November 5, 2015

Reducing Costs and Increasing Benefits with Efficient Data Collection Using Mobile Phones and Tablets

Methods of collecting data in the field range from the traditional manual (paper and pencil) process to the use of sophisticated, proprietary handheld devices using the latest technologies. Another method developed by AgilerMe is a comprehensive, inexpensive, easy to use service using an ordinary Android cell phone or tablet. Profit margins in today's agricultural businesses are very volatile and reducing costs through increased efficiencies is critical to your success. With ever increasing government and customer regulations complete and accurate data collection is mandatory. The AgilerMe system is highly flexible and was developed to handle the small, one crop, one field farmer to the large multi-crop, multi-field, multi-national corporation. The information here is based on the pilot projects in Tea Estates and Citrus Groves and various available literatures, looking at data collection costs pertaining to labor (production and harvesting), material and equipment use, cost of equipment use, inventory on hand, regulatory data log maintenance, pests and sample tracking and tracking for food safety.

While tangible costs savings can be seen upfront, the non-tangible benefits from the AgilerMe application achieved from tracking, inventory control, regulatory compliance and inspection results are an added bonus.

The Study

⇥ Labor:

Production labor :   Collecting and managing the data required to track your labor information such as (payroll, costs, minimum wage hours, overtime and contractual obligations, etc.), is a major cost to most operations and using it doing it more efficiently will reduce costs. Many companies are still printing out time sheets that are then transported to the supervisors in the field who are then filling them out by hand and then transporting them back to the office where another staff member either enters this information into a spread sheet for still another employee to enter it into a payroll system. This is not cost effective and increases the chances of mistakes. With AgilerMe the data can be entered in the field, the employee information is already in the mobile device and the supervisor just enters the location, the job performed and the hours worked. This one entry on the mobile will also record the hourly cost of that employee, the charge you are billing the client if applicable, and provide a running total of hours needed to meet contractual agreements. This data can then be sent using a data plan on the mobile or from a WiFi location. The office staff can then download this information into an excel spread sheet or directly into a compatible payroll system such as Quickbooks.

Harvesting labor: Compensating harvest labor has become a highly regulated process and accurate records are imperative to your success. *AgilerMe* allows you to capture all of the required information needed to comply with all governmental (H2A) requirements and will greatly improve the efficiency of the operation. With each entry you can also record the cost per unit as well as the charge you are charging the client if applicable. Data can be collected on an hourly basis or piecework. *AgilerMe* is completely flexible to handle any type of harvest for any crop as well as multiple crops in multiple locations. Eliminate the cost of travel to and from off-site locations to deliver and pick up hand written time sheets and reduce the repetitive entry of the same data over and over again.

Example: A small to mid-sized Citrus harvester runs 4 harvest crews working an area of approximately 600 square miles, each Monday a supervisor has to meet each crew leader and give them the time sheet for the week. Each day, each crew leader has to track how much fruit each picker has harvested and which block it was picked from. At the end of the week the supervisor has to visit each crew and retrieve the time sheets then deliver them to the office, this could be a 50 to 100 mile round trip (.50/mile : $25 to $50). Now an office employee has to take these time sheets and enter them into a payroll system, since the payroll system does not keep data beyond volume picked and amount paid there are no records for the harvest company to analyze, only the file boxes full of hand written time sheets. The company now uses no time sheets and the crew leaders enter the data in the mobile device, the results are uploaded and analyzed every day instead of once per week and the results are now only checked and uploaded into the payroll system. Now all of the results are in their own data base and they can use the data to analyze as they please. This has created a labor savings of 1 or 2 hours of the supervisor's time and 6 or more hours of office staff's time.

A separate entry can be made to track hours in the field needed to assure minimum wage requirements. *AgilerMe* also allows for photo documentation for employees checking in and out as well if required.

Harvest:

Harvests can either be recorded by volume or weight. Traditionally this is either done by manually writing them in paper based form and later to be entered in system in the office or use expensive proprietary handheld device supplied by a vendor with software with limited capabilities. AgilerMe can be used to record the harvested quantity right in the field by the supervisor in your low cost mobile device. We have scanning capabilities to scan both name tags of the employee and scan codes on individual containers and or pallets, as well as reading results from a "Bluetooth" scale. In tea estates the plucked tea leaves are measured by weight and our system is used along with Bluetooth enabled scales and in some cases traditional scale with manual entry. The system announces the worker name and the weight entered or captured. The whole process improved the weighment collection and eliminated need for processing data from proprietary hand held scale or manual entry of the data at the Division office. This reduced the error in weighment collection and also provided real time field performance. The fruit picking is typically measured by volume. But some research done shows benefit of using weight as shown below.

