2001

Factors of success of small farms and the relationship between financial success and perceived success

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by

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A thesis submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Major: Economics

Program of Study Committee:
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Iowa State University

Ames, Iowa

2001

Graduate College
Iowa State University

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Signatures have been redacted for privacy

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ACKNOWLEDGEMENTS

A special thanks to the US Department of Agriculture, Economic Research Service, which provided the funding for this study.

I would like to express my appreciation and gratitude to Dr Michael Duffy for giving me the opportunity to do this study and for his direction in this study and his patience.

To Dr William Kennedy, Dr Robert Jolly and Dr Paul Lasley, thanks for your insightful advice about this work.

I would also like to acknowledge the contribution of Dr Fred Lorenz to the statistical analyses, and especially the logistic model.

To my husband, Joseph Tsafack, I want to express my gratitude for his patience, encouragement and support.

To my parents and sisters, I want to express my gratitude for their encouragement and support.

To my friends Rachel Lynn Martin, Ingrid Adams and Akemi Malik, and their families, I extend my gratitude for their encouragement and support.

Finally, to the staff of the Economics Department of Iowa State University, particularly Mrs Joan Mattingly, Becky Johnson, Deanna Ward, Deb Moore, and Kathy Strohl, I extend my gratitude for their help and encouragement.

ABSTRACT

This study investigates the factors of farm success, determines the profile of small successful farmers and also explores the factors affecting farmers' perception of success. Farm size was measured in terms of gross sales and a profit index (equal to ratio of gross profit over gross profit minus management return) was used as a measure of financial efficiency and also as a proxy for farms' profitability.

A sample of seventy-three farmers, further divided in four groups based on a combination of farm size and profit levels, was used in the analyses. Means comparisons using t-tests to identify success factors, a multiple regression estimating the effects of main success factors identified through t-tests and a logistic regression estimating the contribution of profitability and other factors on farmers' success perception were based on data from Farm Business Association (1991-1996 period) and from survey.

Results indicate that farms' profitability is affected negatively by farmers' age but positively by farmers' education, crop yields, machinery and labor efficiency, percent of rented acres and percent of revenue from livestock. Farm size appeared to positively affect net farm income. Small successful farmers are young farmers with high education levels who rent most of the land they use and probably also rent high proportions of their equipment and machinery, given their high proportion of rent expenses and low proportion of depreciation and interest expenses. They have a low financial leverage. Overall, management appears an essential ingredient to farm success, as important as hard work, even more so in some instances. It appears that two fifths of profitable farmers do not feel successful while one third of non-profitable farmers feel successful, indicating that profitability doesn't necessarily translate into success perception. Farmers highly value being viewed as a good neighbor, spending time with family and being one's own boss as well as making money. Farmers' success perception is affected positively by farm profitability, farm size and the farmers' value for intrinsic objectives (i.e. being one's own boss, working outside) but negatively by the farmers' value attributed to intergenerational transfer objectives (i.e. passing farm on to children, passing on a family tradition).

I. INTRODUCTION

Fixed costs constitute a significant proportion of total costs in agriculture. The concept of economies of size in economic theory presupposes that as the scale of operation increases, the average cost decreases. The non-divisibility of some of the resources is one of the arguments brought to explain whether or not economies of size exist. Logically large farms are more likely to be successful - that is more profitable - than small farms.

In the literature, many authors note that large farms, on average, are more efficient than small farms, implying that the size of a farm is a controlling factor in the efficient use of farm resources such as labor and machinery (Thomson and Dixon (1914), Quance and Tweeten (1972), Hallam (1993a)). In addition, some technologies are more efficiently used by large farmers. Even though large farm owners are more likely to be successful (profitable), there are small farms that are successful. Former Secretary of Agriculture Charles F. Brannan, an advocate of family farm, stated in 1950 (citation by Quance and Tweeten, 1972) that he does not think that the only way to efficient production is through industrialized mass farming but he believed that family sized farms can also be efficient. Mosher and West (1952) found that farms with medium-sized business had slightly higher net farm earnings than large or small business farms.

These observations raise questions about what makes these small farms successful? Are the factors explaining the success of small farms similar to those observed for large farms? Which factors really make the difference among small farms? The focus of the present analysis is on the small and high profit farms.

An important aspect of the present study is to capture the multiple dimensions of farm success. In most of the past research on farm success factors, the definition of success was often limited to financial success. But financial aspect of success is only part of an extended definition of success. There is a consensus that only considering financial success is a narrow approach that may lead to misinterpreting the farmers' values system, to miss or underestimate the importance of items, facts or issues that really matter to farmers. Farmers do not respond only to pecuniary motivations, such as profit-maximization. To them, farming can be a way of life instead of being a way of making a living as suggested by Ogden (1946). If farming is a way of making a living, then profit maximization leading to financial success might be the top priority to farmers. But, if farming is instead a way of life, then it may be inappropriate to consider profit maximization as the primary objective of farmers because there might be other goals which are as important as making profit to farmers. Crickman

(1924) stated that " the actions of all men, farmers not excepted, are not controlled entirely by pecuniary motives" and "personal abilities and means as well as personal preferences are important factors determining the productive activities of the farmer [and thus their success]". A less restrictive definition of farming success is through the farmers' own perception of their success. This suggests that their value system affects perception of success. Therefore, the definition of farm success is more an individual matter and it involves objective as well as subjective considerations.

Although there have been studies trying to identify the factors which explain why some farmers are successful and others not, there is still a debate. There are few robust results and, thus, there is much to discover about why some farmers are successful and others are not. The findings of most of the success factors' research do not lead to a definite answer (Ajwa, 1991). Fox, Bergen and Dickson (1993) recognized that "nine decades of success factors research have failed to produce a robust or consistent explanation of differences in farm performance". They also found that a variable could influence the profitability differently in two different time periods.

In addition, a literature review did not find a study that assessed directly the potential gap between farm financial success and the farmers' perception of their own success. While most studies focused on financial success, few considered the non-pecuniary variables. One example of study exploring non-pecuniary variables is the study of Ajwa (1991). She introduced job satisfaction and family satisfaction as arguments of the household utility function in her model to predict success.

Success may not be a matter of efficiency only, but also a matter of happiness. Farmers may not seek profit maximization but rather will make some money and then fill their other goals.

The present study has two main objectives:

- First, to determine the major factors which affect farming profitability (financial success) through the characterization of differences and/or similarities between profitable small farms and profitable large farms and between small profitable and non-profitable farms.
- Second, to identify the reasons that make farmers define themselves as successful by analyzing the farmers' objectives/goals rankings and the relationship between objectives rankings and farmers' perception of success.

These main objectives are expanded into five (5) sub-objectives:

1) to characterize and profile the small profitable farms,
2) to identify the similarities and differences between small and large profitable farms,
3) to identify the similarities and differences between small profitable and non profitable farms,

4) to verify the effects of major factors, identified through the comparisons of small profitable farms to other farms groups, on farm financial success and their significance, on one hand. On the other hand, to examine the farmers' subjective factors for farm success,
5) to identify and characterize the relationship between farms' profitability and non pecuniary motivations reflected through farm goals and the farmers' perception of success.

The present thesis is comprised of five sections. First is the introduction. The next section provides the literature review and the theoretical background as well as the research questions. The third section is the methodology section. Section four presents the results and their interpretation. A conclusion constitutes the last section.

II. LITERATURE REVIEW, SOME THEORETICAL INSIGHTS AND RESEARCH QUESTIONS

A. Literature Review

1. Successful farming: factors affecting farms' financial success (farms' profitability)

Even though there has been a multitude of empirical studies on farm success factors, few results are robust and there are some problems in the approaches used. Fox, Bergen and Dickson (1993) conducted a literature review of success factors studies and identified four issues affecting the quality of success factors research. They are the following:

1) Success is multi-dimensional

"Success can be characterized as annual income or returns, growth rates of sales, assets or equity, ability to withstand adverse market conditions, or low levels of income risk. Different farm operators place different weights on different dimensions and a single farmer's emphasis on different measures of success can change over his career". (p. 245)

2) The theoretical agenda

"[The neoclassical theory of the firm does] not offer an explanation of [the] distribution of profits, [...] or probabilities of success" because "[it] has not yet produced a theory of industry structure for an atomistic industry". (p. 246)

3) The simultaneity problem

"...[The use of] endogenous variables to explain variations of endogenous variables in the context of a single equation model". (p. 246)

4) Design of the estimating model

"Examples of redundant [and] or [...] overlapping explanatory variables. [Problem due to] a lack of a coherent consistent theoretical framework to guide the development of empirical models. [Thus there is a need] to identify less interdependent sets of explanatory variables". (p. 246)

In the literature, several factors such as size of the farm, efficiency in production, land tenure, and management factors are often cited as being determinants of success. Socioeconomic characteristics such as age and education are also cited as factors affecting farm profitability. Age affects farm profitability through family cycle, that is older farmers are likely to focus on an adequate retirement and on intergenerational transfer depending on the number of children and their willingness to continue with the family farm business, instead of maximizing profit through major adjustments to their farms. Age and education affect farm profitability through the effect on

management abilities. Some studies suggested that age affects negatively the profitability of the farm; younger farmers have better farm performance and thus on average older farmers are making less profit (Thomson and Dixon (1914), Drache (1976), Gasson et al., (1988)). Education and income are positively related and this conforms to the theory of the human capital; farmers with a higher education are likely to be successful in farming (Castle et al., (1987), Thomson and Dixon (1914)).

According to Mosher and West (1952), the factors positively affecting farm success includes; crop yields, livestock production efficiency, labor cost, price received for products sold, crop system, power and machinery cost. Therefore, farmers who increase livestock efficiency and crop yields and reduce labor and machinery costs increase their earnings compared to others. The reduction in labor, power and machinery costs was achieved through an increase in the size of the farm business.

For Davis and Edwards (1995), the yields (affected itself by management factors) and the machinery costs are the major factors affecting the crop profitability.

Thomson and Dixon (1914) think that some farmers are not successful because of their contentment and indifference. The losses in profitability are due, according to them, to neglected work, low crop yield, inefficient stock, poor farm organization and unused capital. In Drache (1976), hard work, large farm size and high financial leverage are listed among farm success factors.

Hard work is important but management factors, though intangible, are significant factors of farm success. Davis and Edwards (1995) listed some of the management factors that affected significantly the yields: the timing of operations, the choice of seeds, the quality of machinery operation and the use of appropriate pesticides. Drache (1976) described successful farmers as "good detail men", natural competitors who like taking risks and who are superior marketers. These factors are based on the 1972 national "Outstanding Young Farmer" recipients. Those qualities are at the core of management abilities. For Castle et al (1987), there are fewer opportunities for beginning farmers with average management skills compared to farmers with excellent management skills.

Debt in farm business may be a limiting factor but if managed properly, it may lead to farm growth. The 1972-73 "Outstanding Young Farmers" had an average debt of 42 percent compared to the United States national average among farmers of approximately 19 percent (Drache, 1976). Luckham (1976) found that increased financial leverage and the ratio of operating expenses to income (cost control) significantly affected the profitability of Virginia dairy farms. But for Castle et al. (1987), one of the characteristics of successful farmers studied in Indiana and Minnesota was a low debt relative to equity while maintaining enough borrowing capacity to control more resources. According to Mishra et al. (1999), limited-resource and other small farms should lower debt to asset ratio in order to become more profitable.

Another aspect of management is the choice made by farmers to rent or own their land, to rent or own the machinery/equipment they use. Due to high requirements for investment, farmers might have some problems to begin farming operations especially if they don't have the adequate capital or they have little family assistance (Castle et al. (1987), Edmond (1960)). Given the size of the farm, owning some machinery or piece of equipment may lead to inefficiencies inducing the need for a careful choice between ownership or lease options. Owning the machinery may be very expensive for the farm and in such cases the way to reduce costs (especially the ownership costs) are through custom hire, joint ownership of machinery or rental of machinery. Custom hire might negatively affect the timeliness of operations or the quality of the work may not be good and, even though rare, there are risks of spreading pests from one farm to another (Castle et al., 1987). Even though owning the land or the machinery may be in some cases too expensive for the farm, it seems to give the farmer some kind of prestige or a sense of satisfaction.

Edmond (1960) found that land tenure had a significant effect on net farm income but mainly in the first year of beginning farmers. Thomson and Dixon (1914) found that land tenure has an impact on the income level of farmers; for the tenants, the income is positively related to the capital invested while for the landlords, the size of the investment seems to make little difference in income. In fact, cash rental arrangements resulted in lower income to landowners but reduced risks (Castle et al., 1987).

Drache (1976) observed that the 1971-1972 "Outstanding Young Farmers" were leasing a significantly larger proportion of their land and equipment than the average American farmer at that time. On average, they owned 486 acres and rented 862 acres. These successful farmers, with larger rental land bases, seemed to use borrowed money for farm operation expansion but not for ownership. In 1996, Drache noted that renting was viewed by farmers as a "way of freeing up operating capital" and most successful farmers were more likely to be tenants. He added that a 1990 study by USDA showed that 37 percent of all farmers were part owner, part tenant farmers and that 54 percent of all land was controlled by these part owner, part tenant farmers. Although the rental arrangements can give more flexibility to farmers, they can restrict the tenant managerial freedom. The type of rental arrangement affects the managerial freedom of the tenant differently. According to Castle et al (1987), cash rental is less restrictive than crop share.

Crickman studied the factors affecting the successful operation of 231 Warren County farms (1924). He found that profits were affected by the size of the farm, the proportionment of business enterprises (that is the adjustment of the enterprises to the existing economic conditions), and the efficiency in physical production and in market/bargaining. The size of the farm seems to be a

determinant factor in the financial success of a farm. The recent trend has been toward large-scale farming. More and more, the new machinery and equipment have increased capacity, inducing the farmers to increase the size of the farm for a cost efficient use. Hallam (1993a) suggested that " new technologies may favor large firms as opposed to small firms" and that larger firms will more likely adopt new technologies since they can spread the cost to more output units, or they can apply them to a larger resource base. Thus new technologies may not be adopted by individual small farms unless they join together to acquire and use such technology.

Quance and Tweeten (1972) stated that large farms on average are more efficient than small farms and the gap between the efficiency of large farms and small farms is widening due to the fact that the magnitude of adjustment in scale of operations needed for an efficient production is accelerating. They also think, " the good big farmer can outcompete the good little farmer ".

Efficiency of labor use increases with the size of the farm. Machinery costs per crop acre are higher on small farms due to unused capacity but can also be high on very large farms (Crickman, 1924). This indicates the concept of optimal size of the farm. In fact, large farmers have more opportunities to utilize labor and machinery extra capacities and by doing so, they reduce the overhead costs which results in more efficiencies compared to small farms (Crickman, 1924). Drache (1976) cited a 1972 study by Stoneberg and Howell (at Iowa State University), which showed that the greatest savings for large farms was in machinery, taxes, insurance and depreciation and that labor was at least twice as productive on a 640 acre farm compared to a 140 acre farm. Cooperation with neighbors and joint machinery leases rather than ownership of small-scale equipment are necessary for small farmers to survive in the business (Drache, 1976).

Castle et al. (1987) report that according to many US studies, large farms have lower average costs and higher net income, but they cautioned that an increase in the size of a farm does not necessarily mean that there will be an increase in net income. Because farm size is not the only factor, they advise that farmers' management ability be taken into consideration as well as the family situation, resources available and attitude toward risk and uncertainty in the decision to increase the farm size.

Success on small farms may be due to tight control over production process, ability to quickly recognize market opportunities and aptitude to "keep abreast of technology" (Gasson et al., 1988). According to Thomson and Dixon (1914), successful farmers are not spending less than their neighbors who are not as successful as them but they are taking in more (through high yields for example).

To conclude this section on farming success factors, the characteristics of successful farmers based on interviews of farmers from Indiana and Minnesota as listed by Castle et al. (1987) are: higher education, choice of investment of extra income instead of spending it, a small family to support, choice of intensive enterprise such as hog enterprise, large enough operations to get economies of size and a low debt relative to equity.

2. Definition of success; profitability and success

As mentioned in the introduction, few studies considered non-financial criteria in the definition of success. The study by Ajwa (1991) determined the variables (demographic and personality variables) explaining the financial success but also defined the success for farm families to include non-monetary goals such as job and family satisfaction.

> If success is measured in terms of material possessions, if human satisfactions are dependent solely upon material comforts and mechanical devices; then [...] farming, or living in the country, is not a way of life. It becomes merely a way of making a living and a poor way at that. And those who choose to live in the country are placing their hope for success upon governmental subsidies and legislative action. (Ogden, 1946, p.14)

Considering farming as an industry means that it is a way of making a living. Thus, the main objective may be to maximize profits. So the main economic theory to be used to explain farmers' behavior is the theory of the firm. But if farming is a way of life, then the theory of utility maximization is more appropriate since farmers' utility will include all the goals, monetary and/or non monetary.

For Gasson et al. (1988), the assumption of profit maximization in family farms is questionable. Instead they suggest that the objective function of a family farm may include several objectives of which profit maximization is not necessarily the dominant one. They cite Papandreou (1952) and Williamson (1964) when suggesting that farmers as managers want to maximize utility and the utility function may include arguments such as "power, control, prestige and desire for a quiet life".

Gasson et al. (1988) report that high value was attached to independence and intrinsic work satisfaction by farmers in England while profit maximization was holding a secondary position and all these results varied depending on age and size of the farm.

Pearson (1946) stated that to be a successful farmer, a necessary condition is to like country life, implying that success is not all about profits. To confirm this assertion, he argued that "health and happiness are more important than coin of the realm", even though a decent income is needed to enjoy being a farmer. Drache (1976) identified the most important reasons why some successful

young farmers chose a career in farming: challenge and independence. Gasson and Errington (1993) also found from several studies they synthesized that farmers consistently highly valued independence brought by farming and other intrinsic aspects of farming such as outdoor life and working with living things while putting emphasis on earning a reasonable income rather than profit maximization.

Kains (1973) is among the several authors who have a romantic idea of farming and living in the countryside. He listed some of the rewards of the farming life and they are not related to profits. They are "the self-reliance of the farmer himself", "the responsibility and satisfaction of home ownership", "the development and revelation of character and citizenship in the farmer himself and in his spouse and children (which is the basis and superstructure of true success)", "health and happiness" and "the wholesome association with genuine neighbors who reciprocate in kind and degree as few city dwellers know how to do".

B. Theoretical Background

The present section is articulated around two major components:

- the size of the farm and financial success or the profitability of farms,
- the financial success versus the success, and specifically the other factors of success, non profit factors that matter to farmers and that affect their perception of success

1. Economies of size and diseconomies of size

There is still some curiosity about the persistence of small farms when empirical evidences tend to show that larger farms on the average are more efficient than small farms and thus more likely to be profitable. To illustrate these views, Quance and Tweeten (1972) assert that "the good big farmer can outcompete the good little farmer". Hallam (1993b) suggested that economies of size are only one of the factors considered in studies that investigate the continued existence of firms over time in order to identify factors associated with success. Therefore, to address the continued existence of so many small farms in the agricultural sector over time, that is, the viability and profitability of small farms, the concept of economies of size seems to be relevant.

Two important considerations to be considered are the cost faced by the farmers (because of the direct size-cost relationship) but also the time frame in the planning. While in the short run there can be distinguished fixed and variable factors, in the long run, all factors are variable.

It is assumed that farmers are maximizing profit[1]. It is also assumed that farmers are evolving under a perfectly competitive market. There are many farmers and thus each of them can not affect the price because their individual production is small compared to total output. They are all price takers. Thus the cost element is very important for a farmer who wants to stay in business. The size of the farm should be such that the farmer gets the lowest average total cost in the long run.

With the conditions of perfect knowledge and free entry and free exit from the market under perfect competition, it is clear that the time frame is essential. To survive, the farmer should adjust to the economic environment faced, implying adjustment to technology and in size to keep cost low and to be able to compete with the others. In that scope, there are short run economies and long run economies. Before getting the details of these two concepts, economies of size should be defined.

There are economies of size when the percent change in cost is less than the percent change in output, following an increase in the total size of the farm measured in terms of output. Thus economies of size exist when increases in farm size result in a reduction in total cost per unit of output. It can be expressed as follows:

$$\frac{\text{Percent change in costs}}{\text{Percent change in output}} < 1$$

There are diseconomies of size when the percent change in cost is greater than the percent change in output, following an increase in the total size of the farm measured in terms of output. The diseconomies of size are materialized by an increase in total cost per unit of output resulting from increases in the total size of the farm measured in terms of output. It can be expressed as:

$$\frac{\text{Percent change in costs}}{\text{Percent change in output}} > 1.$$

Short run economies result from a fuller utilization of the fixed assets such as the machinery while long run economies are more a result of an improvement in the efficiency of the farm associated with a change in farm size.

Even though the objective for profit maximization is to produce where marginal cost equates marginal revenue, obtaining the lowest average total cost remains important since, in the long run, the price should exceed the average total cost in order to make profit.

Figure 1 presents an illustration of short run and long run average curves and their relation to the size of the farm measured in gross sales.

