvest is a complex and constantly changing problem about which Extension professionals have been unable to offer more than general advice. By capitalizing on important characteristics of mobile devices, a new app enables producers to fully benefit from detailed information universities have generated on grain drying and costs associated with delivery of grain to different locales. Development of such an app demonstrates the power of apps and mobile devices in allowing Extension to deliver previously unattainable services to its clientele.

Joseph Dvorak
Assistant Professor
Biosystems and Agricultural Engineering Department
University of Kentucky
Lexington, Kentucky
joe.dvorak@uky.edu

Sam McNeill
Associate Extension Professor
Biosystems and Agricultural Engineering Department
University of Kentucky
Princeton, Kentucky
sam.mcneill@uky.edu

Clint Hardy
Extension Agent
Cooperative Extension—Daviess County
Owensboro, Kentucky
chardy@uky.edu

Introduction

Many in Extension have found that using apps and mobile devices allows them to serve stakeholders in new ways and confront issues that previously had been impossible to address. Five characteristics of mobile devices made use of by Extension to support producers are (a) mobility and availability, (b) connectivity and associated ability to provide real-time information, (c) computational power, (d) sensor capabilities, and (d) flexibility with regard to individual customization. Relying on the mobility characteristic, for example, the apps Purdue Tree Doctor (Beckerman & Sadof, 2013), Turfgrass Management (McCullough, Waltz, Hudson, & Martinez-Espinoza, 2011), and Florida-Friendly Landscaping Plant Guide (Hansen & Purcell, 2012) make the most of the on-demand information delivery potential of these devices (Drill, 2012), thereby improving on mere print delivery of relevant content. This approach to content delivery represents an expansion of current practice that helps Extension remain relevant and meet stakeholders where they are. Tapping into more than one of the aforementioned characteristics, other Extension projects have resulted in entirely new services for producers that had been unavailable, impractical, or impossible in the past. For example, the apps Feed Cost Calculator (Rusche & Renelt, 2014) and Machinery Sizing (Dvorak, Franke-Dvorak, & Price, 2012) both utilize not only the mobility but also the computational power of

mobile devices to deliver decision support tools based on complex equations stemming from research. These tools help Extension personnel deliver customized advice or "self-assessment" (Drill, 2012) that they otherwise would be unable to provide. Advanced apps, such as Rain Garden (Dietz & Dickson, 2013), Corn Advisor (Saraswat, 2014), and some weather apps, combine information delivery with customized advice based on both equations and location to provide a suite of services. Real-time information provided by apps often has been limited to commercial market or weather data; however, some apps, such as Corn Advisor, also include Twitter feeds from Extension specialists supplying information such as updates on disease outbreaks. All these uses of the new technologies are important and illustrate Extension's relevance and ability to adapt to current trends.

The Problem

The delivery of wet grain during harvest to elevators or on-farm drying and storage facilities is an issue for which Extension previously has been unable to provide effective decision tools. The delivery of wet grain is a complex and constantly changing problem. Grain moisture changes during harvest, over time and from field to field. Many producers are spatially dispersed to the degree that the cost of hauling grain to one elevator or another varies as the producer moves from field to field. Also, every elevator has its own base price and discount schedule for wet grain based on the individual setup of the operation. Common discount types include a set cents-per-bushel discount, a percentage-of-weight discount, and a charge based on drying costs and shrinkage. Moreover, every producer's situation is unique and involves different costs associated with on-farm drying, storage, and grain transportation.

Extension has attempted to assist producers by solving parts of this problem. McNeill (2015) provided equations and computational tools as part of an Extension program to help producers understand grain drying and hauling costs. Extension agents and other information sources constantly update farmers about harvest progress, general grain moisture levels, harvest completion, and elevator conditions, including wait times and prices. In addition, Extension agents have helped producers better understand their on-farm drying setups and associated costs. Even with all this support, however, when a full truck is about to leave a field, a producer is left making an educated guess about the best destination for that load of grain. For example, a producer cannot reasonably calculate whether it is better to send a load of grain to a close elevator that offers a lower price and uses moisture discount schedule A, a more distant elevator that offers a higher price and uses moisture discount schedule B, or his or her own on-farm drying facility. Even if the producer were able to calculate comparative costs for his or her first load of grain, those costs could easily differ for a later load, harvested after a hot, windy afternoon, for example.