In a research study done by Washington state university says that

Mr. Omeg, who farms 375 acres of cherries in The Dalles, OR, considered numerous factors, but there was one that really stood out: His harvest costs were too high. He was paying pickers to fill buckets of cherries that allegedly weighed 20 pounds. The problem is, there wasn't 20 pounds in the average bucket. Omeg knew this because he is a fastidious record keeper.

For example, this year Omeg's crews — there are about 300 people out in the orchards during harvest, including supervisors — picked 5,234,499 pounds of fruit into 266,917 buckets. (Omeg harvests both the fruit he grows and for one other grower.) That comes out to an average bucket weight of 19.61 pounds. Because Omeg pays the pickers based on a 20-pound bucket, he figures he overpaid them by $16,135.

But that's only the direct cost, says Omeg. There are numerous cost savings that could be realized by going with a new system. For example, the foremen who currently monitor the buckets to try and make sure they are full would be freed up for other tasks. "If I didn't have them monitor bucket volume so closely, I could have them focus on other things such as fruit quality," he says, "making sure the pickers aren't too rough on the fruit."

In the second year of the project Pierce hired Yiannis Ampatzidis, a post-doctorate research associate, who had something of a masterstroke: He incorporated RFID technology, so each picker would simply wave a wristband over a reader and would immediately be credited with the weight of fruit he dumped. The device utilizes a hanging scale, so it is self-leveling, an important factor in sloped orchards. More recently — the SCRI project is now in its fourth and final year — Li Tan, a WSU computer engineer, has enabled the system to utilize cloud technology. "That means you could follow the picking anywhere in the world," says Whiting, "and you could integrate the data with payroll software."

All data would be available in real time. Now, in most orchards when a picker dumps a bucket, he gets his ticket punched to receive credit. The new system can automatically spit out a ticket that credits him for picking a certain amount of fruit. The ticket can include all sorts of data, including when and where the fruit was picked, and is automatically compiled. With the current system, at the end of the day someone has to read all those punch cards. "That's ridiculous when you think about it," says Whiting.[1]

Even though the above research solidifies the advantage of paying by weight, the improvement using the RFID technology with their system shows the benefit. Our Mobile technology powered by *AgilerMe* is designed to work for weighment or volume. You do not have to change your methods and still get all the benefits of expensive systems. The great thing is we can work with weighing machines which can send us data with blue tooth.

Since AgilerMe uses available android phone to track data and commercially available Bluetooth scale for weighing, a typical savings on propriety hand held devices can range anywhere from $200 to $1000. Similarly the proprietary Bluetooth scale will may cost more than the commercially available anywhere from $100 - $500. Agiler can be used with existing scale by inputting the weight manually and do not have to invest in buying the proprietary scales.

🔧 Equipment:

Keeping up with maintenance schedules on equipment is imperative to increasing the hours of use and reducing repair costs. When labor data is entered in the mobile device, an entry for the equipment being used can also be entered at the same time. This will not only provide the hours the equipment was operated but also the location the equipment was used in. Evaluating the usage and costs (purchase / repairs / maintenance) of each piece of equipment is critical to the bottom line of your business.

Average ASABC Estimation on equipment repair on equipment and implements worth $545,000 is $20,458. A reduction of 10 % in Repair will save $2045.[2]

Study at IOWA State university Extension outreach showed than an average operating cost for a tractor is $55.80 per Hour (Operating cost = cost of repairs + fuel + lubricant + labor). Operating cost without labor is $39.30. This does not include equipment purchase cost and interest.[3]

◎ Materials

Maintaining a "running" inventory of can help reduce costs from over purchasing, downtime from being out of product, as well as penalties due to non-compliance of various regulations. Enter the purchases made in the mobile device and then as they are used the inventory will be reduced, keep a daily report on what you purchased, what you have used and what you have on hand. Use *AgilerMe* to track pesticide and fertilizer use by the location, track who applied it, the rate that was applied, even the equipment used to apply it, all data necessary to comply with governmental and Food Safety (Global Gap) regulations.

