K A N S A S

Profitability Surveys: Evaluating Management Factors

By T.L. Kastens, H. Nivens, W.M. Stewart, and T.S. Murrell

Economically, a well-managed firm is one that consistently makes greater profits than competing firms in the industry. In terms of production agriculture, good management is demonstrated by profits that are persistently greater than those of similarly structured, neighboring farms. It is therefore necessary, in analyses of profit, to identify management strategies that can be implemented consistently, regardless of yearly variation in other factors. Proven management practices are the ones that are best controlled and upon which producers should focus their attention.

Analysis of Kansas data shows that farm operators who want to improve profitability by improving management should focus on decreasing costs, faster technology adoption, and increasing yields.

The Department of Agricultural Economics at Kansas State University maintains an historical economic database of financial records from Kansas farms that are or have been members of one of six regional farm management associations. The database is referred to as KMAR, for Kansas Management, Analysis, and Research. Records from over 1,000 farms that were continuously enrolled from 1987 to 1996 comprise the data used in this study. This long-term database makes it possible to identify management practices that affect profitability.

The management variables analyzed were profit, yield, input cost, crop price, and adoption of one important technology. Profit was calculated by subtracting seed, fertilizer, marketing, herbicide, machinery ownership and operation, labor, and land costs from accrual crop income. The measure of profit ($/A) used in the analyses was calculated by subtracting the regional annual average profit from the farm's annual profit. Measured yields for a given year were converted to a percentage of regional average yields for that year. Crop input costs considered were machinery ownership and operating costs, crop labor, seed, fertilizer, herbicide, irrigation fuel, and interest costs. If the main crop (wheat, corn, milo, soybeans, and alfalfa) acres were greater then 50 percent of a farm's total crop acres, then annual cost for those crops was converted to a percentage of regional average cost for that year. Similarly, the actual market price at which a producer sold a crop was expressed as a percent of the appropriate region's average crop price. Technological adoption studied in this survey was the use of no-till and was measured by monitoring the replacement of labor and machinery costs by herbicide costs. A technology index was calculated as:

$$\text{Technology index} = \frac{\text{herbicide expense - (crop labor and crop machinery operation expense)}}{\text{herbicide expense + (crop labor and crop machinery operation expense)}}$$

When herbicide expense is zero, the technology index is -1. If labor and machinery costs were zero, the index would be +1. For each region, across 1987 to 1996, the technology index variable was regressed on years and the equation differentiated to determine the average rate of adoption over years for a particular region. This statistical model made it possible to determine each year how far ahead or behind each farm was, in years, compared to the average farm in that region and year.

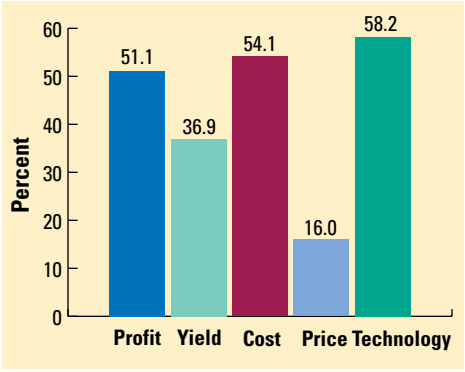

Figure 1. Percent of farms that consistently managed factors during 1987 to 1996.

TABLE 1. Variability of management measures: average value in high and low thirds.

Measure	High third	Low third
Profit, $/A	$79	-$80
Yield, %	17	-18
Cost, %	37	-28
Price, %	12	-11
Technology, years	17	-16

Identifying practices that can be consistently managed was accomplished by averaging a management measure's values for a particular farm over the 1987 to 1996 period and testing whether that average was statistically different from zero. The number of farms with long-term averages that were different from zero was then converted to a percentage of all farms in the survey. The results of this analysis are shown in **Figure 1**. This figure shows that 51 percent, 37 percent, 54 percent, and 16 percent of the farms in the survey consistently maintained either higher or lower profits, yields, costs, or prices, respectively. In addition, 58 percent of the farms were consistently faster or slower adopters of technology. These results indicate that it is easiest for a farm to differentiate itself from its neighbors by focusing upon technology adoption, cost, and yields (ignoring profit, which is more an end rather than a means to an end). The low persistence of price management suggests that it is especially difficult for a farm to achieve higher prices than those attained by other farms.

