Case Analysis #1 – High-Level Current State BI Analysis of your Company/Org
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## Overview

Studies show that "the vast majority of farms and ranches in the United States are family-owned and operated." (USDA) One of the most crucial challenges that many family farms face is information asymmetry. In layman's terms, information asymmetry arises when one organization has better intelligence and more resources than others. For instance, the rise of factory farming powered by massive corporations poses severe risks to family farms. Without a competitive advantage over large corporations, local businesses and small farm owners suffer from many common problems, such as low income, poor land management, resource waste, and a lack of loyal customers. To survive in today's hypercompetitive environment, traditional farmers must implement a comprehensive intelligence system that provides real-time and accurate feedback to make smarter and more scientific decisions.

This paper describes a high-level analysis of a Business Intelligence (BI) solution we implement on a local business in the US – Smithfield Farm. With a history of more than 200 years, located in Berryville, Virginia, Smithfield farm currently has two main branches: Smithfield Farm Bed and Breakfast and Smith Meadows Meats. Operating by Ruth and Betsy, a mother and daughter team, Smithfield Bed and Breakfast is a family-owned inn "offering lodging on a tranquil, 400-acre all-natural and sustainable farm located near many attractions for all kinds of leisure and entertainment."(Smithfield) Furthermore, Smith Meadows Meats is a meat farm that produces grass-fed meat and other organic products. Just like many other traditional farms, the general strategic goal for Smithfield is to increase revenue while reducing workload. Smithfield can leverage a comprehensive BI system to make data-driven decisions and improve its competitive advantages over other farms.

Food and Agriculture Organization of the United Nations (FAO, 2020) indicates that "family farmers, especially those operating at a small-scale level, are particularly exposed to the effects of the COVID-19 pandemic." Movement restrictions hinder small farm owners' access to markets, which leads to unfavorable ripple effects due to the perishable nature of most farm products. On top of that, amid coronavirus restrictions, small inns and B&Bs businesses suffer significantly due to travelers' heightened safety concerns. With the increasing risks of the pandemic, many small businesses are forced to either move online or shut down due to a lack of physical interactions.

After exchanging several messages with the farm owners, we learned that the current status of Smithfield is not optimistic. As previously mentioned, given that most US farms are family-owned, it is reasonable to presume that many other small farms suffer the same issues. Smithfield owners are traditional farmers, and they only have a primitive paper system to record all the relevant data, such as livestock and customer information. A file cabinet or paper system is easy for farmers to implement because it requires little to no computer and database design knowledge. However, it is almost impossible to properly and efficiently analyze a large quantity of data. The current system suffers many problems other than the ones mentioned. For instance, the system is vulnerable to accidental misplacement or even spilled tea. It takes a long time to query, transfer, organize, and analyze data, which means they can't possibly have a dashboard to monitor the farm's current

status to make data-driven decisions. They also have a website, but it's not connected to a database. The only information listed is an introduction of the farm and their listed contact information. In other words, they're not tracking the website's traffic because of the primitive design.

Smithfield isn't a unique example. Most local family farms don't have the right technology or BI systems to gain a competitive advantage over their competitors. We believe that a BI system itself is a competitive advantage, and it can significantly reduce information asymmetry when competing with large corporations. Large corporations and factory farms suffer their problems, such as environmental issues and animal cruelty. Family farms can survive as long as they have competitive advantages that large corporations can't offer. It is not unreasonable that many people prefer traditionally raised organic products over hormone-injected mass production meat. By implementing a BI system, it is also true that one family farm can gain an edge over other small farms. An advantage means more loyal customers, more income, better production, and less waste.

To take one giant step further, it is entirely possible that sophisticated technology and BI systems can ascend a traditional farm into an autonomous money-making machine. Farmers will always be involved in the whole process. However, human involvement should be at a very high intelligence level based on the dashboard's feedback while leaving the most tedious and laborious work to machines.

## Key Decisions

*Smithfield Bed & Breakfast*

Based on historical data and experiences, an integrated BI system can effectively help Smithfield Bed & Breakfast decide on how many reservations to take every day. It can also help Smithfield determine the max operational limit and the expectation on future operations. With occupancy decided, Smithfield can then determine the number of supplies needed for the bed & breakfast service, such as the amount of food to be served, the number of living supplies (toiletry, slippers, etc.) needed to be purchased, and so on.