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[1] At least for the first part of the study on the determination of farm success factors, it is assumed that the farmers' objective is to maximize profit.

In the short run, the average total cost (ATC) per unit decreases as the resources are fully utilized and the fixed costs are divided over the increased units of output. But this reduction in average total costs may be slowed and even overturned, as larger amounts of variable resources are needed to sustain the increase in output. This explains the U shape of the short run average cost (SAC). There is a SAC for each output level.

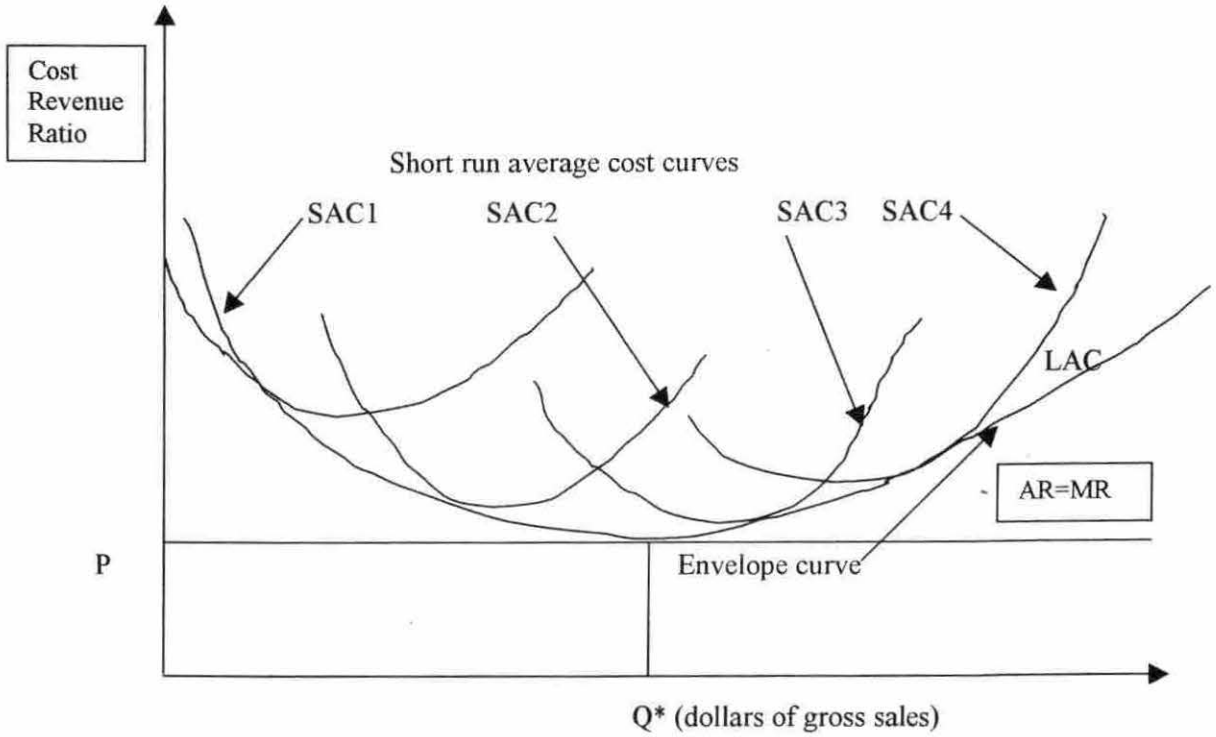

Figure 1: An illustration of short run and long run average cost curves
Source: Adapted from Madden and Partenheimer (1972).

In the long run, the average total cost curve, also called the envelope curve, connects the minimum average total cost for each output level and is thus tangent to the series of SAC estimated. The long run average total cost curve (LAC) is in fact a path of economies of sizes associated to changes in output levels (farm size) over time. The optimal farm size is at point Q* that corresponds to the point where marginal revenue equals average revenue equals LAC. Eventually, after some optimal farm size (Q*) has been reached, there will be one or more limiting factors and the LAC might show an increase in the ATC and a rise in the curve indicating the existence of diseconomies of size.

The LAC implies that there is an increase in operations' efficiency as the resources are fully utilized until there is no capacity left. Then, for any size greater than that optimal size, there are more

costs and therefore, increasing the farm size is no longer an imperative. But as Castle, Becker and Nelson (1987) pointed out an increase in farm size is not always justified by economies of size. Other reasons/factors such as to ensure an adequate net farm income for the family and exercise management ability play non negligible roles.

They distinguish three types of economies of size: technical, price and managerial. The first one is closely related to the better use of fixed inputs such as machinery and equipment as size increases. The price economies of scale refers to the economies realized when inputs are purchased at lower prices due to various discounts, or when getting a premium at selling products due to large amounts sold at once. The managerial economies of size are associated with the ability and the time available to the operator to perform a variety of tasks. Castle, Becker and Nelson (1987) note that labor supervision shows diseconomies of size while other management activities may display economies of size and they conclude that the diseconomies of labor supervision are offset by the economies of size associated to other management activities.

This theoretical framework only explains why large farms are likely to be more efficient than small farms but does not answer completely the question: why are there still many small farms that are financially successful?

Before discussing this question, it should be noted that in addition to decreasing and increasing costs presented earlier, there are constant costs:

$$\frac{\text{Percent change in costs}}{\text{Percent change in output}} = 1$$

The three types of cost-size relationship -decreasing, constant and increasing costs- are depicted by Figure 2. AB represents the decreasing cost phase, BC the constant cost phase and CD the increasing cost phase. There are a variety of possible farm sizes between B and C. So the farm at C will have more total net income than the farm at B. The difference here is that the net income per unit of output is unchanged as opposed to the situation between A and B where farms gain more net income because the net income per unit increases. So a small farm at B and a relatively larger farm at C are cost efficient. They may or may not maximize profit but they are viable farms. Depending on MC and MR, some farmers may increase the farm size above point C until they get MC=MR; they have higher ATC but they maximize profit. This is one of the possible explanations of the coexistence of various farm sizes.

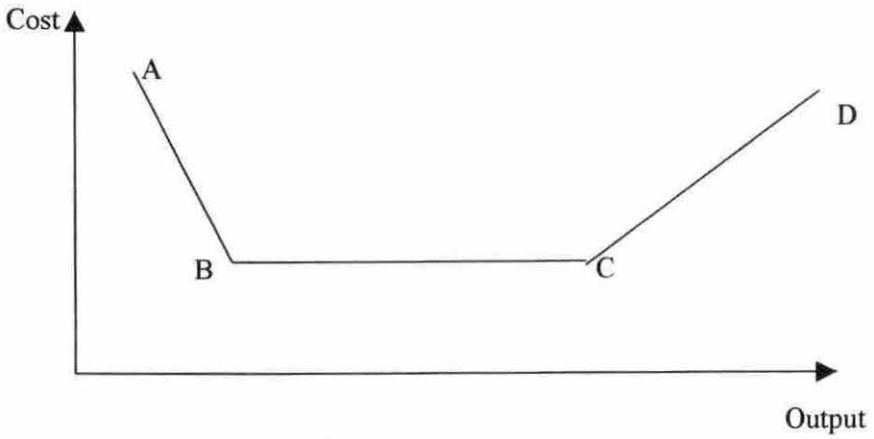

Figure 2: Cost per unit of output
Source: Castle, Becker and Nelson (1987)

The explanations to the persistence of small farms given by Madden and Partenheimer (1972) are the following:

- The theory of fixed assets; some farmers who have ATC exceeding average revenue (AR) may consider that the opportunity cost of their labor is almost zero and thus as long as the revenue covers the variable costs they may continue to farm,
- The non divisibility of some resources can be overcome by hiring services on custom or other rental arrangement,
- Depending on the context, risk aversion may prevent some farmers from producing at the profit maximization level but rather below that level,
- Some financial factors may offset technical economies of size and discourage small farmers from increasing the size of the farms; i.e. some external costs can be internalized in the event of a farm size increase,
- The concept of the farm as a goods-and-services firm; farmers produce goods but also services such as custom work and off-farm jobs. The income from these side activities may help reduce the ATC to a desirable level.

For Castle, Becker and Nelson (1987), there is no guarantee that a small farm, by increasing its size, will improve the net income. There may even exist reasons why some farmers don't want to increase their farm size. So for them, the persistence of small farms is due to:

- Risk aversion,
- Family farm life cycle; due to retirement, some farmers may reduce the farm size, or the farm is still at the beginning of the cycle and is expected to grow later,
- Opportunity cost of farmers' labor and especially that of part time farmers,

- Existence of many motivations other than profit maximizing motivations.

To conclude this section, it can be said that under certain conditions, small farms can be as efficient and profitable as large farms, and increasing the farm size does not guarantee the improvement of the net income. In addition, empirical studies reported in the literature tend to indicate that farmers enjoy other benefits of farming besides profits; namely, their autonomy, living on the farm with their family (Gasson and Errington, 1993).

According to Ogden (1946), if success is measured in terms of material possessions, then farming is a poor way of making a living. If farming is only a way of making a living, then financial success based on profit maximization might be the appropriate criteria. But if farming is instead a way of life, the success criteria might not fit in the profit maximization framework but rather in the utility maximization schedule. As such for a farmer who considers farming as a way of life as well as a way of making a living, financial success constitutes only one aspect of success. So there is a need to carefully define farm success since it depends on each individual's goals and values but also because of its multiple dimensions.

2. Profitability and success; profit maximization versus utility maximization

The farm very often has two dimensions interconnected: the firm whose main objective is to maximize profits and the household, that provides the farm with labor, capital and whose objective is to maximize utility. Since the farm family lives in most cases on the farm, it is generally difficult to separate the firm from the household and it is clear that maximizing profit is only one of a series of objectives that might be conflicting with the primary profit objective. So making profit becomes just an argument of the utility function. Other arguments in the utility function of the farm family can be the job satisfaction and family satisfaction (Ajwa, 1991) or arguments such as "power, control, prestige and desire for a quiet life"(Gasson et al., 1988). In addition to these, the list of arguments can include community recognition (social satisfaction).

The concept of job satisfaction includes elements such as the independence/autonomy (being one's own boss), working with nature, open-air lifestyle, enjoyable work. The concept of family satisfaction involves living on the farm/raising the children on the farm, spending time with family. Social satisfaction is considered as the recognition by other members of the community; particularly the farmer being perceived by the other members of the community as "a good neighbor", as "a conservationist". That means that the norms and values existing in the community affect farmers' behavior. The farmer who values highly the recognition by the rest of the community might give up some profitable project and select less profitable ones in order to gain that recognition.

The cultural norms, the values of the farmers, will affect their perception of success through the achievement of their goals. Farmers who maximize utility will feel successful even though they do not maximize profits but just earn a decent income. Gasson and Errington (1993) invokes the principle of "bounded rationality" which allows individuals to satisfy simultaneously a series of conflicting goals according to their values rather than profit maximization. Individuals who maximize their utility by "satisficing" rather than optimizing are likely to feel successful even though they do not maximize profits.

a) Representation of the utility function

The farmers' utility U is a function of income (I), job satisfaction (Js), family satisfaction (Fs), community recognition (social satisfaction)(Ss) and other personal characteristics (Z); U = U (I, Js, Fs, Ss, Z). These characteristics of farmers will basically help shape their preferences.

The hypothesized signs of the effects of each argument on the utility level are the following:

$\partial U(I, Js, Fs, Ss, C)/\partial I \geq 0$,

$\partial U(I, Js, Fs, Ss, C)/\partial Js \geq 0$,

$\partial U(I, Js, Fs, Ss, C)/\partial Fs \geq 0$,

$\partial U(I, Js, Fs, Ss, C)/\partial Ss \geq 0$,

$\partial U(I, Js, Fs, Ss, C)/\partial Z > = < 0$.

b) Link between utility maximization and perceived success

It is assumed that for each farmer, there is a threshold utility level (Uo) above which farmers perceive themselves as successful. So farmer i, who reaches maximum utility (Uim), is more likely to perceive themselves as successful compared to being at utility level $Ui_1 < Uim$. The approach adopted to build the connection between utility maximization and farmers' success, to associate to each utility level a probability to feel successful or not successful, is the use of a logistic model. The description of the logistic model presented in the following paragraphs is an adaptation of the presentation of logistic regression by Neter et al. (1996).

Let's consider the model: $Yi = \boldsymbol{\beta}' \mathbf{X} + \varepsilon i$,

Where:

- Yi is the response function and the outcome Yi (success) takes the values of either 0 (not successful) or 1 (successful),
- X' is the vector of explanatory variables,
- β is the vector of parameters.

Assuming that $E(\varepsilon i) = 0$, $E(Yi)$ can be rewritten as : $E(Yi) = \boldsymbol{\beta'X}$.

Let Yi be a Bernouilli random variable whose probability distribution is:

$P(Yi=1) = \pi i$, $P(Yi=0) = 1 - \pi i$, meaning that the probability of being successful is πi, the probability of not being successful is $1- \pi i$.

$E(Yi) = \pi i\ (1) + (1-\pi i)\ (0) = \pi i$ and $E(Yi) = \boldsymbol{\beta'X} \rightarrow \pi i = \boldsymbol{\beta'X}$ meaning that the mean response function $E(Yi) = \boldsymbol{\beta'X}$ is the probability $Yi = 1$ for a given set of explanatory variables X'.

In addition, $0 \leq E(Yi) = \pi i \leq 1$ (probability range from 0 to 1).

The functional form for a logistic response function is as follows:

$$E(Yi) = \exp(\boldsymbol{\beta'X}) / [1 + \exp(\boldsymbol{\beta'X})] = [1 + \exp(-\boldsymbol{\beta'X})]^{-1} \quad (1)$$

Under this form, it is not easy to interpret the meaning of parameter estimates b'. Through a logit transformation of the probability πi: $\pi i' = \log_e(\pi i/1- \pi i)$, with the ratio $\pi i/1- \pi i$ being the odds, equation (1) is linearized and becomes: $\pi' = \boldsymbol{\beta'X}$, a logit response function where: π' is the logit mean response ranging from $-\infty$ to $+\infty$.

Some details on the estimation of this multiple logistic regression model are presented in the methodology and results sections.

From the literature review and in accordance with the objectives of the study as well as the theoretical background, a series of research questions have been developed.

C. Research Questions

To achieve each objective, a series of research questions have been elaborated to set up a framework for the analyses. The research questions were developed based on the literature review and what theory postulates. They are the following:

Objective 1: to characterize and profile the small profitable farms.

1) Are small successful farmers younger than the average farmer?
2) Do small successful farmers have high education level on average?
3) Do small successful farmers hire most of the major production factors (such as land)?
4) Do small successful farmers have above average rent expenses[2]?

[2] Rent expenses include not only the rent expenses on land but also the rent expenses on machinery and equipment, and others.

Objective 2: to identify the similarities and differences between small and large profitable farms.

5) Do small and large successful farmers have similar socioeconomic characteristics (i.e. age, education, farming experience, land tenure, farm types)?
6) Do small and large successful farmers share similar management practices?
7) Are small successful farmers as productive as large successful farmers?
8) Are small successful farmers less cost efficient than large successful farmers?
9) Are small successful farmers less efficient than large successful farmers in machinery use?
10) Are small successful farmers less efficient than large successful farmers in labor use?
11) Are small successful farmers as financially efficient as large successful farmers?
12) Are small successful farmers less profitable than large successful farmers?

Objective 3: to identify the similarities and differences between small profitable and non-profitable farms.

13) Do small successful and unsuccessful farmers have different socioeconomic characteristics (i.e. age, education, farming experience, land tenure, farm types)?
14) Do small successful and unsuccessful farmers have different management practices?
15) Are small successful farmers more productive than small unsuccessful farmers?
16) Are small successful farmers more cost efficient than small unsuccessful farmers?
17) Are small successful farmers more efficient than small unsuccessful farmers in machinery use?
18) Are small successful farmers more efficient than small unsuccessful farmers in labor use?
19) Are small successful farmers financially more efficient than small unsuccessful farmers

Objective 4: to verify the effects of major factors, identified through the comparisons of small profitable farms to other farms groups, on farm financial success and their significance, on one hand. On the other hand, to determine the farmers' subjective factors for farm success.

20) Are the rankings by large successful, small successful and unsuccessful farmers of the activities/factors explaining farm success similar?

Objective 5: to identify and characterize the relationship between farms' profitability and non-pecuniary motivations reflected through farm goals and farmers' perception of success.

21) Do small and large successful farmers have similar levels of success score?
22) Do small successful farmers have higher success score than small unsuccessful farmers?
23) Is the farm objective of making money more important to farmers than any non-monetary objective?

III. METHODOLOGY

A. Description of the Data Source

The data used consists of two data sets: a financial data set and a socioeconomic and demographic data set. The financial data on individual farms comes from the Iowa Farm Business Association (FBA). These data are the standard income statement and balance sheet information from the farms in the FBA. The farms were divided into small and large farms based on the USDA's definition; farms with sales less than $250,000 were classified as small farms. The farms are further divided according to a profit index (high or low third). The profit index (PI) is defined by the following ratio: PI ≡ Gross Profit/ Gross Profit – Management return.

The FBA computation of the Gross Profit is: total value of crop as harvested, livestock increase over feed and purchase costs, other income (such as dividends, machine hire, government payment, crop insurance, etc), gain or loss from sales or consumptive charges.

The Management Return is calculated as the net farm income plus interest paid minus a percentage interest charge for investment in feeds, supplies, livestock and machinery minus a percentage interest charge for investment in land and improvements minus value for the operator and unpaid family labor. The Profit index reflects the efficiency of input use independent of the size of the farm or method of financing. The profit index (PI) is used in the definition of the high and low profit groups.

The farms were segregated based on whether or not they were primarily low or high profit. Farms were classified in the high or low profit group according to whether they were in the upper or lower third of the profit index (PI) at least five of the six years for the period from 1991 to 1996. There were 138 farms out of 1500 farms in the FBA who met this criterion. Table 1 gives the details of the repartition of the farms among the main subgroups (small versus large farm, high versus low profit).

Table 1: Repartition of the farms based on farm size and profit level

Size of the farm (in terms of sales value)	Set of 138 farms (1991 to 1996)		
	Low Profit	High profit	Total
Small farm	53	44	97
Large farm	18	23	41
Total	71	67	138

The second data set, the socioeconomic and demographic data set, comes from a telephone survey. The survey included only those meeting the profitability criterion.

The 138 farms were surveyed using a phone survey conducted by the Iowa Agricultural Statistics Service. Of the 138 farms, 73 farmers participated in the final sample of the survey of socioeconomic and demographic data.

The sample size was reduced from 138 farms to 73 farms for the reasons shown in table 2.

Table 2: Reasons of the reduction of the sample from 138 farms to 73 farms

Reasons	Frequencies (percentage of original sample of 38 farms)	
Names not available	20	(14%)
Had left the FBA	8	(6%)
Could not be contacted	12	(9%)
Were out of business	8	(6%)
Refused to answer the phone survey	17	(12%)

The data collected contain demographic and family information, overall management information (cost control, financial, marketing) and information on farms' goals and objectives. The financial data and socioeconomic data were merged for the final sample of 73 farms.

Table 3 presents the repartition of the final sample under the four categories defined by a combination of farm size and profitability level. The farms have been regrouped under four categories:

- Profitable large farms (L/HP),
- Unprofitable large farms (L/LP),
- Profitable small farms (S/HP),
- Unprofitable small farms (S/LP).

Because of the small sample size in category L/LP (only six farms), this category will not be used in the analyses. The profitable and small farms (S/HP) are the main focus of the analyses.

Table 3: Repartition of the sample in the four groups

Farm category	Observations	Percentage of the whole sample
L/HP (large farm and high profit)	14	17%
L/LP (large farm and low profit)	6	13%
S/HP (small farm and high profit)	28	32%
S/LP (small farm and low profit)	25	38%
Total	73	100%

A comparison of the sample of seventy three farmers with the farmers of the State of Iowa using the results of the 1997 Agricultural census, show that the average age for the sample of farmers is similar to that of All Iowa farmers (Table 4). Farmers interviewed have larger acres of land on average compared to Iowa farmers as a whole. In the sample, the proportion of farmers whose principal occupation is farming is greater than that of Iowa farmers. A greater percentage of family corporations are found in the sample than among Iowa farmers. The farm expenses and farm net income are lower for Iowa farmers compared to sample's farmers.

When the sample of farmers interviewed is compared to Iowa farmers of the corresponding categories (large, small farmers), there seems to be more similarities between small farmers of the sample and the Iowa small farmers. Large farmers from the sample are older than Iowa large farmers and they have lower net farm income than their Iowa counterpart. In addition, the proportion of farm corporations (both family and non family) is greater among the sample's large farmers compared to Iowa large farmers.

The disparity observed between the sample and the whole group of Iowa farms could be explained by the fact that the farmers of the sample are FBA members. FBA members are farmers whose farm size (measured in sales) is $40,000 or more while among all Iowa farmers counted during the 1997 agricultural census, 15% of them have less than $2,500 sales, 26% less than $10,000. Most of the FBA farmers have farming as their main occupation as seen in tables 4 and 5 while 32% of Iowa farmers work off farm more than 200 days per year.