The Solution

There is now an app that provides assistance relevant to the delivery of wet grain by making use of all five of the previously identified characteristics of mobile devices:

- Location *sensor capabilities* are used to determine current field location if a producer is using the app in a harvested field. As an alternative, other locations can be provided.

- The app uses *individual customization* to store producer-specific costs for grain transportation (Figure 1).

- Internet *connectivity* means that the app can easily calculate the driving distances between a given location and every elevator under consideration. This same connectivity provides the mechanism for accessing current pricing for each elevator.

- A device's *computational power* is used to evaluate the complicated equations that govern grain drying so that comparisons among elevators are possible.

- The general *mobility and availability* of mobile devices allows a producer to use the app in the field as truckloads of grain are being filled.

Combining these capabilities means that as a truck is pulling out of the field, the producer can see the final price available for that load at various destinations, considering delivery costs and drying discounts (Figure 2).

Figure 1.
Stored Data on Grain Hauling Costs

Figure 2.

Price Estimates Including Drying Discounts and Hauling Costs

The development work on the app described herein has proved that entirely novel Extension services can be made possible through the use of mobile devices. The foundation for the Extension service provided by the app is the scientific experimentation that produced the equations for grain drying, and as with other Extension services, the goal is to make these advances applicable to producers. However, this service differs significantly from other, earlier Extension services, and it is unclear what the best practices will be for its delivery and support. Ongoing work includes pilot testing with stakeholders to ensure that the service is properly packaged, delivered, and supported to best meet the needs of producers. Apps are providing new methods for reaching Extension clientele, but it is important to consider that some of these innovative services will require extra testing before they are implemented widely.

As the project described in this article demonstrates, with modern tools, Extension can address problems that have been impossible to solve in the past. Previously, delivery of wet grain during harvest was an intractable issue for which Extension agents could offer only vague and general advice. Finally, Extension is able to provide farmers a degree of support that heretofore was completely unavailable for this type of decision.

Acknowledgments

This is publication No. 15-05-093 of the Kentucky Agricultural Experiment Station and is published with the approval of the Director. This work is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, Hatch-Multistate project under 1001110.

References

Beckerman, J. L., & Sadof, C. S. (2013). Caught with your plants down? There's an app for that! *Journal of Extension* [online], *51*(2) Article 2TOT3. Available at: http://www.joe.org/joe/2013april/tt3.php

Dietz, M., & Dickson, D. (2013). Encouraging rain garden installation with a smart phone app. *Journal of Extension* [online], *51*(2) Article 2TOT2. Available at: http://www.joe.org/joe/2013april/tt2.php

Drill, S. L. (2012). Mobile applications for Extension. *Journal of Extension* [online], *50*(5) Article 5TOT1. Available at: http://www.joe.org/joe/2012october/tt1.php

Dvorak, J. S., Franke-Dvorak, T. C., & Price, R. R. (2012). "Apps"—an innovative way to share Extension knowledge. *Journal of Extension* [online], *50*(6) Article 6IAW2. Available at: http://www.joe.org/joe/2012december/iw2.php

Hansen, G., & Purcell, S. (2012). A smartphone application for landscape plants: A case study and guide to developing a decision-making application. *Journal of Extension* [online], *50*(6) Article 6TOT2. Available at: http://www.joe.org/joe/2012december/tt2.php

McCullough, P. E., Waltz, F. C., Jr., Hudson, W., & Martinez-Espinoza, A. D. (2011). Turfgrass management at your fingertips: Information delivered through "smart" phone technology. *Journal of Extension* [online], *49*(3) Article 3TOT10. Available at: http://www.joe.org/joe/2011june/tt10.php

McNeill, S. (2015). *Grain storage systems*. Retrieved from http://www.uky.edu/bae/grain-storage-systems

Rusche, W. C., & Renelt, T. E. (2014). Mobile and web-based applications to determine the most economical feedstuffs for livestock. *Journal of Extension* [online], *52*(2) Article 2TOT3. Available at: http://www.joe.org/joe/2014april/tt3.php

Saraswat, D. (2014). Corn advisor: University of Arkansas Division of Agriculture.