Tea estates hold inventory in their division offices/store. Increasing inventory turnover ratio (Inventory turnover ratio = Cost of goods sold / Average value of inventory on hand) will result in better cash management. The cost of inventory is average purchase cost + cost of Holding. Estimates of inventory holding costs for agricultural supply/businesses usually range from 20 to 35 percent. [4]

As an Example, suppose you spent about $25000 in inventory the holding cost is $5000 - $7500. The total cost of inventory is $30,000 - $32,000. If you improve your inventory management slightly by 10 % reduction in average inventory level you could save $3000.

🏛 Regulatory compliance costs

H2A / FLSA / AWPA – Information for H2A workers can be recorded as well as an entry for when they turned down work or left the field early. All of this can help prevent costly fines and judgements from not having proper documentation.

From 2010 – 2013 the Department of Labor assessed nearly $15,000,000 in civil money penalties and nearly $19,000,000 in back wages due to violation of H2A, AWPA, and FLSA laws. While back wages are legitimately part of your normal operating expense, CMP's are not and come right off your bottom line; keeping accurate data will prevent unnecessary losses.[5]

Global Gap – complying with these requirements is a labor intensive process; the amount of data that is required takes precious time away from the everyday job of producing a crop. Streamlining this process, while actually increasing the accuracy of the data, will not only reduce costs but allow for more productivity from your staff.[6]

Pesticide Use – maintaining proper records for employees use of pesticides such as certification dates, exposure times (Item and date), medical supervision requirements. Any violations to these items can lead to expensive, unnecessary costs.[7]

Certified Organic Grower: All the Activity, Harvest, Material and Equipment use data logs required are available with the system and can be download at no additional cost.[8]

Fair Trade organization: The Labor, Minimum wage hours and leave data logs required are available with the system and can be download at no additional cost.

Traceability costs

Tracking – whether it is for tracking procurement and delivery of raw product to a warehouse or processing facility, an accurate accounting of where product came from and where it changed hands along the way must be maintained. Any break in the chain could be very costly if the end product is rejected and you do not have an accurate record of where it came from. With *AgilerMe* product can be tracked from each location to each new location (from field to cold storage or processing facility) using QR codes or RFID technology. If the product is combined to make a new product or put into different containers, the new code can be scanned and then tracked from there. All of the detail is recorded and a complete chain can be produced. Using this technology, product at the end user can be traced back to the field it came from, details of all the transpired in that field will be available.

Food recalls are most importantly a public health issue, but it is also a significant economic issue. The average cost of a recall to a food company is $10 million in direct costs, in addition to brand damage and lost sales according to a joint industry study by the Food Marketing Institute and the Grocery Manufacturers' Association. [9]

Samples and growing conditions: Mobile system can be used to track leaf sample, soil sample, smites, and canker etc. and also used for recording all type of growing conditions such as moisture, rain, sunshine hours, and NPK values etc. This produces an historic map view all sample locations in the Field. The system also allows recording and tracking all auditing results. A fabulous wealth of field knowledge will help in improving the agricultural process.

📊 Analysis and Reports

One of the big in-tangible benefits is the ability to get the analytical and map based reports. The system provides pre-defined reports on Costs, Yields, Incomes, Activities/Services, inventories, purchases, procurement requests, sales etc. As no one can think of all type of analysis individual business needs so the system offers download of the transactions for date ranges. This offers the flexibility for business to load the transactions into Excel or Google Spread Sheet to create any customized reports. We believe in giving you all your consolidate transactions and empower you to dice and slice it to create your analysis. This provides unlimited possibilities of analyzing the data and a major benefit to run your business smoothly and efficiently.

Summary
While market dynamics determine the actual prices you will receive for your harvests properly managing costs and better understanding the profitability of the crop you are growing and the cost effectiveness of the land you are growing it on. AgilerMe captures all required data needed to totally analyze your costs and maximize your returns, as well as providing you with all the accurate data you need to comply with any regulations that are applicable.

A conservative calculation of the savings based on tangible benefits show a savings of more than $10,000 per year on medium size Citrus harvest business and savings of more than $20,000 in a tea estate in India with approximately 200 hectares of cultivation area with 3 divisions.