Table 4: Comparison between sample of farmers and Iowa farmers

	Sample	All Iowa Farms
Age	53.48	52.44
Acres	615.58	343
Sales	$212,404.72	$131596
Principal Occupation		
farming	93.2%	61.96%
Business Arrangement		
Sole proprietor ship	69.4%	83.58%
Family corporation	20.8%	6.31%
Other type corporation	4.2%	1.11%
Partnership	5.6%	9%
Farm expenses	$130,579.89	$92,590
Farm net income (Net cash return from sales and government payments for farm unit)	$49,890.61	$38,462

Source: 1997 census of agriculture, USDA.

Table 5: Comparison between large and small farmers of the sample with large and small Iowa farmers

	Sample		Iowa Farms		
	Large farms (≥$250,000)	Small Farms (<$250,000)	$250,000-$499,999	$100,000-$249,999	$50,000-$99,999
Age	54.10	53.24	48.5	49.8	52.8
Acres	746	565	824	495	292
Sales	$372,934.65	$151,823.39	$329,233	$154,305	$67,942
Principal Occupation					
Farming	95.2%	92.5%	94.53	88.13	71.28%
Business Arrangement					
Sole proprietor ship	35%	82.7%	72.85	83.04	85.22%
Family corporation	45%	11.5%	17.02	7.84	4.42%
Other type corporation	10%	1.9%	<1%	<1%	<1%
Partnership	10%	3.8%	9.49	8.48	9.68%
Farm expenses	$198,883.16	$104,805.07	$213,744	$107,923	$51,144
Farm net income (Net cash return from sales and government payments for farm unit)	$76,700.93	$39,773.50	$121,668	$52,398	$21,246

Source: 1997 census of agriculture, USDA.

B. Main Variables

Several categories of variables are evaluated:

- Socioeconomic characteristics from the survey include farmers' age, education level, experience (indirectly measured by the variables such as "raised on the farm", "years of farming"), farm type, business arrangement, owned versus rented acres, farming objectives, management procedures (cost control, sources of information, financial management practices), success and factors of success and spouse's age and education level.
- Financial variables obtained using Farm Business Association (FBA) data include; production efficiency (yields), machinery use efficiency (i.e. dollars of machinery per crop acre, dollars of machinery per dollar of gross sales), labor use efficiency (i.e. dollars of labor per crop acre, dollars of labor per dollar of gross sales, percentage of hired labor to total labor), debt structure (percentage of short term liability, intermediate liability and long term liability), expense structures (percentage of fixed expenses to total expenses), financial performance measure such as liquidity measures (working capital), solvency measure (debt to asset ratio), profitability measures (return on assets (ROA), return on equity (ROE), management return, operating profit margin ratio, net farm

income, profit index), financial efficiency ratios (assets turnover, operating expense, depreciation expense, interest expense, and net income ratios).

C. Computation of Financial Performance Ratios/ measures

In order to compare the farmers' production efficiency, financial profitability and financial efficiency, some new variables (ratios and other performance measures) have been computed. These are defined as:

Working capital = Short term asset - short term liability

Solvency ratio = ratio of debt to asset (Farm liability/Farm asset).

Return on assets (ROA) = (Net farm income + interest – unpaid labor)/ total farm assets

Return on equity (ROE) = (Net farm income – unpaid labor)/ networth

Operating profit margin ratio = (Net farm income + interest – unpaid labor)/ gross profit

Asset turnover ratio = gross profit /total farm assets

Operating expense ratio = operating expenses/ gross profit

Depreciation expense ratio = Depreciation expense/gross profit

Interest expense ratio = interest expense/gross profit

Net farm income ratio = net farm income/gross profit

D. Recoded Variables

There are some original variables that are recoded for analysis convenience. They are, farm objective variables and success variable that will be discussed in greater details in the results' section. Following are some preliminary discussions of farm objective variables, success variable and the perceived success index (PSI), a new variable created by recoding the success variable.

From the ranking of a list of sixteen objectives by the farmers (from 1 "Not important" to 5 "Very important") were derived original objective variables. Then five new farm objectives, instrumental objective, intrinsic objective, family objective, social objective and intergenerational transfer objective have been created to represent the five farm objectives' categories resulting from an adapted classification system suggested by Gasson and Errington (1993). The score attributed to each new farm objective corresponds to the average of the scores of the objectives listed under each category. More details are presented in the results' section.

Original success variable was constructed on the basis of success scores (from 1 "Not successful" to 7 "Very successful") chosen by farmers and representing their own perception of their farm success. For analysis convenience, a new success index, perceived success index (PSI), was created by recoding the original categorical variable "success". PSI is a subjective measure of success. For success scores above the sample mean score 5.39, they were recoded as one (1), meaning "successful" and the scores below the mean were recoded as zero (0), meaning "not successful".

Therefore:

- if success score is equal to 1 through 5, then PSI is 0, for not successful,
- if success score is equal to 6 or 7, then PSI is 1, for successful.

E. Methods of Analysis

A variety of methods have been used for the analysis. They range from descriptive statistics to T-tests and Mann-Whitney-Wilcoxon tests for pair wise comparisons, to Kruskal-Wallis test for comparisons of more than two groups and to relatively more elaborated models such as multiple regression models and logistic models.

The main descriptive statistics, means, medians, frequencies, and percentages were used for the analyses needed to achieve the five sub objectives. Parametric t-tests were used for pair wise comparisons for the analyses relative to sub objectives 1 to 5 in order to identify significant differences, if any. Non-parametric tests, Mann-Whitney-Wilcoxon and Kruskal-Wallis tests were used for pair wise comparisons and multiple comparison respectively, mainly for sub-objective 5 (identify and characterize the relationship between profitability of farms, farm goals and farm success). They were used to compare the success score of the different farmers' groups and establish the relationship between profit and success.

A multiple regression model for farm financial success prediction was estimated. Only the most significant factors identified by the pair wise comparisons of S/HP farmers to L/HP and S/LP farmers were included in the regression.

The multiple regression model, linear in the parameters is defined as follows:

$Yi = \mathbf{X'\beta} + \varepsilon i$

Where,

Yi, the vector of responses, is the profit index (PI) defined as:

PI ≡ Gross Profit/ Gross Profit – Management return

X' is the vector of explanatory variables and constant,

β is the vector of parameters

εi the error term. It is assumed that errors are normally distributed.

A logistic model with the perceived success index (PSI) as dependent variable was estimated. The purpose of the logistic model was to estimate the contribution of profit and each of the four new objectives (instrumental objective, intrinsic objective, social objective, and family objective described in the previous section) on the perceived success as well as the significance of those contributions. Other variables included are the farm size and the age and education level of the farmer.

The level of significance selected for the entire analysis is 5 percent. Generally, the p-values of tests are given so that each reader can appreciate the significance of the tests.

IV. RESULTS AND DISCUSSION

A. Characterization of Small Successful Farms (S/HP)

Sub-objective 1 of the study is to characterize and profile the small successful farms (S/HP). Descriptive statistics such as means and percentages have been used. First, a general characterization of the small successful farm owners (S/HP) using socioeconomic and demographic information was carried out. This was followed by a farm business analysis including analysis of productivity and production efficiency, solvency, liquidity, profitability and financial efficiency.

1. General characterization of small successful farms

a) Personal information

S/HP farmers are relatively young; 46 years old on average (median = 45 years old). They have higher than average education; 32 percent have a college degree, 29 percent some college education and 29 percent have high school/GED education. Their spouses average 45 years old with some college education (26 percent) or a college degree (48 percent). Daughters generally don't work on the farm (less than 15 percent) while more sons (42 percent) work on the farms. The majority of S/HP farmers (93 percent) were raised on the farm versus 70 percent of the spouses. The majority of S/HP farmers (96 percent), said farming is their principal occupation. Slightly more than one fourth (27 percent) of S/HP farmers reported some work off farm, while 63 percent of their spouses work off farm.

b) General farm information

On average, S/HP farmers have been farming for 22 years and have been on the current farm for 20 years. The S/HP farms are mostly pork farms (39 percent) followed by cash grain and livestock (32 percent) and cash grain farms (25 percent).

The majority of S/HP farmers (89 percent) rented land. Of the total acres, 83 percent of row crop were rented. The most common rental arrangements are the cash rent followed by crop share; 82 percent of all S/HP farmers cash rented part or all rented acres. Those who rented land had from 12 to 100 percent rented acres. Almost two third (68 percent) of all S/HP farmers used crop share rental arrangement (35 to 100 percent of rented acres).

The main business arrangement is sole proprietorship (79 percent) and 18 percent of farms are family corporations. Approximately two third of S/HP farmers (64 percent) indicated how they acquired their farm. The majority of farms were acquired through purchase from a relative or non-relative or a combination of both options (33 percent, 28 percent and 17 percent of those who answered, respectively).

Almost half of S/HP farmers (43 percent) work on other farms owned by relatives (77 percent) at varying levels of involvement ranging from slightly (33 percent) to very involved (50 percent). On the other hand, only 14 percent of S/HP farmers indicated that other families, all of them relatives, were involved in the management of their farm.

c) Management and financial procedures

The majority of S/HP farmers (71 percent) reported they do not use production contracts. The farmers were asked to rank the level of use of some management and financial practices on a 5 points scale from 1 "not used" or "never used" to 5 "very used" or 5 "considerable use".

i) Cost control. S/HP farmers ranked seven cost control measures (table 6).

Table 6: Ranking of cost control measures by S/HP farmers

Cost control measures	Mean scores for S/HP farmers
Use of soil tests	$4.68^{1(a)}$ (1)
Keeping debt low	4.29^{1} (2)
Use of forward purchasing	4.18^{2} (3.5)
Minimization of hired labor use	4.18^{2} (3.5)
Use of integrated crop management	3.75^{2} (4)
Use of integrated pest management	3.57^{3} (5)
Membership in a buying group	1.96^{4} (6)

Note: (a) mean scores followed by the same number (in superscript) are not significantly different. The ranking of each objective is in parenthesis.

S/HP farmers listed soil testing as the most commonly used measure followed by keeping debt low but there is no significant statistical difference between these two cost control means.

ii) Sources of information. S/HP farmers were asked to rank sources of information used (table 7). Farm magazines and radio were the most used sources of information by S/HP farmers ahead of extension sources. This indicates the importance for the extension services to use farm magazines and radio programs to reach out to these farmers.

iii) Financial practices. The majority of S/HP farmers used borrowed capital; 71 percent borrowed operating capital and 79 percent borrowed long-term capital. The ranking of the importance of financial management practices by S/HP farmers is summarized in table 8.

iv) Overall management. The ranking of the main sources of information used by S/HP farmers when they evaluate new production technology are presented in table 9.

Table 7: Ranking of sources of information by S/HP farmers

Sources of information	Mean scores for S/HP farmers
Farm magazines	$3.64^{1(a)}$ (1)
Radio	3.43^{1} (2)
Trade journal	3.36^{2} (3)
Extension	3.14^{2} (4)
Data Transmission Network (DTN)	2.86^{2} (5)
Newspapers	2.82^{2} (6.5)
Neighbors	2.82^{2} (6.5)
Commodity organizations	2.43^{3} (8)
Television	2.08^{4} (9)

Note: (a) mean scores followed by the same number (in superscript) are not significantly different. The ranking of each objective is in parenthesis.

Table 8: Ranking of financial management practices by S/HP farmers

Financial management practices	Mean scores for S/HP farmers
Calculating per unit cost of production	$4.54^{1(a)}$ (1)
Annual financial statements	4.29^{1} (2)
Cash flow projections	4.07^{1} (3)
Use of a computer	4.04^{1} (4)
Evaluation of new alternative production strategies	3.64^{2} (5)
Accrual accounting	3.36^{2} (6)

Note: (a) mean scores followed by the same number (in superscript) are not significantly different. The ranking of each objective is in parenthesis.

Table 9: S/HP farmers' ranking of main sources of information used when evaluating new production technology

Main sources of information used when evaluating new production technology	Mean scores for S/HP farmers
University research	$3.50^{1(a)}$ (1)
Neighbors	3.32^{1} (2.5)
Other farmers	3.32^{1} (2.5)
Company representatives	3.18^{1} (4)
Magazine/journal articles	3.14^{1} (5)

Note: (a) mean scores followed by the same number (in superscript) are not significantly different. The ranking of each objective is in parenthesis.

It is interesting to note that neighbors or other farmers are almost as used as university research for the evaluation of new production technology. This indicates the importance of relationship between neighbors in the rural community.

2. Farm business analysis of small successful farms (S/HP)

a) Production, machinery and labor efficiencies

On average, 18 percent of the revenues for S/HP farmers come from livestock sales. Only 21 percent of S/HP farmers have some acres under hay or permanent pasture (11.2 acres on average). Average corn and soybean yields for S/HP farms over the 19911-1996 period were 135.76 and 48.10 bushels per acre, respectively. This compares to the statewide average yields for 1991-1996 period of 126.17 and 42.33 bushels per acre for corn and soybean, respectively.

On average, the cost of corn production is $333.45 per acre ($2.47 per bushel) and the cost of soybean production is $381.80 per acre ($6.03 per bushel). In hog production, the average feed cost per hundred weight (cwt) production is $26.20. The feed return per dollars of feed fed is $1.16. The average production cost per hundred weight (cwt) production is $12.31. The ratio of total cost to gross profit is 0.55 for S/HP farmers.

The average labor cost per acre of soybean is $53.14 and $55.27 per acre of corn. This labor cost includes family and hired labor. The ratio of hired labor to total labor is 0.08 and it indicates that S/HP farmers rely more on family labor.

S/HP farmers spent $110.17 for machinery per crop acre. The average machinery cost per acre of corn is $33.90 and $33.79 for soybean. S/HP farmers spent $0.38 for machinery per dollar of gross sales and $0.12 of labor per dollar of gross sales. The data available did not allow drawing the distinction between owned and hired machinery and equipment. Nevertheless, there are indications that among S/HP farmers, machinery and equipment lease may be common. For example, the ratio of depreciation expenses to total expenses and the depreciation expense ratio (ratio of depreciation expense to gross profit) are low (0.098 and 0.059, respectively). The depreciation expense ratio of S/HP farms is lower than that of all Iowa farms (0.09), Iowa high profit farms (0.07) or small Iowa farms (0.085).

b) Owned versus rented acres of land

S/HP farmers rent a high proportion of acres for row crop production. Most of S/HP farmers (89 percent) rent from 26 percent to 100 percent of the crop acres they use with an average of 83 percent of crop acres rented.

c) Debt structure

The short-term liabilities constitute 39 percent of farm liabilities, intermediate liabilities and long-term liabilities are 33 percent and 28 percent respectively.

d) Expense structure

Different expense ratios are presented in table 10. The ratio of fixed expenses to total expenses for S/HP farmers is 28 percent versus 62 percent for the ratio of operating expenses to total expenses.

Table 10: Summary of the expense structure of S/HP farmers

Type of expense	Average Percentage
Ratio of fixed expenses to total expenses	32
Ratio of operating expenses to total expenses	68
Ratio of depreciation to total expenses	11
Ratio of interest expenses to total expenses	6.34
Ratio of taxes to total expenses	1.43
Ratio of rent expenses to total expenses	18
Ratio of insurance expenses to total expenses	4.03

Source: FBA farm management data set, 1991-1996.

e) Financial performance measures

The values presented in the analysis are averages for the period 1991-1996.

i) Liquidity measures. The working capital for S/HP farms ranges from a minimum of $26,380 to a maximum of $327,111 with average value of $119,878.

ii) Solvency measures. The debt to asset ratio for S/HP farmers is 0.19. This relatively small value indicates that S/HP farms are financially stable. They have relatively low leverage; the ratio of debt to net worth of the farm varies from 0 to 97 percent for an average of 29.5 percent confirming the high degree of solvency of S/HP farms.

iii) Financial profitability measures. Net farm income ranges from $32,953 to $91,216 with an average of $61,971. Management returns range from $7,621to $54,628 with an average of $29,010. The average return on assets (ROA) for S/HP farms is 16.8 percent while the average return on equity (ROE) is 21 percent. The operating profit margin ratio for S/HP farmers is 51.4 percent. The average

level of non-farm income is $7,035 and the ratio of non-farm income to farm income ranges from 0 to 61 percent with an average value of 11.65 percent.

iv) Financial efficiency measures. S/HP farms have a high asset turnover ratio, 0.55. This may be due to the fact that most S/HP farmers rent a large percentage of the land they use. The net farm income to gross farm revenue ratio is 39 percent while the operating expense to gross farm revenue ratio is 37 percent, the depreciation expense to gross farm revenue ratio 6 percent and the interest expense to gross farm revenue ratio 3.5 percent for S/HP.

3. Conclusion

S/HP farmers are relatively young with high education level. They have been farming for more than two decades on average. The dominant business arrangement is sole proprietorship. They have high corn and soybean yields, above Iowa State average yields. They rent a high proportion of the land they farm and 36% of them are full tenants. They have a low financial leverage and keeping the debt low is second most important cost control measure they use. Family is the main labor source. Overall, S/HP farmers have above average are financially efficient. There are indications that among S/HP farmers, machinery and equipment lease may be common. Most of the characteristics of small successful farmers in this study confirm the findings of studies on factors of farm success. Nevertheless, it appears that successful farmers in the seventies had high financial leverage while the S/HP farmers kept the debt low and had a low financial leverage.

B. Comparison of Small Profitable Farms (S/HP) and Large Profitable Farms (L/HP)

The sub-objective here, sub-objective 2, is to identify the similarities and differences between small profitable farms (S/HP) and large profitable farms (L/HP). The purpose of the comparison between L/HP and S/HP farmers is to identify the effect of the farm size on the financial success respectively. To achieve this sub-objective, a series of eight research questions have been developed to provide a guideline (see page 16 for more details about these research questions).

Descriptive statistics such as means, percentage as well as parametric t-tests were used for the comparisons. The significance level selected is 5 percent. The p-values of tests are given so that each reader can appreciate the significance of the tests.

1. General comparison

a) Personal information

Table 11 summarizes the comparison of personal information for S/HP and L/HP farmers and the results of t-tests. L/HP and S/HP farmers and their spouse are relatively similar in age. There is no significant difference in farmers' and spouses' education level. Over 60 percent of sons and 25 percent of daughters of L/HP farmers work on the farm compared with less than 45 percent of sons and 15 percent of daughters of S/HP farmers. Like S/HP farmers, most of L/HP farmers and their spouses were raised on the farm and farming is the principal occupation. More S/HP farmers work off farm than L/HP farmers (table 11).

This result is not different from results in the literature, which show that small farmers are more likely to face difficulties in gathering the capital that is needed for their farm business compared to large farmers. Off farm employment was therefore an alternative chosen by some small farmers to alleviate the problem of scarcity of resources and to enhance the profitability of their farm.

b) General farm information

Almost two thirds (64 percent) of L/HP farms are pork farms. This compares to 39 percent of S/HP farms that are pork farms (table 12). More L/HP farms are family corporations while more S/HP farms are sole proprietorship. This result is not a surprise since large profitable farms are more likely to be corporations than sole proprietorship due to their size.

The family corporation provides business continuity, easy ownership transfer and limited liability. In addition to the size of the farm, the family corporation business arrangement might explain the higher involvement of children on the L/HP farms. A large farm size is a motivation for children to continue farming on the family farm and the advantages offered by the family corporations are also incentives to stay in the family business.

L/HP farmers have been farming for significantly more years than S/HP farmers but the years they spent on their current farms are not different. L/HP farmers rent a significantly lower proportion (61 percent) of row crop acres than the S/HP farmers (83 percent) (table 12). The most common rental arrangements for L/HP and S/HP farmers are cash rental arrangement followed by the crop share. All L/HP farmers use cash rental for 8 percent to 100 percent of their rented acres as compared to 82 percent of S/HP farmers that use cash rental for 12 percent to 100 percent of their rented acres. Half of the L/HP farmers have from 20 percent to 92 percent of their rented acres under crop share and 68 percent of S/HP farmers used crop share for 35 percent to 100 percent of their rented acres.

Table 11: Personal information on L/HP and S/HP farmers

	L/HP	S/HP	Comparison of L/HP and S/HP (T-values, p-values)
Age	51	46	T=-1.845, p-value=0.072
Education levels	43% have a college degree, 21% have some college education, 21% have high school/GED degree, 15% graduated from technical schools	32% have a college degree, 29% have some college education, 29% have high school/GED degree and 10% are technical school graduates	T=-0.497, p-value=0.622
Children's work on the farm	Less than 50% of daughters work on farm while 63% to 77% of sons work on farm	Less than 15% of daughters work on farm while 42% of sons or less work on farm	T=-2.214, p-value=0.035* For first sons T=-2.040, p-value=0.057 For first daughters, For others, non-significant differences.
Raised on the farm	100%	93%	T=-1.441, p-value=0.161
Principal occupation	93%	96%	T=0.502, p-value=0.619
Work off farm	1 (7%)	7 (27%)	T=-, p-value =-
Weeks of work off farm	50	18	T=-, p-value =-
Farming years	28	22	T=-2.201, p-value=0.034*

Note: * significant difference at 5 percent

Even though land is good collateral for loans, most of these farmers (L/HP and S/HP) chose the lease option instead of full ownership. The lease option reduces the level of capital investment. It gives the business flexibility that it would not have with ownership. One of the trade-off to the gain in flexibility of lease option is the limitation of managerial freedom. In general, crop share is more restrictive than cash rental. The latter values the managerial skills of the farmer but demands higher levels of operating capital. This could explain why more L/HP and S/HP farmers use cash rent than to crop share.