An interactive BI system can also efficiently track customer's reservations to know what kind of recreational activities on the farm are needed to be prepared beforehand. Smithfield can then accommodate the resources in the farm, such as tools of farming, to be best prepared for customers' entertainment needs. In cases where special accommodations are required, such as food allergies and children's activities, with BI insights, Smithfield can also respond in a timely manner.

*Smith Meadows Meats Farm*

There is a massive amount of resources needed to be managed with BI insights to efficiently operate the meat farm. For example, since a majority of animals in Smith Meadows Meats Farm are grass-fed and free-range, with an implemented BI system, the farm can decide how much fertilizer and insecticide is required for a specific period of time. The farm can also rely on the BI insights to calculate the time period of animal raising, milk production, egg production, and so on so that farmers can manage other resources efficiently in order to prepare for harvest.

BI insights can also help the farm keep track of the livestock's health condition and the product's quality so that the farm can determine resource allocation on each livestock. When livestock is harvested, a BI system can also help farmers decide the price of each product, taking into account resources allocated to the livestock.

*Employees and Other Resources*

The operation of a farm like Smithfield requires close management of employees, machinery, and many other resources. With BI insights, Smithfield can keep track of the number of employees needed for a specific time period and help make decisions about when to hire or downsize employees. For example, during current pandemic conditions, the operation of the farm and the bed & breakfast services can be turbulent. Thus, Smithfield can actively use BI insights to manage all resources in the farm to keep competitive over time.

## Opportunities

One of the major opportunities with BI systems for Smithfield is to increase customer satisfaction. Utilizing BI systems to analyze operational capacity and interpret customer's preferences, Smithfield can improve customer satisfaction by constantly providing high-quality service. In addition, BI systems can track order and order line fill rates, so the business is ready to handle seasonal spikes and drops in orders (Hennel, 2019). Therefore, Smithfield can effectively maximize their profit by preparing for surges and drops of orders accordingly and quickly.

By actively engaging in a BI system that monitors livestock's health condition, the Meat Farm can maintain its product quality at high levels. Furthermore, with the guarantee of high-quality meat, milk, and egg products, Smithfield can engage in valuable and flexible pricing strategies to be competitive in the market.

BI can help Smithfield to boost sales. One of the most effective pricing strategies that Smithfield can leverage is called value-based pricing and marketing. In layman's terms, value-based pricing means a farm "sets prices and promotes products based on the value consumers perceive a service or good to have." (Thibodeaux) When deciding the optimal price, it is imperative for business owners to pay special attention to factors consumers consider when assessing the value of a product. Some initial questions that Smithfield can understand by leverage a BI system are the following:

1. What criteria does the consumer use its value judgment?
2. Is it farm product quality? Quantity?
3. Organic/healthy produce vs. mass produce?
4. Nutrition values?
5. Are the average consumers willing to pay the extra money for grass-fed meat? Why do some consumers choose other products over ours?

By having a better understanding of customer needs and their motivations for purchasing a certain product, Smithfield can leverage this information to formulate more effective sales strategies and marketing plans to gain an edge over its competitors.

In addition, with a BI system that constantly tracks daily purchases, production, and sales of the farm, Smithfield can manage to find an optimized balance between supply and demand. This

would also refine its production system by keeping track of inputs of resources to the daily operations and reducing waste such as excessive crops and meat products that cannot be sold or consumed by the farm.

## Challenges

As a tool, business intelligence is used to process existing data in the enterprise and convert it into knowledge, analysis, and conclusions, to assist businesses or decision-makers to make wise business decisions. There are challenges that Smithfield farm needs to tackle to better implement and make full use of BI.