Appendix A: minimal cost saving calculation for a Citrus Operation:
A small to medium Citrus grove one can estimate the savings as follows

Savings description	Hour/Week	Weekly	Monthly	Yearly
Collection , preparation and data entry of field data for payroll and accounting	8	$150	$600	$7200
Vehicle use for delivering manual data sheet (includes gasoline cost) [3]	1	$50	$200	$2400
Maintaining H2A records, Activity logs, Harvest logs, Equipment cleaning, Material use, Hazardous Material application Log ((Conservative estimate)[6,7,8]	2	$30	$120	$1440
Total Savings				13440

Appendix B: minimal cost saving calculation for a Tea estate:

A medium Tea estate with approximately 200 hectares will have typically 3 divisions (Adjusted to Indian labor cost)

Savings description per division	Hour/Week	Weekly	Monthly	Yearly
Savings on using android phone over proprietary hand held or proprietary scale*(5 units/division anywhere from $ 200)				$1000
Consolidating weighment and sundry data in the division from all the fields and data entry of field data for payroll and accounting (Labor cost is adjusted to Indian condition)	8	$40	$160	$1920
Eliminating PC at divisional office and its maintenance and software cost per year				$1000
Vehicle use for delivering manual data sheet (includes gasoline cost) [3]	1	$30	$120	$1440
Marinating, Activity log, Harvest log, Equipment cleaning, Material use, Hazardous Material application Log (Conservative estimate)[6,7,8]	2	$10	$40	$480
An increase of 1 inventory turnover by reducing on hand inventory , reducing waste and obsolescence in division let us say produce a savings of 5 %[4]				*
Total savings per division				$5840
Total Savings for the estate				$17,520

References

1. Paying Fruit Pickers Per Pound. (n.d.). Retrieved from Growing Produce website: http://www.growingproduce.com/fruits/paying-fruit-pickers-per-pound/
   Scope: The fruit picking by weight experiment saving cost using technology to track

2. William F. Lazarus – Farm Machinery Management. (n.d.). Retrieved from University Of Minnesota website: http://wlazarus.cfans.umn.edu/william-f-lazarus-farm-machinery-management/
   Scope:
   Repair Cost Calculator (REPAIRCOST.xls) Download the MS Excel spreadsheet template.
   Download a Forage Focus article about the repair cost calculator. Download Paper (REPAIR_CHECK.pdf)

3. Estimating Farm Machinery Costs. (n.d.). Retrieved from IOWA STATE UNIVERSITY Extension and Outreach website: https://www.extension.iastate.edu/agdm/crops/html/a3-29.html
   Farm equipment cost estimates by hour

4. UNIVERSITY OF ILLINOIS AT URBANA-CHAPAIGN COLLEGE OF AGRICULTURE COOPERATIVE EXTENSION SERVICE CIRCULAR 1063. (n.d.). Retrieved from INVENTORY MANAGEMENT AND CONTROL IN AGRICULTURAL MARKETING AND SUPPLY BUSINESSES website: https://www.ideals.illinois.edu/bitstream/handle/2142/27791/inventorymanagem1063broo.pdf?sequence=1
   Scope: Inventory management and some sample calculations

5. REPORTS. (n.d.). Retrieved from Farmworker Justice website: https://www.farmworkerjustice.org/resources/reports

6. Frequently Asked Questions. (n.d.). Retrieved from GLOBALG.A.P. North America website: http://www1.globalgap.org/north-america/front_content.php?idart=2261
   Scope: Cost savings: Use of good documentation for un advertised auditing

7. Revisions to the Worker Protection Standard. (n.d.). Retrieved from EPA United States Environmental Protection Agency website: http://www2.epa.gov/pesticide-worker-safety/revisions-worker-protection-standard

8. Recordkeeping Tools. (n.d.). Retrieved from www.ccof.org website: http://www.ccof.org/certification/help/recordkeeping-tools
   Scope: Various log sheets from the site. All the data needed is downloadable to a time frame with location and time stamp

9. Recall: *The Food Industry's Biggest Threat to Profitability* [White paper]. (n.d.). Retrieved from Tyco integrated Security website: https://www.tycois.com/wps/wcm/connect/ab4fd1f4-4aa2-45a3-a4f1-b91b36539e0f/LT1000-02FoodDefenseWP_Part2_hireresDigital.pdf?MOD=AJPERES
   Scope: Food recall costs and integrated approach of food safety