It appears that the majority of L/HP farmers acquired their farm mainly through purchase from a relative or non-relative or a combination of both options. Similarly among S/HP farmers, the majority of farms were acquired through the purchase from a relative, a non-relative or from a combination of both options.

Table 12: General farm information on L/HP and S/HP farmers

	L/HP	S/HP	Comparison of L/HP and S/HP (T-values, p-values)
Farm type	64% pork farms 7% Cash Grain and Livestock 14% Cash grain 15% other	39% pork farms 32% Cash Grain and Livestock 25% Cash grain 4% mixed	T=1.303,p-value=0.200
Business arrangement	43% family corporations 29% sole proprietorship 14% Partnership 14% corporation	18% family corporations 79% sole proprietorship 3% partnership	T=3.063, p-value=0.007*
Years on current farm	26	20	T=1.521, p-value=0.136
Rental arrangements (% of farmers using the arrangement) (Land tenure)	100% used cash rental 50% used crop share 0% used flexible rent 0% used custom farm	82% used cash rental 68% used crop share 4% used flexible rent 4% used custom farm	Comparing the areas under each rental arrangement, it appeared that they are not significantly different
Percentage of rented acres	61% of crop acres are rented	83% of crop acres are rented	T=-2.746, p-value=0.009*
Farm acquisition (N=56)	39% purchase from relative 23% purchase from non relative 15% purchase from relative and non- relative 15% combination inherit and purchase 8% other	33% purchase from relative 28% purchase from non relative 17% purchase from relative and non- relative 11% combination inherit and purchase 6% inherit 6% other	T=0.281, p-value=0.781
Work on other farms	14% worked on other farms	43% worked on other farms belonging mainly to relatives	T=-2.101, p-value=0.043*
Involvement of other people on the farm	15% of farmers mentioned the involvement of other relatives' families in the management of the farm	14% of farmers mentioned the involvement of other relatives' families in the management of the farm	T=-0.09, p-value=0.928

Note: * significant difference at 5 percent.

Approximately half the S/HP farmers who work on others' farms, mainly relatives' farms, but only a few L/HP farmers (14 percent) work on other farms. This seems to indicate a managerial interconnection between many of the S/HP farmers studied and their relatives creating an informal family corporation which doesn't have necessarily the legal status of family corporations, but that benefits from the sharing of skills and some other resources. Further investigations are needed before drawing any conclusion.

The answer to the research question; do L/HP and S/HP farmers have similar socioeconomic characteristics, associated with the sub-objective 2 - identify the similarities and differences between small profitable farms and large profitable farms is mixed. Even though there are many similarities between L/HP and S/HP farmers such as:

- L/HP and S/HP farmers are relatively of similar age and education level,
- They were for most of them raised on the farm, their main occupation is agriculture,
- The farm types are not significantly different, the land tenure and the way of acquiring the farm too,

L/HP and S/HP farmers differ in many characteristics such as; business arrangement, years of farming, work on other farms, percentage of rented acres, children's work on the farm.

c) Management and financial procedures

Table 13 summarizes the main results of the comparison between L/HP and S/HP farmers on cost control measures, sources of information and the financial management practices.

i) Cost control measures. Soil testing and keeping debt low are the most commonly used cost control measures for both L/HP and S/HP farmers (table 13). S/HP farmers use relatively more forward purchasing and the minimization of hired labor than L/HP farmers. However, these differences are not significant. Overall, there is no significant statistical difference between these two groups in terms of cost control measures.

ii) Sources of information. The top five sources of information are the same for L/HP and S/HP farmers (extension, data transmission network (DTN), farm magazines, trade journals, radio) but their rankings differ. S/HP farmers use farm magazines and radio more frequently, while L/HP farmers use more frequently extension and Data Transmission Network (DTN).

iii) Financial management practices. Borrowing practices are relatively similar for L/HP and S/HP farmers even though 71 percent of S/HP farmers borrowed operating capital compared to only 50 percent of L/HP farmers. This large percentage of S/HP farmers borrowing operating capital may be due to their high percentage of rented acres and large rent payments. Another explanation may be that L/HP farmers are more liquid due to the large size of their farms.

Table 13: Comparison of L/HP and S/HP farmers management practices

	L/HP	Percentage respondent choosing a score of 4 or 5	S/HP	Percentage respondent choosing a score of 4 or 5	Comparison of L/HP and S/HP farmers (T-value, p-value)
a) Cost control					
Use of soil test	4.71 (1)	92.9	4.69 (1)	92.9	T=0.16, p-value=0.88
Keeping debt low	4.36 (2)	78.6	4.29 (2)	82.1	T=0.19, p-value=0.85
Use integrated crop management	4.07 (3)	71.4	3.75 (5)	60.4	T=1.09, p-value=0.28
Use integrated pest management	3.79 (4)	56.1	3.57 (6)	50.0	T=0.63, p-value=0.53
Minimize use of hired labor	3.71 (5)	64.3	4.18 (4)	82.1	T=-1.08,p-value=0.29
Use forward purchasing	3.62 (6)	53.9	4.18 (3)	75.0	T=-1.59,p-value=0.12
Member of a buying group	2.21 (7)	7.1	1.96 (7)	14.3	T=0.66,p-value=0.51
b) Sources of information					
Extension	3.71 (1)	50.0	3.14 (4)	28.5	T=2.01,p-value=0.05
Data Transmission Network (DTN)	3.50 (2)	57.2	2.86 (5)	46.5	T=1.28,p-value=0.21
Farm magazines	3.36 (3)	50.0	3.64 (1)	60.7	T=-0.93,p-value=0.36
Trade journals	3.21 (4)	35.7	3.36 (3)	42.8	T=-0.44,p-value=0.66
Radio	3.14 (5)	35.7	3.43 (2)	53.6	T=-0.76,p-value=0.45
Neighbors	3.00 (6)	42.8	2.82 (7)	28.6	T=0.43,p-value=0.67
Commodity Organizations	2.93 (7)	37.7	2.82 (8)	28.6	T=0.28,p-value=0.78
Newspapers	2.86 (8)	21.4	2.86 (6)	28.5	T=0.00,p-value=1.00
Television	2.43 (9)	21.4	2.43 (9)	17.9	T=0.00,p-value=1.00
c)Financial management practices					
Calculate per unit cost of production	4.64 (1)	82.8	4.54 (1)	92.8	T=0.52,p-value=0.61
Prepare annual financial statements	4.43 (2)	78.5	4.29 (2)	82.1	T=0.35,p-value=0.73
Use a computer	4.36 (3)	78.5	4.04 (4)	75.0	T=0.71,p-value=0.48
Evaluate new alternative production strategies	3.79 (4.5)	42.8	3.64 (5)	57.1	T=0.41,p-value=0.68
Accrual accounting	3.79 (4.5)	71.4	3.36 (6)	57.1	T=0.82,p-value=0.42
Prepare and use of cash flow projections	3.71 (6)	50.0	4.07 (3)	67.9	T=-0.97,p-alue=0.34

Note: Figures in parenthesis represent the rank attached to each practice.

There is no significant difference in financial practices between L/HP and S/HP farmers. The most common financial management practices of L/HP and S/HP farmers were calculating per unit cost of production, preparing annual financial statements and use of a computer. Preparation and use of cash flow projections was reported by S/HP farmers as one of most used financial management practices.

iv) Overall management. The most commonly used sources of information by L/HP and S/HP farmers to evaluate new production techniques are university research, neighbors and other farmers. It should be noted that overall, less than 50 percent of farmers in each group reported using these sources. Few farmers used production contracts; 29 and 36 percent of S/HP and L/HP farmers respectively. Overall, S/HP and L/HP farmers share similar management practices.

2. Farm business analysis

The main elements of comparison between L/HP and S/HP farmers, particularly measures of production, machinery and labor efficiency are presented in table 14. The figures are averages over the period 1991-1996.

a) Production, productivity and scale of operations

On average, 24 percent of the revenues of L/HP farmers come from livestock sales and this percentage is not significantly different from the 18 percent for S/HP farmers (T=1.115, p-value=0.271).

Half the L/HP farmers have some acres under hay or permanent pasture ranging from 2 to 19 acres for a group average of 5 acres compared to 21 percent of S/HP farmers with 5 to 195 acres (group average of 11.2 acres). The average acres under hay or pasture are not significantly different for both farmers' groups (T=-0.587, p-value=0.561). Hay and permanent pasture seem to be marginal activities for L/HP and S/HP farmers unlike S/LP farms, which include some beef or dairy farms associated with the presence of large areas of hay or pasture for grazing purposes.

There is no significant difference in corn and soybean yields between these two groups of farmers. The average corn yield is 135.76 and 138.04 bushels per acre for S/HP and L/HP farmers, respectively. The average soybean yield is 48.10 and 47.84 bushels per acre for S/HP and L/HP, respectively. In hog production, both groups have similar return per dollar of feed fed (table 14). The results (similarity in yields and return per dollar of feed fed for the two groups of farmers) indicate that S/HP farmers are as productive as L/HP farmers.

On average, the per unit (acre or bushel) cost of corn production and soybean production is similar for both groups. In hog production, both groups have similar production cost efficiency levels (table 14). L/HP and S/HP farmers have similar cost efficiency levels in crop as well as hog production. Based on these results, it can be stated that S/HP farmers are not less cost efficient than L/HP farmers.

Table 14: Comparison of the productivity and machinery and labor efficiency of L/HP and S/HP Farmers

	L/HP farmers	S/HP farmers	Comparison between L/HP and S/HP farmers (T-tests)
Productivity and Efficiency in crop production			
Corn yield (bu/ acre)	138.04	135.76	T=0.474, p-value=0.638
Soybean yield (bu/acre)	47.84	48.10	T=-0.161, p-value=0.873
Cost of corn ($/ acre)	320.45	333.85	T=-0.807, p-value=0.425
Cost of soybean ($/ acre)	430.72	381.80	T=0.772, p-value=0.445
Cost of corn ($/ bu)	2.46	2.47	T=-0.090, p-value=0.929
Cost of soybean ($/ bu)	6.28	6.03	T=0.394, p-value=0.896
Machinery on corn field ($/ acre)	33.77	33.91	T=-0.025, p-value=0.980
Machinery on soybean field ($/ acre)	30.69	33.79	T=-0.531, p-value=0.598
Labor on corn field ($/ acre)	50.16	55.28	T=-0.606, p-value=0.548
Labor on soybean field ($/ acre)	46.20	53.14	T=-0.775, p-value=0.443
Efficiency per dollar of gross profit			
Machinery	0.43	0.42	T=0.011, p-value=0.944
Labor	0.11	0.14	T=-2.088, p-value=0.043*
Productivity and Efficiency in Hog production			
Average feed cost per cwt production ($)	24.95	26.20	T=-0.341, p-value=0.736
Average production cost per cwt production ($)	10.82	12.31	T=-0.270, p-value=0.789
Return per $ of feed fed ($)	1.22	1.16	T=0.276, p-value=0.785
Machinery in hog production ($/ cwt)	1.43	2.51	T=-1.171, p-value=0.253
Labor in hog production ($/ cwt)	0.55	1.55	T=-0.716, p-value=0.481
Machinery to labor ratio	4.44	3.47	T=1.327, p-value=0.192
Total cost to gross profit ratio	0.54	0.55	T=-0.268, p-value=0.790

Source: FBA farm management data set, 1991-1996.
Note: * significant difference at 5 percent

When taking all the enterprises together, it appears that L/HP and S/HP farmers have similar total cost to gross profit ratios (0.54, 0.55 respectively) (table 14). This confirms the similarity of cost efficiency between the two groups and indicates that these farmers are on segment BC of figure 2 (page 13).

The average revenues received by L/HP and S/HP farmers for their corn, soybean and hog sales, measured in dollars per bushel (corn, soybean) and dollars of value per cwt production (hog) are not significantly different (respectively: $2.44, $4.96, $10.82 for L/HP farms and $2.34, $5.38, $11.71 for S/HP farms). There is no obvious indication of any kind of sales price premium that could have been gained by L/HP because of the size of their sales.

b) Owned versus rented acres of land

S/HP farmers rent a higher proportion of acres for row crop production than L/HP farmers. S/HP farmers rent an average of 83 percent of crop acres while L/HP farmers rent 61 percent of crop acres.

c) Machinery and labor efficiencies

L/HP and S/HP farmers spent relatively the same amount of dollars on machinery and labor per acre for each enterprise (table 14). It can be concluded that L/HP and S/HP farmers have similar efficiency levels in machinery and labor use. The value of the machinery per dollar of gross profit is similar for L/HP and S/HP farmers. S/HP spent significantly more on labor per dollar of gross profit (0.14) than L/HP farmers (0.11). The ratio of total machinery spending to total labor spending is not significantly different for L/HP farmers (4.44) and S/HP farmers (3.47). More is spent on machinery than labor by a ratio of 4 to 1 and 3 to 1 for L/HP and S/HP farmers, respectively.

Based on the machinery and labor expenses per crop acre or cwt of hog production, it can be concluded that S/HP farmers are as efficient as L/HP farmers in machinery and labor use. But, when the whole farm business, regardless of the type of enterprise, is considered, S/HP and L/HP farmers do not differ in terms of efficiency in machinery use but they do have different efficiency of labor use. The farm size may affect significantly labor efficiency.

d) Debt structure

Table 15 presents the proportions of different types of liabilities and their comparison for L/HP and S/HP farmers' groups. It shows there is no significant difference between L/HP and S/HP farmers in terms of proportion of short-term liability or intermediate liability.

Table 15: Comparison of the debt structure on L/HP and S/HP farmers

	L/HP	S/HP	Comparison L/HP and S/HP (T-values, P-values)
Ratio of short term liabilities to total farm liabilities	31%	39%	T= -0.822, p-value=0.416
Ratio of intermediate term liabilities to total farm liabilities	19%	33%	T= -1.307, p-value=0.199
Ratio of long term liabilities to total farm liabilities	50%	28%	T= 1.959, p-value=0.057

Source: FBA farm management data set, 1991-1996.

The main difference between these two groups, but not significant at 5 percent level of significance, comes from the proportion of long-term liability; L/HP farmers have a relatively higher proportion of long-term liability than S/HP farmers. This may be due in part to the lower value of machinery/equipment use by S/HP farmers and the high proportion of rented land for S/HP farmers.

e) Expense structure

The ratio of fixed expenses to total expenses is similar for L/HP and S/HP farmers (table 16). This is also the case for the ratio of operating expenses to total expenses. The ratios of each of the following types of expenses - interest expenses, rent expenses and insurance expenses - to total expenses are also similar for L/HP and S/HP farmers. The only difference is that L/HP farmers have a higher ratio of tax expenses to total expenses than S/HP farmers. The high proportion of land rented by S/HP farmers can explain this difference and also their relatively high proportion of rent expenses.

Table 16: Comparison of the expense structure between L/HP and S/HP farmers

	L/HP	S/HP	Comparison L/HP and S/HP
Ratio of fixed expenses to total expenses	33%	32%	T=0.325, p-value=0.747
Ratio of operating expenses to total expenses	67%	68%	T=-0.325, p-value=0.747
Ratio of depreciation to total expenses	12%	11%	T=0.884, p-value=0.382
Ratio of interest expenses to total expenses	6.82%	6.34%	T=0.270, p-value=0.788
Ratio of taxes to total expenses	2.76%	1.43%	T=2.411, p-value=0.021*
Ratio of rent expenses to total expenses	16%	18%	T=-0.309, p-value=0.759
Ratio of insurance expenses to total expenses	4.21%	4.03%	T=0.262, p-value=0.795

Source: FBA farm management data set, 1991-1996.
Note: * significant difference at 5 percent.

f) Financial performance measures

i)Liquidity measures. Using the working capital criterion, it appears that L/HP farms are more liquid than S/HP farms, as expected, given the difference in size; $215,034 for L/HP versus $119,878 for S/HP.

ii) Solvency measures. The ratio of debt to assets is not significantly different for L/HP and S/HP farmers (0.22 and 0.19, respectively), meaning that these two group of farmers have similar solvency levels and relatively low leverage. These ratios indicate that these farms are stable because they can secure their debt. These ratios are lower than the average 31 percent, debt to assets ratio reported for Iowa (period 1990-1998) (ISU, 2000). The ratios of debt to farm net worth (0.38 and 0.30, respectively) are not different for L/HP and S/HP and they confirm the high degree of solvency of these farms.

iii) Financial profitability measures. L/HP farmers have a higher net farm income and return to management than S/HP farmer as expected since the size of the farm has a positive impact on these

measures. The use of ratios such as return on assets (ROA), return on equity (ROE), profit index, and ratio of management return to gross profit, is intended to control for the farm size effect.

S/HP farms have on average a higher return on assets (ROA) and on equity (ROE) than L/HP farmers; but the only significant difference is with the return to assets (table 17).

The operating profit margin ratio and the profit index are not significantly different for L/HP and S/HP farmers (table 17). The average level of non-farm income and the non-farm to farm income ratio also are not significantly different between L/HP and S/HP.

S/HP farmers are less profitable than L/HP farmers when the farm net income and the management return are the criteria considered. But when ROA, ROE, operating profit margin ratio, and profit index are considered, the farm size effect is neutralized, S/HP farmers appear to be as profitable as L/HP farmers and even more so in some instances.

Even though the per unit net income, ratio of farm net income to gross profit is not statistically different for L/HP and S/HP farmers (0.394 and 0.392, respectively), large successful farmers (L/HP) have significantly higher net farm income ($105,925) and management return ($48,882) than small successful farmers (S/HP) ($61,971 and $29,010, respectively).

Table 17: Comparison of the financial profitability and efficiency measures for L/HP and S/HP farmers

	L/HP farmers	S/HP farmers	Comparison between L/HP and S/HP farmers (T-tests)
Financial Profitability			
Net farm income ($)	105925	61971	T=4.055, p-value=0.001*
Management return ($)	48882	29010	T=2.772, p-value=0.014*
Management return to gross profit ratio	0.180	0.178	T=0.075, p-value=0.940
Return on assets (ROA)	0.13	0.17	T=-2.023, p-value=0.050*
Return on equity (ROE)	0.17	0.21	T=-1.027, p-value=0.310
Operating profit margin ratio	0.36	0.31	T=1.608, p-value=0.116
Profit index	1.25	1.23	T=0.528, p-value=0.601
Financial Efficiency			
Asset turnover ratio	0.38	0.55	T=-3.396, p-value=0.002*
Operating expense ratio	0.50	0.51	T=-0.454, p-value=0.652
Depreciation expense ratio	6.5E-02	5.9E-02	T=0.878, p-value=0.385
Interest expense ratio	3.9E-02	3.5E-02	T=0.406, p-value=0.687
Net farm income ratio	0.394	0.392	T=0.057, p-value=0.955
Non farm to farm income ratio	8.7E-02	0.12	T=-0.732, p-value=0.468
Non farm income	8527	7035	T=0.596, p-value=0.555

Source: FBA farm management data set, 1991-1996.
Note: *significant difference at 5 percent.

These results indicate that farm size has a positive effect on income. So the assertion that a "good big farm is better than a good little farm" seems to be justified. S/HP and L/HP farmers are on segment BC of figure 2 (page 13) since they are both cost efficient and as seen earlier they both have similar per unit net farm income. But because L/HP farmers have larger sales (bigger output), they get more income than S/HP farmers. On figure 2, S/HP farms could be located at point B and L/HP at point C.

iv) Financial efficiency measures. S/HP farms have a higher asset turnover ratio (0.55) than L/HP farms (0.38) indicating that S/HP farmers more efficiently use the investment capital. This may be due to the fact that S/HP farmers rent a larger percentage of the land they use compared to L/HPfarmers. As seen in table 17, the farm net income ratio, the operating expense ratio, the depreciation expense ratio, and the interest expense ratio are not significantly different for L/HP and S/HP farms. It can be concluded that S/HP farmers are as financially efficient as L/HP farmers and even more so in some instances (S/HP have higher asset turnover ratio).

3. Conclusion

L/HP and S/HP farmers are relatively young farmers with high education levels. This result is similar to the findings in the literature on farm success. They differ in the type of business arrangement; more family corporations are observed among L/HP farms (43 percent) than S/HP farms (18 percent).