Survey participants were grouped into three categories for each management measure: high, middle, and low third. The mean of the management measures in the high and low third is presented in **Table 1**. This table shows that the high profit group averaged $79/A more than average. Similarly, those in the high third of yield or price were 17 and 12 percent higher than average, respectively. Those in the low third of costs were 28 percent better than average. **Figure 1** showed that it would be difficult to become a superior price manager. **Table 1** shows that even those who are good at pricing only get prices 12 percent higher than average. If one assumes that the typical price breaks even, then the cost row may be compared to the price row. This comparison indicates that it is much easier to achieve low costs (28 percent lower for the low third) than to achieve high prices (12 percent higher for the high third).

Those in the high third of technology

TABLE 2. Persistence across management traits (33.3% is considered random).

	This percent is in the...			
Of those in the...	Highest third of yield	Lowest third of cost	Highest third of price	Fastest third of technology
Highest third of profit	40.1	44.2	33.0	50.3
Highest third of yield		36.2	25.9	47.4
Lowest third of cost			34.4	49.1
Highest third of price				30.0

adoption were 17 years ahead of average. During the 1987 to 1996 period studied, the use of chemicals over tillage advanced slowly on average. Consequently, those farms that were principally no-till were calculated to be many years ahead of the average producer.

Management trends of the top third respondents are presented in **Table 2**. A random association between any two categories would be 33.3 percent. Therefore, percentages higher or lower than 33.3 percent indicate a possible relationship. High profits were associated with higher yield, lower costs, and faster adoption of new technology. Those in the highest third of profit were generally not better marketers of grain.

TABLE 3. Impact of individual management traits upon profit.

Marginal		Best third	
This change	Results in this change in profit, $/A	This change	Results in this change in profit, $/A
1% increase in yield	0.65*	17% increase in yield	11.05*
1% decrease in costs	0.72*	28% decrease in costs	20.16*
1% increase in price	0.14	12% increase in prices	1.68
1 year increase in speed of technology adoption	0.83*	17 year increase in speed of technology adoption	14.11*
10 acre increase in farm size	0.31*		

*Significantly different than zero at the 95% confidence level.

To determine the effect each management measure had upon profit, a multiple regression model was developed. This model determined the magnitude of the effects of yield, cost, price, technology, and farm size on profit. The results of this model are shown in **Table 3**. Based on profit impacts of being in the best third of a management category (right hand side of table), the most important factors for increasing profit were, in order: cost decreases, technology adoption (no-till), and increased yields. Increased price from marketing was not a significant factor. The marginal analysis (left side of table) showed that increased farm size had a significant impact on farm profitability, independent of the other management aspects measured.

The results from this study show that operators who wish to improve profitability by improving management should focus upon decreasing costs, faster technology adoption, and increasing yields. In this study, no-till adoption was used to measure the rate of technological adoption. If a new agricultural technology, for example precision agriculture, is thought similar to the no-till technology studied here, then prudent managers should consider getting involved early – unless they believe that the new technology is not here to stay. It is important to remember that early adopters garner the profits associated with a new technology. Once the technology becomes established, profits disappear. However, greater profits often come with greater risks, and a wise manager will balance risk and profits in a way that provides the desired comfort level and profit. BC

Dr. Kastens is Assistant Professor, Department of Applied Economics, Kansas State University, Manhattan. Ms. Nivens is a graduate research assistant. Dr. Stewart is PPI Great Plains Director, located at Lubbock, Texas. Dr. Murrell is PPI North-central Director, located at Andover, Minnesota.