The first one will be money, "the average cost to purchase a business intelligence software is about $3,000 per year". (Geoff Hoppe, 2019) Lots of companies will choose between purchase and build to implement their system, but in this case, it will be cheaper and easier for Smithfield to purchase a business intelligence system. At the same time, th*e "*average net cash farm income (NCFI) for farm businesses is forecast at $104,500 in nominal terms in 2020*"*.("USDA ERS - Farm Business Income," 2020). Thus, it will cost around 3% of net income for the farm to implement the new BI software, and that does not include the personal training time. More importantly, taking into consideration of the rising cost of raw materials, unstable consumer demands due to Covid, and animal illness, the cost of implementing a new system is definitely a challenge that Smithfield needs to overcome.

The second challenging part Smithfield needs to tackle is to create an online database system to collect and analyze the data. Business intelligence system relies on valid data to make wise business decisions, collecting useless and redundant data is no better than having no data at all. Smithfield shall use electronic sensors/cameras to collect data and monitor any changes instead of relying on human laborers to physically check on-site and report back. Needless to say that humans make mistakes, and it is also costly to have someone on-site 24/7. Furthermore, an online database system provides accurate data measurement, which can help Smithfield better manage their operations – "the more information they have, the more they can make decisions that are tailored to their farm's specific needs."(Friedman, 2015)

## BI Recommendations

1. Pricing management BI system.

One of the main problems facing business owners is setting the optimal price to generate the most income. By tracking customer information, such as checking-in dates and the number of bookings, owners can have a rough idea of the optimal supply and demand. Smithfield shall use a dynamic pricing management BI system to replace spreadsheet or manual updates, especially for the bed & breakfast business. Consumers shall pay differently based on the dates of the booking, duration of stay, types of rooms, and amenities, and this price shall be aligned with the market rate while maintaining competitiveness. Smithfield shall deploy a smart pricing strategy to generate the most revenue instead of fixed pricing all year round. By utilizing a comprehensive pricing management system, it can extract both internal and external data sources to calculate real-time pricing for consumers combing on the current booking status, market trends, and the farm's vacancy rate. More importantly, the dynamic pricing system shall have an interactive dashboard that provides a

direct revenue calculation for the owner to visually see the farm operation status to make any necessary adjustments.

2. Employee management BI system.

"Employee management focuses on the employee to ensure they are performing their best in order to achieve bigger organizational goals. In doing so, teams can capitalize on employee strengths and needs to maximize on a functional and efficient workplace."(Taylor, 2020) The productivity of employees can be tracked and monitored by leveraging a specified BI system. "Research shows that, indeed, the best farm employee can consistently be four to eight times better than the worst."(Billikopf, 2006) By utilizing the employee management system, Smithfield can track employees on their attendance, overtime, and breaks to better manage payroll situations. Furthermore, the BI system can also help Smithfield store employee confidential information, generate surveys & feedback, and evaluate performance. The system can also help Smithfield to host new employee orientation, conduct training sessions, drive engagement and optimize revenue. By simply viewing the system dashboard, an employee who doesn't show up for work or tardy constantly risks losing their job when a downsizing decision is made. Furthermore, the system can also identify what's lacking in certain divisions, such as a lack of workforce to do the job, and which divisions are sustainable without extra workers or attention and of course, the system can also identify the most vulnerable employees and notify the farm to give suitable incentive rewards. Therefore, the optimal employee management BI system can help Smithfield owners monitor the worker's performance, improve the workers' productivity, make suitable headcount adjustments to achieve the best operation process.

3. Livestock monitor system.

It's very easy for farmers to lose track of the number of cows, chickens, or goats on the farm. More importantly, the farm needs to monitor the health status of the livestock to make sure that they are healthy and not contagious. A BI system can significantly help the process by tracking the data. For example, Anitrack, a livestock monitoring startup, created a smart wearable collar for cows to monitor their health status. ("5 Top Livestock Monitoring Startups Impacting Agriculture," 2019). These wearable devices provide the farmers with the information they need to know about their livestock to ensure everything is running well. This is completely doable for Smithfield to better monitor their livestock by leveraging the BI systems. Smithfield can react quicker in cases that they notice one animal is sick, and they can provide treatments and separation on time. Since Smithfield has different livestock, by placing the unique sensor on all livestock and connecting to a live database, the BI systems can provide a detailed report on different livestock based on their species, age, health status, and etc. Therefore, Smithfield can better monitor the health, movement, and safety of all the livestock.

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