Overall, they are similarly efficient not only in production, in machinery and labor use, but also financially, except for the efficiency in investment capital. L/HP and S/HP farmers are efficient farmers but the difference in farm size affects significantly their income levels; larger farmers get more income over more units of output (sales) than small ones. Means used by small successful farmers (S/HP) to overcome the obstacles due to their small size range from renting high proportion of the land they use (83 percent), choosing lease/rent option for machinery (very likely), keeping debt low (low financial average) when the difference in farm size is controlled. S/HP farmers rent a significantly higher proportion (83 percent) of the land they use.

C. Comparison of Small Profitable Farms (S/HP) and Small Non Profitable Farms (S/LP)

The purpose of the comparison between S/HP and S/LP farmers, all small farms in terms of sales but with different profitability levels, is to determine if differences exist between them. The

differences could indicate key factors explaining the financial success of S/HP farms or the failure of S/LP farms, that is, why some small farms are successful and others are not.

A series of seven research questions have been developed to guide the analysis in order to achieve sub-objective 3- identify the similarities and differences between small profitable farms (S/HP) and small non-profitable farms (S/LP). For the statistical analyses, descriptive statistics such as means, percentage as well as parametric t-tests were used for the comparisons. The significance level selected is 5 percent. Generally, the p-values of tests are given.

1. General comparison

a) Personal information

The comparison of S/HP and S/LP farmers based on personal information is summarized in table 18.

Table 18: Personal information on S/HP and S/LP farmers

	S/HP	S/LP	Comparison of S/HP and S/LP (T-tests)
Age	46	61	T=-6.02, p-value=0.00*
Education levels	32% have a college degree, 29% have some college education, 29% have high school/GED degree and 10% are technical school graduates	16% have a college degree, 16% have some college education, 60% have high school/GED degree, 4% graduated from technical schools and 4% have a graduate degree	T=1.82, p-value=0.075
Children's work on the farm	Less than 15% of daughters work on farm while 42% of sons or less work on the farm	Less than 6% of daughters work on farm while 39% sons or less work on the farm	T=-0.17, p-value=0.86 For first sons T=-0.90, p-value=0.37 For first daughters, Non-significant differences for the first children and also for the others.
Raised on the farm	93%	96%	T=0.49, p-value=0.63
Principal occupation	96%	88%	T=-1.12, p-value=0.27
Work off farm	7 (27%)	6 (24%)	T=0.24, p-value=0.82
Weeks of work off farm	18	40	T=-2.59,p-value=0.035*
Farming years	22	38	T=-5.85, p-value=0.00*

Note: * significant difference at 5 percent.

S/HP farmers are significantly younger than S/LP farmers (46 and 61 years old, respectively), as are their spouses. S/HP farmers and spouses have a higher education level compared to S/LP farmers and spouses. While 61 percent of S/HP farmers and 74 percent of their spouses have a college degree or some college education, only 32 percent of S/LP farmers and 38 percent of their spouses have a college degree or some college education. The results related to age and education of farmers conform to those reported in the literature.

Like S/HP farmers, most S/LP farmers and their spouses were raised on the farm (table 18). It should be noted that most of 88 percent of S/LP farmers said farming was their principal occupation compared to 96 percent for S/HP farmers.

Both groups of farmers work off farm (no significant difference) but S/LP farmers worked significantly more weeks off farm than S/HP did. Many studies found that small farmers are likely to have part time jobs compared to large farms.

This is verified here because only one L/HP farmer had a part time job off farm. The role of the part time job in the management of the farm might vary from S/HP to S/LP farmers. The latter need non-farm income to supplement for the losses in their farm business. S/HP farmers might need extra sources of income to finance some purchases for the farm and thus to enhance their farm profitability instead.

b) General farm information

A high proportion of S/HP and S/LP farms are cash grain farms or cash grain and livestock (57 percent and 64 percent, respectively) but 12 percent of S/LP farms are beef or dairy farms while none of the S/HP farms are beef or dairy farms (table 19).

The dominant business arrangement for the two groups of farmers is sole proprietorship. S/LP farmers have been farming for more than S/HP farmers, as expected, since they are older than S/HP farmers.

S/LP farmers rent a significantly smaller proportion (53 percent) of row crop acres than S/HP farmers (83 percent) do. The most common rental arrangements are the cash rental arrangement and the crop share rental arrangement.

Approximately half of S/LP (52 percent) used cash rental arrangement for 4 percent to 100 percent of rented acres compared to 82 percent of S/HP farmers who used it for 12 percent to 100 percent of their rented acres. The crop share rental arrangement was used by 36 percent of S/LP farmers for 23 percent to 100 percent of rented acres of land while close to two thirds of S/HP farmers (68 percent) used crop share for 35 percent to 100 percent of their rented acres.

Unlike S/HP farmers, relatively few S/LP farmers work on other farms belonging mainly to relatives (table 19). The results indicate that S/HP and S/LP farmers have different socioeconomic characteristics; they differ in terms of age, education levels, farm experience, work on other farms and even the amount of work time spent off farm (measured in weeks).

Table 19: General farm information on S/HP and S/LP farmers

	S/HP	S/LP	Comparison of S/HP and S/LP (T-tests)
Farm type	39% pork farms 32% Cash Grain and Livestock 25% Cash grain 4% mixed	20% pork farms 24% Cash Grain and Livestock 40% Cash grain 12% Beef or Dairy 4% other	T=0.55, p-value=0.58
Business arrangement	18% family corporations 79% sole proprietorship 3% partnership	4% family corporations 88% sole proprietorship 4% Partnership 4% corporation	T=0.00,p-value=1.00
Years on current farm	20	36	T=-4.37,p-value=0.00*
Rental arrangements (% of farmers using the arrangement) (Land tenure)	82% used cash rental 68% used crop share 4% used flexible rent 4% used custom farm	52% used cash rental 36% used crop share 0% used flexible rent 0% used custom farm	Comparing the areas under each rental arrangement, it appeared that they are not significantly different
Percentage of rented acres	83% of crop acres are rented	53% of crop acres are rented	T=3.12, p-value=0.005*
Farm acquisition	33% purchase from relative 28% purchase from non relative 17% purchase from relative and non- relative 11% combination inherit and purchase 6% inherit 6% other	16% purchase from relative 37% purchase from non relative 5% purchase from relative and non- relative 26% combination inherit and purchase 11% inherit 5% other	T=0.20, p-value=0.98
Work on other farms	43% worked on other farms belonging mainly to relatives	8% worked on other farms	T=-3.16,p-value=0.003*
Involvement of other people on the farm	14% of farmers mentioned the involvement of other relatives' families in the management of the farm	4% of farmers mentioned the involvement of other relatives' families in the management of the farm	T=-1.28, p-value=0.21

Note: * significant difference at 5 percent.

c) Management and financial procedures

i) Cost control. Soil testing and keeping debt low are the most commonly used cost control measures for both S/HP and S/LP farmers (table 20). S/LP farmers use less forward purchasing than S/HP farmers.

ii) Sources of information. The top four sources of information for S/HP and S/LP farmers include farm magazines, radio, extension, trade journals (table 20) with the top two sources of information (farm magazines, radio) similar for both farmers groups. S/HP farmers, who are relatively younger, use more advanced sources of information (i.e DTN) while S/LP farmers prefer the old channels of getting the information (i.e neighbors).

iii) Financial practices. There is no significant difference between S/HP and S/LP farmers in the percentage of farmers who borrowed operating capital. The percentage of S/HP farmers who borrowed long-term capital is significantly higher than that of S/LP farmers. This difference could be due to the fact that S/LP farmers are relatively old and might not be interested in farm growth but rather in securing their retirement. This is also consistent with the finding of Perkin (1992) cited by Gasson and Errington (1993) that older farmers are more risk averse than the younger ones.

The most often used financial management practices common to S/HP and S/LP farmers were calculating per unit cost of production and preparing annual financial statements (table 20). S/HP farmers used computers more often than S/LP farmers. There were 54 percent of S/LP farmers who admitted that they never used a computer. Once more, the age factor is likely to explain this difference.

iv) Overall management. The most commonly used sources of information by S/HP and S/LP farmers to evaluate new production techniques are university research, neighbors and other farmers. But at most, half of farmers in each group attributed a score of 4 or 5 to these sources, indicating that they don't use them often. Approximately one fourth of S/LP farmers use production contracts compared to 29 percent of S/HP farmers. Overall, the results presented indicate that S/HP and S/LP farmers have different management practices.

Table 20: Comparison of S/HP and S/LP farmers management practices

	S/HP	Percentage respondents choosing a score of 4 or 5	S/LP	Percentage respondents choosing a score of 4 or 5	Comparison S/HP and S/LP farmers (T-tests)
a) Cost control					
Use of soil test	4.68 (1)	92.9	4.52 (1)	91.3	T=0.79, p-value=0.43
Keeping debt low	4.29 (2)	82.1	4.26 (2)	78.3	T=0.07, p-value=0.94
Use forward purchasing	4.18 (3)	75.0	3.52 (5)	56.5	T=2.04,p-value=0.046*
Minimize use of hired labor	4.18 (4)	82.1	3.83 (4)	60.8	T=0.95, p-value=0.35
Use integrated crop management	3.75 (5)	60.4	4.17 (3)	78.3	T=-1.66, p-value=0.10
Use integrated pest management	3.57 (6)	50.0	3.30 (6)	39.1	T=0.76, p-value=0.45
Member of a buying group	1.96 (7)	14.3	1.91 (7)	13.0	T=0.15, p-value=0.88
b) Sources of information					
Farm magazines	3.64 (1)	60.7	3.67 (1)	50.0	T=-0.08,p-value=0.94
Radio	3.43 (2)	53.6	3.63 (2)	50.0	T=-0.60,p-value=0.55
Trade journals	3.36 (3)	42.8	3.42 (5)	37.5	T=-0.20,p-value=0.85
Extension	3.14 (4)	28.5	3.63 (3)	54.1	T=-1.52,p-value=0.14
Data Transmission Network (DTN)	2.86 (5)	46.5	1.87 (9)	13.0	T=2.56,p-value=0.014*
Newspapers	2.86 (6)	28.5	3.00 (6)	29.2	T=-0.44,p-value=0.66
Neighbors	2.82 (7)	28.6	3.59 (4)	45.5	T=-2.28,p-value=0.03*
Commodity Organizations	2.82 (8)	28.6	2.54 (7)	16.6	T=0.84, p-value=0.41
Television	2.43 (9)	17.9	2.41 (8)	18.1	T=0.06, p-value=0.95
c) Financial management practices					
Calculate per unit cost of production	4.54 (1)	92.8	4.17 (2)	79.2	T=1.35, p-value=0.19
Prepare annual financial statements	4.29 (2)	82.1	4.38 (1)	79.2	T=-0.26,p-value=0.80
Prepare and use of cash flow projections	4.07 (3)	67.9	3.58 (4)	62.5	T=1.23,p-value=0.24
Use a computer	4.04 (4)	75.0	2.67 (6)	41.6	T=2.86,p-value=0.006*
Evaluate new alternative production strategies	3.64 (5)	57.1	3.92 (3)	66.7	T=-0.86, p-value=0.39
Accrual accounting	3.36 (6)	57.1	3.17 (5)	54.1	T=0.413, p-value=0.68

Note: * significant difference at 5 percent. The values in parenthesis represent the ranks attributed to each management practice.

2. Farm business analysis

The production, machinery and labor efficiency measures are presented in table 21 for S/HP and S/LP farmers. The data are averages on the period 1991-1996.

a) Production, productivity and scale of operations

On average, 18 percent of the revenues for S/HP farmers come from livestock sales, practically twice the percentage for S/LP farmers. But the difference is not significant statistically at 5 percent significance level (T=-1.978, p-value=0.054).

Almost three fourth of S/LP farmers (72 percent) have some acres under hay or permanent pasture ranging from 3 to 299 acres for a group average of 67.5 acres compared to 21 percent of S/HP farmers with 5 to 195 acres (average of 11.2 acres). S/LP farmers have a significantly higher amount of acres under hay and permanent pasture than S/HP farmers (T=-2.888, p-value=0.007). The large average acreage under hay and pasture among the S/LP farmers is due to the 12 percent of beef or dairy farmers while none of the S/HP farmers are beef or dairy farmers. The dairy or beef farms need large acreage of hay and pasture for grazing animals.

S/HP farmers are significantly more efficient in corn and soybean production than S/LP farmers; they have higher corn and soybean yields than S/LP farmers average corn yield (table 21). But there is no significant difference in the return to feed per dollar of feed fed for both groups in hog production (table 21).

On average, the per unit (acre, bushel) cost of corn production is higher for S/LP farmers. For soybean production, the cost of production per acre is similar for S/HP and S/LP farms. Due to higher soybean yields on S/HP farms, they have relatively lower per bushel cost than S/LP farms (table 21). There is no significant difference in the feed cost per cwt production as well as the cost per cwt production for both groups in hog production. The ratio of total cost to gross profit is significantly different; 0.55 and 0.74 for S/HP and S/LP farms respectively (table 21). Overall, it can be concluded that S/HP farmers are more cost efficient than S/LP farmers.

The average price received from corn, soybean and hog sales, measured in dollars per bushel (corn, soybean) and dollars of value per cwt production (hog) are respectively: $2.99, $5.86, $21.64 for S/LP farms versus $2.34, $5.38, $11.71 for S/HP farms. Only the average price for corn is significantly different for the two groups. Nothing conclusive can be said about marketing efficiency.

Table 21: Comparison of the productivity and machinery and labor efficiency of S/HP and S/LP farmers

	S/HP farmers	S/LP farmers	Comparison between S/HP and S/LP farmers (T-tests)
Productivity and Efficiency in Crop production			
Corn yield (bu/ acre)	135.76	127.39	T=2.095, p-value=0.041*
Soybean yield (bu/acre)	48.10	42.45	T=4.392, p-value=0.000*
Cost of corn ($/ acre)	333.85	443.03	T=-6.460, p-value=0.000*
Cost of soybean ($/ acre)	381.80	395.90	T=-0.304, p-value=0.762
Cost of corn ($/ bu)	2.47	3.69	T=-7.618, p-value=0.000*
Cost of soybean ($/ bu)	6.03	7.06	T=-1.974, p-value=0.054
Machinery on corn field ($/ acre)	33.91	44.39	T=-1.857, p-value=0.070
Machinery on soybean field ($/ acre)	33.79	40.06	T=-1.186, p-value=0.241
Labor on corn field ($/ acre)	55.28	69.73	T=-1.829, p-value=0.074
Labor on soybean field ($/ acre)	53.14	57.73	T=-0.630, p-value=0.532
Efficiency per dollar of gross profit			
Machinery	0.42	0.73	T=-3.922, p-value=0.000*
Labor	0.14	0.22	T=-4.626, p-value=0.000*
Productivity and Efficiency in Hog production			
Average feed cost per cwt production ($)	26.20	25.37	T=0.183, p-value=0.857
Production cost per cwt production ($)	12.31	27.27	T=-1.589, p-value=0.143
Return per $ of feed fed ($)	1.16	1.09	T=0.385, p-value=0.704
Machinery in hog production ($/cwt)	2.51	4.53	T=-0.795, p-value=0.435
Labor in hog production ($/cwt)	1.55	3.99	T=-1.509, p-value=0.146
Machinery to labor ratio	3.47	3.84	T=-0.513, p-value=0.610
Total cost to gross profit ratio	0.55	0.74	T=6.164, p-value=0.000*

Source: FBA farm management data set, 1991-1996.
Note: * significant difference at 5 percent.

b) Owned versus rented acres of land

S/HP farmers rent a higher proportion of acres used for row crop production (83 percent) than S/LP farmers (53 percent).

c) Machinery and labor efficiencies

S/HP farmers, compared to S/LP farmers, spent relatively fewer dollars on machinery and equipment, and labor for corn production, soybean and hog production, but the differences observed are not significant. S/HP spent significantly less on labor per dollar of gross profit as well as on machinery per dollar of gross profit than S/LP farmers. The relative labor inefficiency of S/LP farmers might be due to their age. The age factor is significantly and positively correlated to the labor per dollar of gross profit and machinery per dollar of gross profit meaning that as farmers grow in

age, they are less efficient in labor and machinery use. The age factor is negatively and significantly correlated to factors/variables such as education, the use of technologies such as computers, and Data Transmission Network. The speculation we can make here is that the correlation coefficients indicate that age combined to education affect significantly the farmers' management capacities (attitude toward risk, the access and use of information, new technology, etc).

S/HP farmers are more efficient than S/LP farmers in machinery and labor use, when the amount spent on machinery or labor per dollar of gross profit. But there is no significant difference when the comparison is based on each enterprise. These results suggest the challenge faced in dividing the machinery and labor expenses among enterprises when a farm business is diversified.

The ratio of total machinery value to total labor value is not significantly different for S/HP farmers (3.47) and S/LP farmers (3.84). These results indicate that more is spent on machinery than labor by the ratio of 3 to 1 and almost 4 to 1 for S/HP and S/LP farmers respectively.

d) Debt structure

Table 22 presents the proportions of different types of liabilities and their comparison for S/HP and S/LP farmers' groups. There is no significant difference between S/HP and S/LP farmers in terms of debt structure even though S/HP farmers have a relatively smaller proportion of long-term liability than S/LP farmers (28 percent and 41 percent respectively) but a relatively higher proportion of short-term liability than S/LP farmers (39 percent and 25 percent respectively). This can be explained by higher proportion of rental payments for S/HP farmers.

These figures give the indications that S/HP farmers tend to choose more the rent option instead of ownership of the land and probably of the equipment and machinery they use and they could constitute a possible answer to the lower proportion of long term liability.

Table 22: Comparison of the debt structure of S/HP and S/LP farmers

	S/HP	S/LP	Comparison S/HP and S/LP (T-values, P-values)
Ratio of short term liabilities to total farm liabilities	39%	25%	T= 1.642, p-value=0.107
Ratio of intermediate term liabilities to total farm liabilities	33%	34%	T= -0.108, p-value=0.915
Ratio of long term liabilities to total farm liabilities	28%	41%	T= -1.347, p-value=0.184

Source: FBA farm management data set, 1991-1996.

e) Expense structure

T-tests show that on average S/HP farmers spent significantly less than S/LP farmers on interest, on depreciation and on taxes (table 23). This can be explained by the fact that S/HP farmers spent more than S/LP farmers for rent.

Table 23: Comparison of the expense structure of S/HP and S/LP farmers

	S/HP	S/LP	Comparison S/HP and S/LP
Ratio of fixed expenses to total expenses	32%	29%	T=0.869, p-value=0.389
Ratio of operating expenses to total expenses	68%	71%	T=-0.869, p-value=0.389
Ratio of depreciation to total expenses	11%	16%	T=-2.718, p-value=0.010*
Ratio of interest expenses to total expenses	6.34%	10.08%	T=-1.830, p-value=0.075
Ratio of taxes to total expenses	1.43%	5.30%	T=-5.790, p-value=0.000*
Ratio of rent expenses to total expenses	18%	5.88%	T=4.133, p-value=0.000*
Ratio of insurance expenses to total expenses	4.03%	4.46%	T=-0.731, p-value=0.468

Source: FBA farm management data set, 1991-1996.
Note: * significant difference at 5 percent.

f) Financial performance measures

i) Liquidity measures. The working capital of S/HP farms is $119,878 compared to $80,340 for S/LP, indicating that S/HP farms are more liquid than S/LP farms and thus with a higher capacity to face obligations in the short term.

ii) Solvency measures. The ratio of debt to asset is similar for S/HP and S/LP (0.19) meaning that these two groups of farmers have similar solvency levels. With such a low leverage, these farms are stable because they can secure their debt.

iii) Financial profitability measures. S/HP farmers have a higher net farm income and return to management than S/LP farmers. They also have on average a higher return on assets (ROA), return on equity (ROE), operating profit margin ratio and profit index than S/LP farmers (table 24). S/LP farmers have a higher non-farm income than S/HP farmers but because of high variability of the non-farm to farm income ratio among S/LP farmers, the difference observed is not significant.

iv) Financial efficiency measures. S/HP farms have a higher asset turnover ratio (0.55) than S/LP farms (0.22) indicating that S/HP farmers use the investment capital more efficiently. As seen in table 24, the net farm income ratio, the operating expense ratio, the depreciation expense ratio, and the interest expense ratio are significantly different for S/HP and S/LP farms.

Table 24: Comparison of the financial profitability and efficiency measures for S/HP and S/LP farmers

	S/HP farmers	S/LP farmers	Comparison between L/HP and S/HP farmers (T-tests)
Financial Profitability			
Net farm income ($)	61971	14912	T=11.02, p-value=0.00*
Management and labor return	29010	-23411	T=18.83, p-value=0.00*
Management return to gross profit ratio	0.178	-0.289	T=14.75, p-value=0.01*
Return on assets (ROA)	0.168	5.38E-03	T=11.20, p-value=0.00*
Return on equity (ROE)	0.21	-3.4E-02	T=8.68, p-value=0.00*
Operating profit margin ratio	0.313	4.44E-02	T=7.77, p-value=0.00*
Profit index	1.231	0.787	T=20.14, p-value=0.00*
Financial Efficiency			
Asset turnover ratio	0.548	0.224	T=7.52, p-value=0.00*
Operating expense ratio	0.514	0.659	T=-5.93, p-value=0.00*
Depreciation expense ratio	5.94E-02	0.111	T=-5.16, p-value=0.00*
Interest expense ratio	3.46E-02	8.21E-02	T=-2.74, p-value=0.01*
Net farm income ratio	0.392	0.148	T=7.55, p-value=0.00*
Non farm to farm income ratio	0.12	-3.31 [(a)]	T=1.08, p-value=0.29
Non farm income	7035	18597	T=-2.22, p-value=0.035*

Source: FBA farm management data set, 1991-1996.
Note: * significant difference at 5 percent.
(a) minimum is –78.07, maximum is 3.91, and median is 0.227.

S/HP farmers have lower operating, depreciation and interest expenses ratios than S/LP farmers. Low depreciation and interest expense ratios for S/HP farmers can be due to the high level of their rent expenses. The lower operating expense ratio for S/HP compared to that of S/LP indicate the cost inefficiency of S/LP farmers since S/HP were more likely to have a higher operating expense ratio because of the high proportion of rent expenses. The results give enough evidence to conclude that S/HP farmers are financially more efficient than S/LP farmers.

3. Conclusion

S/HP farmers are more efficient than S/LP farmers financially, in terms of production, labor and machinery use and also in terms of costs. Given that S/HP farmers are younger and better educated than S/LP farmers, it can be concluded that S/HP farmers have better management capabilities.

One indicator of this is their efficiency in terms of production, cost, finances. S/HP farmers seem to have overcome the obstacle linked to their size through a smart mix between ownership and lease options for land, and machinery which gives them more flexibility.

But, due to the high correlation between education and age and the fact that S/LP farmers are older, the conclusions should be cautious. It is difficult to distinguish the effect of age from the effect of education and the effect of good management. Generally old farmers may be more risk averse and less likely to be willing to take risks compared to young farmers. In addition, younger farmers might be innovators. Farmers with high education level are likely to have higher managerial capabilities. All these factors might then explain the gap in efficiency and profitability between S/HP and S/LP farmers.

Boehlje and Eidman (1984) and Castle et al. (1987) suggested that the stage of the farm business in the family cycle is determinant in the performance of a business. Errington (1999) pointed out that the process of intergenerational transfer may affect the performance of the farm business. Unlike younger farmers seeking productivity increase, overall improvement of efficiency and profitability, and eyeing the possibility of additional investment while weighing advantages and disadvantages of such a move, older farmers are more interested in ensuring an adequate retirement and as a consequence, they may engage in disinvestment for that purpose (Errington, 1999). Similar findings have been reported by Ladue and Crispell in their study of "Farming-together relationships in the process of intergenerational farm transfer" (1992). They recognized that the personal employment and lifetime goals for younger and older farmers involved in these relationships were different. The focus for older farmers was on free time, retirement and successful intergenerational farm transfer while the focus for younger farmers was on providing for children, enjoying the time with family and improving the business.

D. Conclusion on the Characterization of Small Successful Farms (S/HP)

The first sub objective of the present study was to characterize and profile the small profitable farmers. To achieve this goal, a series of four research questions were developed from previous studies (see page 16). The previous results sections were trying to describe the small profitable farmers (S/HP) and then find similarities and differences between them (S/HP) and large profitable farmers (L/HP) on one hand and small non profitable farmers (S/LP) on the other hand. The results from these previous sections help provide answers to these four research questions and therefore to depict a profile of the small profitable farmers.

Table 25, which summarizes the similarities and differences between L/HP and S/HP farmers, and between S/HP and S/LP farmers, highlights the main characteristics of small successful farmers.

Table 25: Similarities and differences between S/HP and L/HP and S/LP farmers.

Criteria of comparison	Comparison L/HP and S/HP	Status	Comparison S/HP and S/LP	Status
age	Relatively of same age, their age is below average age of the sample of seventy three farmers (53 years old)	No significant difference	S/HP farmers younger than S/LP farmers	Statistically different
Education level	Above the average education level for both groups	No significant difference	S/HP farmers more educated than S/LP farmers	Statistically different
Criteria of comparison	Comparison L/HP and S/HP	Status	Comparison S/HP and S/LP	Status
Children's work on the farm	More L/HP farmers' children work on the farm than S/HP farmers' children	Statistically different	Sons work on the farm relatively more than daughters	No significant difference
Work on other farms	More S/HP farmers (43%)work on other farms than L/HP farmers (14%), farms belonging mainly to relatives	Statistically different	More S/HP farmers (43%) work on other farms than L/HP farmers (8%), farms belonging mainly to relatives	Statistically different
Business arrangement	Most S/HP (79%) are sole proprietorships while more L/HP are corporations (57%)	Statistically different	Most S/HP and S/LP are sole proprietorships	No significant difference
Rental arrangements	Cash rent is most used followed by crop share	No significant difference	Cash rent is most used followed by crop share	No significant difference
Cost control measures	Most common are soil test and keeping debt low	No significant difference	Most common are soil test and keeping debt low but S/HP use forward purchasing more than S/LP	Statistically different only for forward purchasing
Sources of information	Most common are farm magazines and radio for S/HP and extension and DTN for L/HP but differences not significant	No significant difference	Most common are farm magazines and radio but S/HP use more DTN and S/LP rely more on neighbors	Statistically different for DTN more used by S/HP and Neighbors more consulted by S/LP
Financial management practices	Calculating per unit costs of production, preparing annual financial statements most used by both groups.	No significant difference	Calculating per unit costs of production, preparing annual financial statements most used by both groups but S/HP use more computers	Statistically different for computer use

Note: T-tests were used to test the differences between groups and the level of significance is 5%.

Table 25: (Continued)

Criteria of comparison	Comparison L/HP and S/HP	Status	Comparison S/HP and S/LP	Status
Production	Relatively similar percentages of revenue coming from livestock, hay and pastures acres seem to constitute marginal activities.	No significant difference	S/LP have significantly smaller percentage of revenue from livestock and larger acreage under hay and pasture	Statistically different
Productivity	Crop yields and return per $ of feed fed are not significantly different	No significant difference	S/HP have better crop yields	Statistically different
Total cost to gross profit ratio	0.54 and 0.55 for L/HP and S/HP respectively	No significant difference	0.55 and 0.74 for S/HP and S/HP respectively	Statistically different
Machinery use efficiency	The amount spent on machinery for corn, soybean and hog are not significantly different	No significant difference	S/LP spent more on machinery for corn, soybean and hog than S/HP but the difference not significant S/LP spent significantly more on machinery per dollar of gross profit than S/HP farmers.	No significant difference in per acre/cwt machinery dollars but significant difference for machinery dollars per gross profit.
Labor use efficiency	The amount spent on labor for corn, soybean and hog are not significantly different	No significant difference	S/LP spent more on labor for corn, soybean and hog than S/HP but only the labor dollars spent on corn are significantly different at 10%.	At 5% significance level, labor use efficiency similar, at 10%, there is a difference for corn
Owned versus rented land	S/HP farmers rented more acres than L/HP farmers (83% versus 61%)	Statistically different	S/HP farmers rented more acres than S/LP farmers (83% versus 53%)	Statistically different
Debt structure	Proportions of short term and intermediate term liabilities are similar but the difference in the proportion of long term liability (50% for L/HP and 28% for S/HP) is not significant at 5%	No significant difference in debt structure	Proportions of short term intermediate term and long term liabilities are not significantly different	No significant difference in debt structure

Table 25: (Continued)

Criteria of comparison	Comparison L/HP and S/HP	Status	Comparison S/HP and S/LP	Status
Expense structure	Except for the proportion of tax expenses that lower for S/HP (1.43%) than L/HP (2.76%), the others (fixed, operating, rent, interest, depreciation) are similar	Statistically different for proportion of tax expenses only	S/LP have higher proportions of depreciation, interest and tax expenses but lower proportions of rent expenses than S/HP	Statistically different for proportions of rent, tax and depreciation expenses
Liquidity	L/HP more liquid ($215,034 versus $119,878 for S/HP)	Statistically different	S/HP more liquid ($119,878 for S/HP versus $80,340)	Statistically different
Solvency	Debt to asset ratios are 0.22 and 0.19 for L/HP and S/HP respectively	No significant difference	Debt to asset ratio is 0.19 for S/HP and S/LP	No significant difference
Profitability	Net farm income and management return of L/HP are higher, ROA of S/HP is higher, but ROE, PI, operating profit margin ratio, management return to gross profit ratio are similar for the two groups.	Due to large size, L/HP get higher profits but when controlling for farm size, S/HP are as profitable or more profitable than L/HP	S/HP is more profitable than S/LP	Statistically different
Financial efficiency	Asset turnover larger for S/HP (0.548 versus 0.38 for L/HP) but other ratios similar (operating, depreciation, interest, net farm income ratios)	No significant difference in financial efficiency except for asset turnover	S/HP are more efficient than S/LP	Statistically different

Small successful farmers (S/HP) are young educated farmers who rent most of their land and probably also hire a high proportion of their machinery and equipment. They have a high proportion of rent expenses. S/HP farmers have high managerial abilities as observed in:

- The choice of enterprises; The S/HP farms are mostly pork farms (39 percent) followed by cash grain and livestock (32 percent) and cash grain farms (25 percent). They have a higher percentage of revenue coming from livestock (18 percent),
- High productivity; high yields in crop production for example,
- High efficiency level in machinery and labor use,
- High costs efficiency; ratio of total cost to gross profit relatively low (0.55),

- High financial efficiency; High efficiency level in the use of investment capital; highest asset turnover ratio of the three groups studied (0.55), low financial leverage,
- High profitability level; S/HP may be as profitable as large profitable farms (L/HP) and even more so in some instances. The ratio of net farm income to gross profit is similar for both groups but L/HP have higher net farm income due to the difference in size,
- Cooperation with other farmers, mainly relatives; even though most of S/HP farmers claim sole proprietorship, they are involved in some kind of non formal corporation with their relatives where they share the resources such as labor, and possibly the machinery and equipment as well as managerial skills. Almost half of small successful farmers (43 percent) work on other farms mainly belonging to relatives. This percentage is significantly higher than the percentage of other non-successful small farms working on other farms (8 percent). Profit index and Work on other farms are positively correlated indicating that the managerial cooperation is beneficial to those small farmers that engage in it. In addition, 14 percent of S/HP farmers admitted that other families, all of them relatives were involved in the management of their farm,
- The choice between ownership, lease options of land, machinery and equipment and any combination of ownership and lease options to gain some flexibility and to reduce the need for capital financing since the lease of land and machinery and equipment reduces the need for capital financing (Mishra et al., 1999).

Due to the correlation between age and education, the impact of each of these variables can not be easily isolated; young farmers are also the one more likely to have a higher education level. Then the effect of age may be due to the family life cycle effect or instead to the fact that young farmers are less risk averse than older ones as suggested in the literature. Age effect could also be observed through labor efficiency that might be higher with young farmers than old ones (we expect an increase in labor efficiency up to an optimal age and then a decrease as age increases after the optimal level). The higher the education level, the higher the management capacities and also the higher the labor efficiency. In terms of innovations, the educated farmers are supposed to be among the early adopters.

Both small profitable farmers (S/HP) and large profitable farmers (L/HP) are financially and cost efficient. They both have low average total costs and an illustration of this result using figure 2 (page 13) is that small profitable farms (S/HP) and large profitable farms (L/HP) are on BC segment. But, the average size of S/HP farms means they may be closer to B than L/HP farms who may be closer to C. Since they are both profitable farms, the difference in the level of net income comes from the level of sales. Small non-profitable farms (S/LP) have higher average total costs than S/HP and L/HP

farms. This means they may be on AB segment of figure 2. The net income ratio that is a proxy for per unit net income is still increasing on Segment AB from A to B. According to the theory of economies of size, S/LP farmers may have to increase their size to get on BC segments or fully utilize the capacity of physical capital and labor to become cost efficient.

A comparison of these farms with the other Iowa farms is summarized in table 26. L/HP and S/HP farmers share similar characteristics with Iowa high profit farms, particularly for financial profitability and efficiency. The exception is for the asset turnover ratio where S/HP are higher and L/HP are lower than average Iowa high profit farms. L/HP and S/HP have a debt to asset ratio lower than the average of high profit farms or all farmers in Iowa for 1991-1998.

Table 26: Comparison of L/HP, S/HP and S/LP farms to Iowa farms (average for 1990-1998)

	L/HP farms	S/HP farms	S/LP farms	High profit Iowa farms (1990-1998) (1)	Low profit Iowa farms (1990-1998) (1)	Iowa Large farms (250,000 or more) (1)	Iowa Small farms (1990-1998) (1)	
							40,000 to 99,999	100,000 to 249,999
Working capital	215,034	119,878	80,340	87,207	58,682	186,658	47,915	86,993
Debt to asset ratio	0.22	0.19	0.19	0. 27	0. 28	0.35	0.27	0. 32
Financial Profitability								
Net farm income ($)	105,925	61,971	14,912	79,068	14,134	75,042	14,496	34,177
Return on assets (ROA)	0.13	0.17	0.01	0.14	0.01	0.09	0.02	0.07
Return on equity (ROE)	0.17	0.21	-0.03	0.19	-0.06	0.09	-0.01	0.06
Operating profit margin ratio	0.36	0.31	0.04	0.32	0.03	0.20	0.05	0.16
Financial Efficiency								
Asset turnover ratio	0.38	0.55	0.22	0.44	0.27	0.36	0.34	0.36
Operating expense ratio	0.50	0.51	0.66	0.52	0.71	0.67	0.66	0.64
Depreciation expense ratio	0.07	0.06	0.11	0.07	0.11	0.07	0.09	0.08
Interest expense ratio	0.04	0.04	0.08	0.06	0.11	0.08	0.08	0.08
Net farm income ratio	0.39	0.39	0.15	0.37	0.09	0.16	0.18	0.20

Source: (1) Financial Performance Measures for Iowa Farms, ISU Extension publication FM 1845, 2000.

When comparing S/HP farms to Iowa small farms, S/HP farms appear to be more liquid, more solvent and more profitable. In addition, S/HP farmers are also more financially efficient; that is, they have much higher asset turnover and net farm income ratios, lower depreciation and interest expense ratios.

S/LP farmers share similar characteristics with Iowa low profit farms, particularly for financial profitability and efficiency. They differ in terms of liquidity and solvency levels and net farm income ratio. S/LP farmers share similar characteristics with small farms, particularly the farms with an agricultural production value of $40,000 to $99,999. These observations indicate that L/HP and S/HP are representative of Iowa high profit farms while S/LP are representative of Iowa low profit farms.

In conclusion, S/HP farmers are younger and better educated than average farmer of the sample of 73 farmers. They have high crop yields, low average costs, they are efficient in labor and machinery use as well as financially. All these indicate that S/HP farmers have above average management capacities and skills. S/HP farmers seem to have overcome the obstacle linked to their farm size through the mix between ownership and lease options for land, and machinery that give them more flexibility. They more efficiently use their investment capital as indicated by their high asset turnover ratio. The profile of small successful farmers in this study is similar to the one depicted in many other studies on factors of farm success.

E. Multiple Regression Model for the Estimation of Financial Success and Presentation of the Activities explaining the Farm Success

The present section uses the previous results identifying the major factors of success of small profitable farms relative to other farms groups, in a more formal model. This section also reports the farmers' subjective factors for farm success. The methods used for the analysis are descriptive statistics, t-tests and regression models.

1. Multiple regression model for the estimation of financial success

The regression model was estimated to verify the effects of major factors identified through pairwise comparisons. The regression helps limit the probabilities that some of the relationships observed between variables occurred by chance. It will formally capture the key factors of financial farm success, the magnitude of their effect and their significance. The whole sample was used for the model. Only the most significant factors identified in the previous analyses are included in the

regression. The main variables that determine farm financial success and their statistics are summarized in table 27.

The dependent variable is profit index (PI) defined by the following ratio:

PI ≡ Gross Profit/ Gross Profit – Management return. PI ranges from 0.59 to 1.61 with mean of 1.05. It is a proxy for farm profitability (farm financial success). The independent variables considered in the different equations are: education level, corn yield, soybean yield, percent of rented acres, percent of revenue from livestock, machinery per gross profit, labor per gross profit, machinery per gross profit squared, labor per gross profit squared.

Table 27: Variables descriptive statistics for multiple regression model

	Minimum	Maximum	Mean	Standard deviation	N
Age	33	75	53.48	11.97	73
Education (1)	1	3	1.85	0.88	73
Farm size ($ of sales)	45020.25	643,450.88	212,404.7	124,956.30	73
Percentage of rented acres	0.03	1.00	0.67	0.30	57
Percentage of rent expenses	0.00	0.41	0.13	0.11	73
Percentage of revenue from livestock	-38.22	57.42	15.90	17.27	73
Crop Yields					
Corn (bu/acre)	74.29	158.25	132.31	14.17	73
Soybean (bu/acre)	15.14	59.00	45.35	6.58	73
Dollars of labor per gross profit (2)	0.06	0.37	0.16	0.069	73
Dollars of machinery and equipment per gross profit (2)	0.10	1.54	0.55	0.30	73
Dollars of labor per crop acre ($/acre)					
Corn	22.82	158.62	58.48	27.71	72
Soybean	17.46	131.40	52.28	25.49	70
Dollars of machinery and equipment per crop acre ($/acre)					
Corn	2.41	88.80	37.92	19.51	73
Soybean	3.04	80.04	35.68	18.54	71
Profit index (PI)	0.59	1.61	1.05	0.23	73

Note: (1) 1 high school/technical school/GED or less, 2 some college education, 3 college degree or graduate degree.

(2) The second order terms of these variables are included in some of the equations.

A correlation matrix has been estimated to help detect the variables that are highly correlated and to reduce multicollinearity problems during the estimations (see appendix 1). It helps to reduce, avoid, the problem of overlapping explanatory variables or redundant variables observed in the design of the estimating model (Fox, Bergen and Dixon, 1993); problem mentioned in the literature review.

From the preliminary analyses, the negative correlation coefficient between profit index and age indicates that age and profitability move in opposite directions; that is, as age increases, the profitability decreases. L/HP and S/HP farmers are relatively younger than L/LP and S/LP farmers. But, the variable age is negatively correlated with almost all the listed variables. Thus, age has been left out of the model. Older farmers are relatively less educated and the combination of the two factors affects negatively the managerial capabilities of the old farmers and thus their financial and production efficiencies.

The variable percentage of rent expenses is positively correlated to the variable percentage of rented acres and is then removed from the pool of variables introduced in the model. Farm size has been left out because it is correlated to many of the explanatory variables (education, livestock percent revenue from livestock, second order term of the variable, "dollars of machinery per gross profit", dollars of labor per gross profit and its second order term) (appendix 1). Since no significant difference was detected between different farmers groups in relation with hog productivity, the variables related to hog production were not included in the model. In addition, the introduction of hog related variables would have reduced considerably the sample size to be used for the model and thus reduce the degrees of freedom.

There are other significant correlation coefficients between many of these variables in table 21 (see appendix 1 for correlation matrix). But, because of the importance of these variables in explaining the profitability of a farm business, they could not be removed from the model. It is the case of:

- education and dollars of labor per gross profit (the higher the education level, the higher the labor efficiency), and its second order term,
- percentage of revenue from livestock and dollars of machinery per gross profit and its second order term (it seems that the higher machinery efficiency is observed in livestock enterprises)
- corn yield and dollars of labor per gross profit (the higher the corn yield, the higher the labor efficiency), and its second order term,
- soybean yield and dollars of labor, machinery per gross profit (the higher the soybean yield, the higher the labor, machinery efficiency), and their second order term.

The variables, dollars of labor per acre, dollars of machinery and equipment per acre were dropped because the variables dollars of labor per gross profit and dollars of machinery per gross profit were more appropriate given the heterogeneity among farms. There are cash grain, pork, dairy, beef, cash grain and livestock farms.

The problem with survey data is that it is impossible to isolate the effect of factors and measure them independently of other external factors. Age and education explains yields or labor efficiency for example. The approach used here is the description of potential causal relationships between variables to explain potentially unexpected results.

The model selected is a multiple regression model, linear in the parameters and defined as;

$\hat{Y}i = \mathbf{X'b}$

Where,
Yi, is the profit index (PI)

X' is the vector of explanatory variables and constant,

b is the vector of estimated parameters

The dependent variable is profit index (PI) defined by the following ratio:
PI ≡ Gross Profit/ Gross Profit – Management return. PI ranges from 0.59 to 1.61 with mean of 1.05. The independent variables considered in the different equations are: education level, corn yield, soybean yield, percent of rented acres, percent of revenue from livestock, machinery per gross profit, labor per gross profit, machinery per gross profit squared, labor per gross profit squared.

Four equations have been estimated. The first one included all the independent variables and the second one was estimated without the squared terms (machinery per gross profit squared, labor per gross profit squared). An analysis of the residuals showed a pattern of unequal error variance (heteroschedasticity) and thus a need to transform the dependent variable to remedy the problem. Among the transformations tried (square root, log and inverse), the inverse transformation of PI corrected best the problem of heterogeneity of error variance. The third equation is similar to equation one, except that the dependent variable PI has been transformed into INVPI (inverse of PI). The fourth equation has INVPI as dependent variable and does not include squared terms, machinery per gross profit squared, labor per gross profit squared. The four equations are presented in table 28. The parameter estimates are reported as well as their t-values.

The results of the regression models show that the models using INVPI (inverse of profit index) as the dependent variable give better results (higher F value, higher R^2 and R^2adj). When interpreting the sign of the parameters, a negative sign means that the variable has a negative effect on the inverse of profit index and thus a positive effect on profit index. For the interpretation of regression results, the models with INVPI (equations 3 and 4) are the only ones to be considered.

From the equations 3 and 4, the education level has a positive effect on profitability but that effect is not significant. This is a surprising result since the t-test show that L/HP and S/HP farmers, the successful farmers, have an education level higher than that of non-successful farmers (S/LP) and the correlation between education and profit index is positive and significant (0.243).

A possible explanation to this result is that education level is significantly and negatively correlated to the value of labor per gross profit (-0.284). The higher the education level, the lower the value of labor per gross profit which is an indication of higher labor efficiency.

Table 28: Summary of the results of the regression models

PI = dependent variable (eq1 and eq2) INVPI= dependent variable (eq3 and eq4)

Variables	Equation1 (PI)	Equation2 (PI)	Equation3 (INVPI)	Equation4 (INVPI)
Corn yield per acre	3.105E-03 (2.481) *	2.72E-03 (2.086)*	-2.94E-03 (-2.437)*	-3.16E-03 (-2.603)*
Soybean yield per acre	-1.16E-04 (-0.034)	-3.39E-04 (-0.103)	1.838E-03 (0.605)	2.024E-03 (0.608)
Percent of rented acre	0.257 (4.131)*	0.287 (4.460) *	-0.289 (-4.853) *	-0.272 (-4.512)*
Labor/gross profit	-3.843 (-2.613)*	-1.395 (-3.449)*	1.797 (4.801) *	3.347 (2.347)*
(Labor/gross profit)^2	6.718 (1.549)	-	-	-4.376 (-1.040)
Machinery/gross profit	-0.570 (-2.216)*	-0.303 (-3.888)*	0.319 (4.430)*	0.414 (1.661)
(Machinery/gross profit)^2	0.140 (0.705)	-	-	-3.38E-02 (-0.176)
Education	3.683E-02 (1.603)	3.192E-02 (1.336)	-1.86E-02 (-0.841)	-2.18E-02 (-0.979)
Percent revenue from Livestock	1.561E-03 (1.258)	1.342E-03 (1.034)	-2.05E-03 (-1.707)	-2.15E-03 (-1.790)
Constant	1.066 (4.364)*	0.843 (3.710)*	1.096 (5.213)*	0.959 (4.048)*
R^2	**0.750**	**0.713**	**0.777**	**0.787**
R^2adj	**0.703**	**0.672**	**0.745**	**0.746**
F	**15.699***	**17.386***	**24.393***	**19.303***

Note: * significant at 5%. T-values are in parenthesis

According to the theory of human capital, it is likely that educated farmers would have better managerial skills than less educated farmers and as a result more likely to have better profits. The findings of studies on farm success factors are similar. However, as discussed later, the farmers themselves did not rank the formal education and training among the top five factors explaining farm success.

Equations 3 and 4 show that the percentage of revenue from livestock has a positive effect on the profitability. But it has been noted from preliminary analyses that beef and dairy farms in the sample studied were not profitable. This result seems to indicate that having a livestock enterprise (hog enterprise?) and a high percentage of revenue from livestock is a positive choice that can boost the profitability status of the farm. The profitable farms have a higher percentage of livestock (24 percent and 18 percent for L/HP and S/HP farmers, respectively) than non-profitable farms, S/LP (9 percent).

The percentage of rented acres definitely has a significant positive impact on profitability. It confirms the results of t-tests comparing S/HP farmers to L/HP and S/LP farmers and similar results found in the literature. As discussed in previous sections renting is a financially viable option that brings more flexibility especially to small farmers. But, depending on the rental arrangement, the farmer choosing to rent part or all the land he farms might not have the flexibility needed in the management of the farm. Cash rent seems to give more managerial freedom to farmers than crop share.

Equations 3 and 4 show that corn yields have a positive significant impact on profitability as expected but surprisingly the effect of soybean yield is not significant at all and a negative sign is even observed. This unexpected result can be explained by the existence of a significant correlation between soybean yield and corn yield (+0.287), percentage of livestock (+0.293), machinery per gross profit (-0.318), labor per gross profit (-0.373), machinery per gross profit squared (-0.284) and labor per gross profit squared (-0.360).

In equation 4, the first and second order terms for the labor value per dollars of gross profit and the machinery value per dollars of gross profit are introduced. The labor value per dollars of gross profit has a significant negative impact on profitability but its squared value has a positive non-significant effect on profitability. This indicates that the second order term can be left out of the equation.

The machinery value per dollars of gross profit has a non-significant negative effect on profitability and its second order term has a positive non-significant effect. Probably, the presence of the second order term here has negatively affected the impact of machinery value per gross profit on profit index.

In equation 3, the second order terms for the labor value per dollars of gross profit and the machinery value per dollars of gross profit are not introduced. The results then show that the labor value per dollars of gross profit and the machinery value per dollars of gross profit have a significant negative effect on profitability. As the value of the labor or machinery per gross dollar increases, the profit index decreases or, said differently, the higher the labor or machinery values per dollars of gross profit, the lower the profit index.

So the major factor of success is top/excellent managerial skills translating into labor and machinery use efficiency, high yields, percentage of rented acres and finally the choice of profitable enterprises, especially the proportion of livestock enterprise in the farm business. Farmers should be flexible and be able to make necessary adjustments in their farm business according to the economic environment. Given their managerial skills capacities, the availability of resources and the market conditions, farmers to be successful should determine:

- the optimal mixture between ownership and lease/rental options for land, machinery and equipment
- the optimal mixture of enterprises,
- the optimal size of their farm.

2. Presentation of the activities explaining the farm success

One of the sub-objective 4 was to report the farmers' subjective factors for farm success that is what they perceive as factors of farm success.

The farmers were asked to rank the activities/factors that explained farm success based on their own experience and their value system. They had to choose a score for each of the factors ranging from 1 "not important" to 5 "very important".

For the analysis, the computation of mean scores of farm success factors resulted in the overall ranking of success factors. Descriptive statistics and t-tests were used for the analysis.

For the whole sample of seventy-three farmers, the top five most important activities or factors for farm success have mean scores of more than four, meaning that they are important. They are in descending order of importance: hard work, timing, attention to details, accurate information about farming operation and careful consideration of available options. Government policies were ranked seventh and formal education and training, eighth (mean scores of 3.75 and 3.69, respectively, meaning somewhat important). So, for them, hard work is more important than formal training and education that are as important as government policies and even luck. T-tests show that the timing, the attention to details and getting the accurate information are as important as working hard.

The ranking of perceived factors for farm success may vary among farmers depending on their age and the size of their farm. The ranking of L/HP, S/HP and S/LP farmers are compared to complete the comparison between the three groups of farmers.

The average age of the whole sample of farmers is 53.5 years old. Except for their rankings, the five top factors are similar for the old farmers (53 years old and more) and the young farmers (who are less than 53 years old). They are hard work, accurate information about farming operation, timing, attention to details, careful consideration of available options (table 29). In addition, Older farmers value more the accurate information about farming operations than younger farmers do (T=2.067, p-value=0.042) and similarly collaborative decision making are more important to older farmers in explaining farm success than to younger farmers (T=2.181, p-value=0.033). For young and old farmers, hard work is important but management (expressed by timing, accurate information, attention to details, careful consideration of available options) is also important. Formal education and training are not listed among the top factors of success and is ranked seventh and eighth by old and young farmers respectively.

Table 29: Ranking of perceived factors of success by young and old farmers

Key to farm success	Old Farmers ≥53 years old	Young Farmers < 53 years old
Hard work	4.69 (1)	4.53 (2)
Accurate information about farming operation	4.66 (2)	4.24 (4)
Timing	4.38 (3)	4.60 (1)
Attention to details	4.34 (4)	4.49 (3)
Careful consideration of available options	4.00 (5)	4.05 (5)
Government policies	3.93 (6)	3.62 (7)
Formal education and training	3.86 (7)	3.58 (8)
Collaborative decision making	3.72 (8)	3.12 (10)
Luck	3.69 (9)	3.79 (6)
Intuitive decision-making	3.52 (10)	3.51 (9)
Off-farm employment	2.57(11)	2.47 (11)

Note: The ranks of the objectives are in parenthesis.

The comparison based on the size of the farm does not show any significant difference between the rankings of factors or success by large and small farmers. The top four factors explaining farm success are similar for the two groups. They are hard work, timing, accurate information about farming operation, attention to details. Once more, it appears that hard work is an important factor of farm success but other management related factors such as timing, accurate information about farming operation, attention to details are also important.

The rankings by L/HP, S/HP, S/LP are presented in table 30. The top four farming success factors, hard work, timing, attention to details and accurate information about farming operation are similar for L/HP, S/HP and S/LP farmers except for minor differences in their ranking (table 30).

Differences are observed in the importance given to hard work as compared to management related factors such as timing and attention to details. For L/HP and S/HP farmers, hard work is as important as timing and attention to details to farming success while this is not the case for S/LP farmers who give more importance to hard work than to timing and attention to details (table 30).

Table 30: Ranking of perceived factors of success by L/HP, S/HP and S/LP farmers

Key to farm success	L/HP (Large and profitable farms)	Percentage respondents choosing a score of 5	S/HP (Small and profitable farms)	Percentage respondents choosing a score of 5	S/LP (Small and non profitable farms)	Percentage respondents choosing a score of 5
Hard work	4.57^{1} (1)	71.4	4.61^{1} (2)	64.3	4.54^{1} (2)	62.5
Attention to details	4.50^{1} (2.5)	57.1	4.57^{1} (3)	57.1	4.17^{2} (4)	45.8
Timing	4.50^{1} (2.5)	57.1	4.64^{1} (1)	64.3	4.38^{2} (3)	58.3
Accurate information about farming operation	$4.21^{1,2}$ (4)	50.0	4.26^{2} (4)	40.7	4.75^{1} (1)	79.2
Careful consideration of available options	3.79^{2} (5)	21.4	4.25^{2} (5)	35.7	$3.92^{2,3}$ (6)	41.7
Formal education and training	3.57^{2} (6.5)	14.3	3.53^{3} (9)	14.3	3.75^{3} (7)	33.3
Government policies	3.57^{2} (6.5)	14.3	3.52^{3} (8)	11.1	$4.13^{2,3}$ (5)	41.7
Luck	3.36^{2} (8)	28.6	3.93^{3} (6)	35.7	3.71^{3} (8)	37.5
Intuitive decision-making	3.14^{3} (9)	14.3	3.64^{3} (7)	21.4	3.63^{3} (9)	20.8
Collaborative decision making	2.93^{3} (10)	7.1	3.29^{3} (10)	14.3	3.67^{3} (10)	20.8
Off-farm employment	2.14^{4} (11)	7.1	2.19^{4} (11)	0.0	3.08^{4} (11)	29.2

Note: The ranks of the objectives are in parenthesis. The means followed by same number within each column are not significantly different.

S/LP farmers also differ from the other farmers in the importance they attribute to accurate information about farming operation (most important factor for S/LP farmers) and government policies in explaining farm success. The perception of key factors for farming success is not significantly different for L/HP and S/HP but there are differences between S/LP farmers and S/HP farmers.

Overall, formal education and training is not ranked among the top five factors for farm success of L/HP, S/HP and S/LP farmers. Being educated is somewhat important but hard work, timing and attention to details are more important according to these farmers. Profitable farmers (L/HP and

S/HP farmers) rank formal training and education higher in terms of farm success than non-profitable farmers. The farmers think that hard work is important but managerial skills are also important, even more important in some cases, results in accordance with the literature on farm success. The results of the analysis indicate that while there is no significant difference in the ranking of factors for farm success between L/HP and S/HP farmers, the rankings by S/LP farmers significantly differs from that of S/HP farmers.

3. Conclusion

From the regression models, the key factors of farm success are high yields, labor and machinery use efficiency, percent of rented acres and the percent revenue from livestock. All these factors are related to management and therefore suggest the importance of management as a key success factor.

From the rankings by the farmers themselves of "subjective" factors for success, there are indications that hard work, timing of the operations, attention to details and the accurate information about farming operations are the most important factors. Except for hard work, the other factors are related to management. It seems that even though hard work is important, the timing of the operations, the attention to details and the accurate information about farming operations, all related to management are as important and even more so in some cases.

An interesting observation is the difference in the perception of factors explaining farm success between S/HP and S/LP and the similarity between the perceptions of L/HP and S/HP. The age difference could be an explanation of this observation. For the young farmers (and for S/HP farmers), the timing is essential. The young farmers (especially S/HP farmers) are more likely to rent land, machinery and equipment and thus to be more vulnerable to the problem of timing of the operations.

From these analyses, it appears the management is a key success factor. Castle et al. (1987) advised that anyone who becomes a farmer, must have well-developed managerial skills. They even added that there are many opportunities for farmers with excellent managerial abilities but only few opportunities for those with average managerial skills.

F. Profitability, Farm objectives and Success

One of the objectives of this study was to identify the relationship between profitability, farm objectives and success and more specifically, to characterize the farmers' perception of success. Three research questions were developed to guide the analysis in order to achieve this objective;

- Do small and large successful farmers have similar levels of success score?

- Do small successful farmers have higher success score than small unsuccessful farmers?
- Is the farm objective of making money more important to farmers than any non-monetary objective?

Respondents were asked to rank, on a 5 point scale from 1 "Not important" to 5 "Very important", the relative importance of a list of sixteen farm objectives (It is discussed later in this section).

Following the question on farm objectives, farmers were asked: "Now taken all together, how would you rate the success of your farm?"

The farmers had to choose a success score from 1 "Not successful" to 7 "Very successful" depending on their own perception of farm success and according to how they value each of the goal/ objectives. The mean success score for the whole sample of 73 farmers is 5.39.

For analysis convenience, perceived success index (PSI), was constructed based on mean success score of 5.39 by recoding the original categorical variable "success" as follow;

- PSI is 0 ("not successful"), if success score is equal to 1 to 5
- PSI is 1("successful"), if success score is equal to 6 or 7

PSI is a subjective measure of success and it refers to an internal assessment system by which farmers, based on their values and the cultural norms in their communities, determine whether they feel successful or not. This is contrasted with financial success (profitability), an objective measure of success, based on external criteria that could be observed by anyone.

To identify the relationship between profitability and perceived farm success, comparisons of mean success scores between L/HP, S/HP and S/LP farmers were conducted. In addition, cross tabulations between profit groups (L/HP to S/LP) and perceived success (0, 1) are used to identify the "special cases". These cases are constituted of farmers who have profitable farms (L/HP and S/HP) but who don't feel successful (PSI=0, success score of 5 or less) and the farmers whose farms are not profitable but who perceive themselves as successful (PSI=1, success score of 6 or 7).

The ranking of the objectives by the different groups of farmers is used to establish the non-monetary motivations of farmers and therefore to describe the connection between farm objectives and success and to complete the explanation of the association between profit and success.

After determining the relationship between profitability and success on one hand, and farm objectives and success on the other hand, a logistic model was estimated with the perceived success index (PSI) as dependent variable. The purpose of the logistic model was to estimate the effect of profit and farm objectives on the farmers' perception of success as well as the significance of those effects.

1. Profitability and success

The objective here is to identify and characterize the relationship between profit and farm success. Two research questions related to this objective are:

- Do small profitable farmers (S/HP) and large profitable farmers (L/HP) have similar levels of success scores?
- Do large profitable farmers (L/HP) and small profitable farmers (S/HP) have higher success score than small non-profitable farmers (S/LP)?

Descriptive statistics, t-tests, non-parametric tests such as Mann-Withney-Wilcoxon and Kruskal-Wallis procedures were used to compare the success score of the different farmers' groups and establish the relationship between profit and success.

a) Comparison of L/HP, S/HP and S/LP farmers' success perception

T-tests and the Mann -Whitney-Wilcoxon test were conducted to compare L/HP and S/HP, L/HP and S/LP, and S/HP and S/LP. The results of these tests are presented in table 31.

Table 31: Results of Mann-Whitney-Wilcoxon tests and T-tests comparing success mean scores and PSI for L/HP, S/HP and S/LP farmers

Mann-Whitney-Wilcoxon tests						
	Comparison L/HP and S/HP		Comparison L/HP and S/LP		Comparison S/HP and S/LP	
	Success	PSI	Success	PSI	Success	PSI
Mann Whitney U	172	168	104.5	97	226	242
Wilcoxon W	578	574	404.5	397	526	542
Z	-0.683	-0.888	-1.976	-2.494	-2.103	-2.005
Asymp. Sig (p-value)	0.495	0.375	0.048*	0.013*	0.035*	0.045*
T- tests						
	Comparison L/HP and S/HP		Comparison L/HP and S/LP		Comparison S/HP and S/LP	
	Success	PSI	Success	PSI	Success	PSI
T-value	0.497	0.886	2.022	2.697	2.258	2.069
p-value	0.622	0.381	0.057	0.011*	0.028*	0.044*

Note: * significantly different at 5%.

The results from Mann -Whitney-Wilcoxon tests and t-tests show that the mean success score of L/HP farmers (5.79), is not significantly different from the success score (5.64) of S/HP farmers. When rounding these mean scores to the closest integer, it appears that L/HP and S/HP farmers have on average a mean success score of 6, equivalent to a PSI of 1. On average, these farmers perceive themselves as successful.

The average success score of S/LP farmers, 4.96 (approximately 5), corresponds to a PSI with a value equal to 0. On average, they perceive themselves as somewhat successful but based on PSI, they are not successful. S/LP farmers' mean success score is significantly different (and smaller) from the success score of L/HP and S/HP farmers, as expected.

These results mean that the profit level does affect significantly the success score or indicator of the farmers' perception of success.

b) Identification of special cases

Table 32 presents a cross tabulation between the farmers' categories and the Perceived Success Index (PSI). The shaded cells represent those farmers who are either financially successful but do not perceive themselves as successful or those not financially successful but who perceive themselves as successful. Both groups of farmers may be very different. The farmers not financially successful who perceive themselves as successful may be labeled as "non profit maximizers". But financially successful farmers (S/HP and L/HP) who don't feel successful are not necessarily "non profit maximizers". For example, S/HP farmers who don't feel successful might have preferred to get a higher income than their current one.

Table 32: Repartition of farmers per profitability and per perceived success

Perceived Success Index (PSI)	L/HP (Large profitable farms)	L/LP (Large non profitable farms)	S/HP (Small profitable farms)	S/LP (Small non profitable farms)	Total
1 (successful)	10 (71.4%)	3 (50%)	16 (57.1%)	7 (29.2%)	36
0 (not successful)	4 (28.7%)	3 (50%)	12 (42.9%)	17 (70.8%)	36
Total	14 (100%)	6 (100%)	28 (100%)	24 (100%)	72

Those "special case" farmers confirm the fact that the concept of success is a broad concept that involves objective and subjective considerations, as well as profit and non-profit considerations. The objective considerations are linked to criteria external to individuals (here the farmers) such as the financial profitability that can be measured. Therefore, financial success refers more to the objective portion of the success concept.

The shaded cells indicate that the subjective considerations are internalized and weighed by farmers according to their own values and also are reflected in the farmers' perception of success. The ranking of the importance of farm goals falls under subjective considerations since they are specific to each individual farmer.

The concept of success, then, includes not only the financial dimension but also other dimensions that are linked to non-pecuniary motivations which could be revealed by the study of the farmers' ranking of the importance different farm goals. Almost twice as many S/HP farmers as L/HP farmers (43 percent and 29 percent, respectively) have financial success and yet don't feel successful or at most feel somewhat successful while more than a fourth of not financially successful farmers (S/LP) feel successful.

Another indirect way to determine the importance of profitability in the farmers' perception of success is to analyze the answers of the farmers to the question about whether or not they would choose to be farmers again if they had the choice. It is assumed that farmers who make profit are more likely to perceive themselves as successful and consequently they are more likely to choose farming as a career if they had it to do over again. Similarly the farmers who don't make profit are more likely to feel not successful and therefore they are more likely to hesitate (be unsure) or say no when asked if they had it to do over again, would they still choose farming as a career.

The hypothesis is the following: Successful farmers are more likely to choose farming as a career if they had the choice again compared to non-successful farmers. To test this hypothesis, a Mann - Whitney-Wilcoxon test was been carried out to compare successful farmers (PSI=1) to non-successful farmers (PSI=0) in relation with the proportion of farmers who would choose farming as a career again. The results of Mann-Whitney-Wilcoxon test were the following: Mann Whitney U of 450, Wilcoxon W of 117, Z of -3.321 and asymp. Sig. (p-value) of 0.001.

The hypothesis that successful farmers are more likely to choose farming as a career if they had the choice again compared to non-successful farmers is not rejected. The variable "choose farming again as a career" can be an indicator of the level of importance of profitability's impact versus that of non-monetary objectives on perceived success when used to compare different profit groups. Table 33 presents a cross tabulation between the farmers' categories and the variable "choose farming again as a career".

Table 33: Cross tabulation of profit groups and choice of farming as a career

Choose farming as a career again	L/HP (Large profitable farms)	L/LP (Large non profitable farms)	S/HP (Small profitable farms)	S/LP (Small non profitable farms)	Total
1 (yes)	12 (86%)	5 (83%)	23 (82%)	19 (76%)	59 (81%)
2 (no)	0 (0%)	0 (0%)	0 (0%)	2 (8%)	2 (3%)
3 (unsure)	2 (14%)	1 (17%)	5 (18%)	4 (16%)	12 (16%)
Total	14 (100%)	6 (100%)	28 (100%)	25 (100%)	73 (100%)

The shaded cells represent the farmers who are either financially successful and not sure/not willing to choose farming as a career again or the non-profitable farmers who are willing to choose farming as a career. Regardless of the profitability of the farm, approximately 80 percent of farmers or more in each group were willing to be farmers again if given the choice.

A Kruskal Wallis test was done to check the existence of any significant difference between farmers groups in the proportion of farmers who are willing to choose farming as a career again. The farmers who answered "no" or "unsure" were grouped together versus the group of farmers who said "yes".

The Kruskal Wallis statistic follows a Chi-Square distribution with a degree of freedom of 3 in this case. The value of the Kruskal Wallis statistic was 0.638, and P-value 0.888, which is greater than significance level of 0.05. Therefore the null hypothesis that all of the farm groups (ranging from L/HP to S/LP) have similar proportions of farmers who are willing to choose farming as a career again can not be rejected.

The perception of success by farmers affects significantly and positively their choice of farming as a career while the realization of high profits by the farmer does not. This result supports the claim that even though profitability is an important factor in the perception of success, there are other important non-monetary factors of success that compete with it.

Overall, the majority of the farmers involved in the study enjoy being farmers and are willing to choose farming if given the choice again even though some of them don't make profits now. This indicates once more that farming for most of them is a way of life more than a way of making a living.

The next step in the analyses is to identify the other factors, which are highly valued by farmers and that compete with profitability in the determination of success. To identify those factors, the ranking of the importance of a list of objectives by the farmers has been analyzed.

2. Farm objectives and success

The results in the previous section show that profitability is an important factor but apparently not necessarily the only factor in explaining the perception of success by farmers. It can be said that making profit is a necessary but not sufficient factor in explaining success. Therefore, maximizing profit is not necessarily the major objective (let alone the only objective); instead, it appears that the farmers are maximizing their utility, as discussed in the literature. Their utility is a function of the income they make but also other factors that bring them happiness such as family satisfaction, job satisfaction as mentioned by Ajwa (1991), and we would add community recognition.

It is assumed here that farmers who achieve higher utility levels are more likely to perceive themselves as successful.

The purpose of the analysis of the ranking of the importance of the farm objectives is to identify the other non-monetary objectives that are important to the farmers studied and thus affects positively their utility and success perception. The research question to be answered is; is the farm objective of making money more important to farmers than any non-monetary objective?

The ranking of a list of objectives by the farmers is based on the importance they give individually to each of these objectives. It is an internal process reflecting the farmers' values and thus, the subjective considerations involved in the concept of success as opposed to objective considerations such as profitability or financial success. The list of sixteen objectives which farmers were asked to rank the relative importance, on a 5 point scale from 1 "Not important" to 5 "Very important", is as follow:

Making money
Maintaining a certain lifestyle
Spending time with family
High production farm
Vacations
Place to raise a family
Working outside
Being my own boss
Feeding the world
Work with nature
Passing farm on to children
Passing on a family tradition
Ensuring adequate retirement
Being viewed as a conservationist
Being viewed as a good neighbor
Keeping my kids on the farm.

A mean score was computed for each of the farm objectives listed based on the choice of the farmers.

Following various classification approaches of farm objectives suggested by Gasson and Errington (1993), an adapted classification system has been used to group farm objectives into five categories:

- **Instrumental objectives:**

  making money, high production farm, vacations, ensuring adequate retirement,

- **Intrinsic objectives:**

  working outside, working with nature, being my own boss, maintaining a certain lifestyle,

- **Social objectives:**

  being viewed as a conservationist, being viewed as a good neighbor, feeding the world,

- **Family related objectives:**

  spending time with family, place to raise a family,

- **Intergenerational transfer related objectives:**

  passing on a family tradition, passing farm on to children, keeping my kids on the farm.

Most of t-tests will be used to analyze these original objectives. Due to the large number of objectives listed and ranked by farmers, there was a necessity to aggregate these objectives in a smaller number of new objectives. Five new farm objectives, instrumental objective, intrinsic objective, family objective, social objective and intergenerational transfer objective have been created to represent the five farm objectives' categories mentioned above.

The score attributed to each new farm objective corresponds to the average of the scores of the objectives listed under each category. The mean score of social objective is equal to the average of the scores of "being viewed as a good neighbor", "being viewed as a conservationist", and "feeding the world". The mean score of intrinsic objective is equal to the average of the scores of "working outside", "working with nature", "being my own boss", and "maintaining a certain lifestyle". Similarly, the mean score of instrumental objective, family objective and intergenerational transfer objective have been computed.

These new objectives are used as explanatory variables in the estimation of a logistic model to complete the analysis of the relationship between farm objectives and farmers' perception of success.

Descriptive statistics were used to establish the ranking of farm objectives. T-tests were used to detect significant differences, if any and to perform many sets of comparisons to ultimately identify the link between these objectives and the farmers' perception of success. The significance level used is 5 percent. Both original and new aggregated objectives are used in the analyses.

The analysis of the ranking of objectives starts with the comparison of the rankings of L/HP and S/LP farmers to those of S/HP farmers. Then the ranking of objectives by the whole sample of all seventy-three farmers is studied. Since L/HP are large farmers and S/HP small farmers, comparisons based on the size of the farm (small versus large farms) are also done. Similarly, S/HP farmers are younger than S/LP farmers and thus, comparisons based on the age of farmers are performed. These comparisons based on age of farmers or size of the farm should allow comparing the findings with the findings of some European studies synthesized by Gasson and Errington (1993).

a) Importance of objectives/goals for large profitable farmers (L/HP) and small profitable farmers (S/HP)

L/HP farmers rank making money as the number one objective (highest mean score) (table 34). However, having the farm as a place to raise a family and spending time with family are as important as making money since their mean scores are not statistically different. T-tests show that for L/HP farmers, the objectives of being viewed as a good neighbor, having a high production farm and being their own boss are statistically less important than making money.

Table 34: Ranking of objectives by L/HPand S/HP farmers

Farm Goals /Objectives	L/HP (Large and profitable farms)	Percentage respondent choosing a score of 4 or 5 (a)		S/HP (small and profitable farms)	Percentage respondent choosing a score of 4 or 5		Comparison L/HP and S/HP
		% of 4	% of 5		% of 4	% of 5	
Making money	4.93 (1)[1]	7.1	92.9	4.71 (3.5)[1]	21.4	75.0	T=1.73,p-val=0.046*
Place to raise a family	4.86 (2)[1]	14.3	85.7	4.71 (3.5)[1]	21.4	75.0	T=0.89, p-val=0.45
Spending time with family	4.64 (3)[1]	21.4	71.4	4.75 (2)[1]	17.9	78.6	T=-0.59,p-val=0.28
Being viewed as a good neighbor	4.57 (4)[2]	42.9	57.1	4.79 (1)[1]	14.3	82.1	T=-1.30,p-val=0.10
High production farm	4.43 (5)[2]	14.3	71.4	4.25 (8)[2]	32.1	46.4	T=0.60,p-val=0.275
Ensuring adequate retirement	4.43 (6)[2]	35.7	57.1	4.29 (7)[2]	21.4	7.1	T=0.45,p-val=0.326
Being my own boss	4.36 (7)[2]	28.6	57.1	4.64 (5)[1]	21.4	71.4	T=-1.19,p-val=0.121
Maintaining a certain lifestyle	4.29 (8)	28.6	50.0	4.14 (10)[2]	39.3	39.3	T=0.52,p-val=0.304
Working outside	4.21 (9)	14.3	57.1	4.32 (6)[2]	39.3	46.4	T=-0.34,p-val=0.368
Being viewed as a conservationist	4.14 (10)	28.6	42.9	4.14 (9)	42.9	35.7	T=0.00, p-val=0.50
Passing farm on to children	3.93 (11)	28.6	42.9	3.46 (14)	25.0	25.0	T=1.12,p-val=0.134
Work with nature	3.93 (12)	21.4	35.7	3.96 (11)	50.0	25.0	T=-0.13,p-val=0.897
Vacations	3.86 (13)	35.7	35.7	3.39 (15)	25.0	21.4	T=1.19,p-val=0.119
Passing on a family tradition	3.71 (14)	21.4	35.7	3.82 (12)	17.9	35.7	T=-0.29,p-val=0.38
Feeding the world	3.50 (15)	0.0	35.7	3.79 (13)	39.3	28.6	T=-0.75,p-val=0.229
Keeping my kids on the farm	2.92 (16)	15.4	15.4	2.82 (16)	17.9	7.1	T=0.26, p-val=0.40

Note: * significant at 5 percent. The ranks of the objectives are in parenthesis. The means followed by same number within each column are not significantly different.

(a) In the ranking of objectives, farmers had to choose a score for each of the objectives ranging from 1 "not important" to 5 "very important" with 4 meaning "important".

As seen in table 34, small profitable farmers (S/HP) ranked the goal of "being viewed as a good neighbor" as the most important goal even though statistically, it is not significantly different from the objectives of "making money" or "being my own boss".

Both L/HP and S/HP farmers enjoy being close to their family and having the opportunity to spend time with family. They place a high value on family related objectives such as have a place to raise children and spending time with family, all made possible by living and working on the farm. L/HP farmers value making money more than S/HP farmers; 93 percent of L/HP farmers rank making money as very important versus only 75 percent of S/HP farmers. A t-test shows that this difference is statistically significant.

In the top five objectives, large and profitable farmers (L/HP) have two instrumental objectives listed, one more than the S/HP farmers. A high proportion of S/HP farmers (82 percent) value "being viewed as a good neighbor" as "very important" compared to 57 percent of L/HP farmers. S/HP farmers ranked this social objective first while L/HP farmers ranked it fourth. The difference however is not statistically significant at the 5 percent level. These results indicate that large and profitable farmers (L/HP) place a higher value on instrumental objectives than S/HP farmers do.

Small profitable farmers (S/HP) appear to value the intrinsic aspects of farming relatively more than L/HP farmers; among the top five objectives, they have an intrinsic objective ("being my own boss") while L/HP farmers have no intrinsic objective in the top five objectives.

More analysis was conducted to verify the robustness of the results presented above, particularly the use of aggregated objectives. The comparison of the importance of the five aggregated objectives for L/HP and S/HP farmers yielded the results summarized in table 35.

For large and small profitable farms (L/HP, S/HP), the family objective is the most important objective and is statistically more important than aggregated instrumental objective.

Table 35: Importance of aggregated objectives/goals for L/HP and S/HP farmers

Aggregated farm goals /objectives	L/HP	S/HP	Comparison L/HP and S/HP (T-tests)
Family objective	4.7500[1] (1)	4.7321[1] (1)	T=0.118, p-value=0.907
Intrinsic objective	4.1964[2] (3)	4.2679[2] (2)	T=-0.402, p-value=0.690
Social objective	4.0714[3] (4)	4.2381[2] (3)	T=-0.768, p-value=0.447
Instrumental objective	4.4107[2] (2)	4.1607[2] (4)	T=1.659, p-value=0.105
Intergenerational transfer objective	3.5128[3] (5)	3.3690[3] (5)	T=0.423, p-value=0.675

Note: The means followed by same number in each column are not significantly different. The ranking of each objective is in parenthesis.

For L/HP farmers, the instrumental objective is the second most important objective but not statistically different from intrinsic objective.

The value to small profitable farmers (S/HP) of the aggregated intrinsic objective, second most important objective, is not statistically different from that of the aggregated instrumental objective.

The value of aggregated instrumental objective to L/HP farmers is higher than that of S/HP farmers but this difference is not statistically significant.

b) Importance of objectives/goals for small profitable farmers (S/HP) and small non-profitable farmers (S/LP)

Being viewed as a good neighbor is the most important objective for both S/HP and S/LP farmers since it has been ranked first by both groups (table 36). But for S/HP and S/LP farmers, the value of being viewed as a good neighbor is not significantly different from the value of making money (third position for both S/HP and S/LP farmers) or that of being one's own boss.

S/HP farmers place more value on family related objectives (spending time with family, have a place to raise a family among top five objectives) than S/LP farmers do (no family objectives are in the top five objectives). S/LP farmers are older than S/HP farmers, probably most of their children are living away and so to them, family considerations (like having a place to raise a family) are less important compared to their other objectives such as autonomy, working conditions, recognition of their community (good neighbor, a conservationist).

S/LP farmers have two more intrinsic objectives than S/HP farmers among the top five objectives. This difference could be explained once more by the age gap between them. For S/LP farmers, it may not be so much having a place to raise a family that matters the most but instead the open air lifestyle (working outside, working with nature) rendered possible by living and working on the farm.

Further analyses have been carried out using aggregated objectives (table 37). The aggregated intrinsic objective is not significantly different from the aggregated social objective for both S/HP and S/LP who are small farmers. The aggregated instrumental objective is less valued than aggregated intrinsic and social objectives by both S/HP and S/LP farmers but the only significant differences are observed for S/LP farmers.

These results are similar to the results obtained from the previous analyses, which showed that small farmers valued highly intrinsic objective compared to instrumental objective.

Table 36: Ranking of objectives by S/HP and S/LP farmers

Farm Goals /Objectives	S/HP (Small and profitable farms)	Percentage respondent choosing a score of 4 or 5 (a)		S/LP (Small and non profitable farms)	Percentage respondent choosing a score of 4 or 5		Comparison S/HP and S/LP
		% of 4	% of 5		% of 4	% of 5	
Being viewed as a good neighbor	4.79[1] (1)	14.3	82.1	4.83[1] (1)	16.7	83.3	T=-0.38,p-val=0.35
Spending time with family	4.75[1] (2)	17.9	78.6	4.46 (6.5)	16.7	66.7	T=1.48,p-val=0.07
Making money	4.71[1] (3.5)	21.4	75.0	4.71[1,2] (3)	20.8	75.0	T=0.04,p-val=0.48
Place to raise a family	4.71[1] (3.5)	21.4	75.0	4.38 (8)	12.5	70.8	T=1.34,p-val=0.09
Being my own boss	4.64[1] (5)	21.4	71.4	4.75[1,2] (2)	16.7	79.2	T=-0.66,p-val=0.26
Working outside	4.32 (6)	39.3	46.4	4.63[2] (4)	20.8	70.8	T=-1.58,p-val=0.06
Ensuring adequate retirement	4.29 (7)	21.4	57.1	4.38 (9)	25.0	58.3	T=-0.34,p-val=0.37
High production farm	4.25 (8)	32.1	46.4	3.88 (13)	20.8	37.5	T=1.47,p-val=0.07
Being viewed as a conservationist	4.14 (9	42.9	35.7	4.46 (6.5)	37.5	54.2	T=-1.59,p-val=0.06
Maintaining a certain lifestyle	4.14 (10)	39.3	39.3	4.17 (10)	25.0	50.0	T=-0.09,p-val=0.46
Work with nature	3.96 (11)	50.0	25.0	4.54 (5)	20.8	66.7	T=-2.73,p-val=0.00*
Passing on a family tradition	3.82 (12)	17.9	35.7	3.63 (14)	12.5	37.5	T=0.60,p-val=0.28
Feeding the world	3.79 (13)	39.3	28.6	3.96 (11)	25.0	41.7	T=-0.55,p-val=0.29
Passing farm on to children	3.46 (14)	25.0	25.0	3.92 (12)	12.5	50.0	T=-1.26,p-val=0.11
Vacations	3.39 (15)	25.0	21.4	3.42 (15)	8.3	25.0	T=-0.08,p-val=0.47
Keeping my kids on the farm	2.82 (16)	17.9	7.1	2.58 (16)	16.7	12.5	T=0.66,p-val=0.26

Note: * significant at 5%. The ranking of each objective is in parenthesis. The means followed by same number within each column are not significantly different.

(a) In the ranking of objectives, farmers had to choose a score for each of the objectives ranging from 1 "not important" to 5 "very important" with 4 meaning "important".

Table 37: Importance of aggregated objectives/goals for S/HP and S/LP farmers

Aggregated farm goals /objectives	S/HP	S/LP	Comparison S/HP and S/LP (T-tests)
Intrinsic objective	4.2679[2] (2)	4.5208[1] (1)	T=-1.941, p-value=0.058
Social objective	4.2381[2] (3)	4.4167[1] (2.5)	T=-1.090, p-value=0.281
Instrumental objective	4.1607[2] (4)	4.0938[2] (4)	T=0.401, p-value=0.690
Family objective	4.7321[1] (1)	4.4167[1] (2.5)	T=1.1683, p-value=0.101
Intergenerational transfer objective	3.3690[3] (5)	3.3750[3] (5)	T=-0.020, p-value=0.984

Note: The means followed by same number in each column are not significantly different. The ranks of the objective are in parenthesis.

To S/HP farmers, unlike S/LP farmers, the family objective is significantly more important than the intrinsic objective and this result, similar to the one just mentioned in the paragraphs above, can be explained by the age difference. Even though there are differences due to the age gap, overall these small farmers value highly non-monetary objectives (family, intrinsic and social objectives). This is consistent with the findings of Gasson and Errington (1993) that smaller farmers, unlike larger farmers, value intrinsic objectives more than instrumental objectives.

c) Importance of objectives/goals for the farmers of Iowa (whole sample)

More analysis was conducted to verify the robustness of the results presented above, namely the comparison of the objectives for the whole sample of farmers. Table 38 summarizes the ranking of the objectives for the whole sample of seventy-three farmers.

Table 38: Importance of objectives/goals for the farmers of Iowa (whole sample)

Farm Goals /Objectives	Objectives category	Mean scores	% of "very important" score	Rank
Making money	Instrumental	4.78[1]	80.6	1
Being viewed as a good neighbor	Social	4.76[1]	77.8	2
Being my own boss	Intrinsic	4.65[1]	73.6	3
Place to raise a family	Family	4.61[1]	75.0	4.5
Spending time with family	Family	4.61[1]	72.2	4.5
Working outside	Intrinsic	4.46[2]	61.1	6
Ensuring adequate retirement	Instrumental	4.35[2]	58.3	7
Being viewed as a conservationist	Social	4.29[2]	47.2	8
Work with nature	Intrinsic	4.28[3]	44.4	9
High production farm	Instrumental	4.18[3]	48.6	10
Maintaining a certain lifestyle	Intrinsic	4.14[3]	45.8	11
Passing farm on to children	Intergenerational transfer	3.81[4]	41.7	12
Vacations	Instrumental	3.76[4]	26.4	13
Passing on a family tradition	Intergenerational transfer	3.72[4]	38.9	14
Feeding the world	Social	3.51[5]	33.3	15
Keeping my kids on the farm	Intergenerational transfer	2.81[6]	12.9	16

Note: The means followed by same number are not significantly different.

Even though "making money" is ranked first, t-tests show that there is no significant difference between the objectives "making money"(instrumental), "being viewed as a good neighbor"(social), "being my own boss"(intrinsic), "place to raise a family"(family) and "spending time with family"(family). This indicates that for the farmers studied, they attach as much value to being viewed as a good neighbor, spending time with family or being their own boss as to making money.

Consequently, from these results, it can be concluded that the farm objective of making money is not always more important to farmers than any non-monetary objective. This indicates the theory of the firm, which states that the objective of a rational economic agent is to maximize profits, could be quite restrictive. It appears from the results that the farmers have a multitude of objectives and are "satisficing" rather than maximizing their profits as mentioned by Gasson and Errington (1993). Therefore, farmers may have a low profit farm but still perceive themselves as successful since their other objectives are satisfied.

Gasson and Errington (1993), from many European studies they synthesized, reported that instrumental objectives have relatively lower scores than social and intrinsic objectives. These findings are similar to the ones of the present study; besides "making money" that has a high score, the other instrumental objectives (ensuring adequate retirement (7^{th}), high production farm (10^{th}), vacation (13^{th})) have lower scores (table 38).

The use of the five aggregated objectives -instrumental objective, intrinsic objective, family objective, social objective, and intergenerational transfer objective- indicates that the most important objective to farmers is the family objective (table 39). The instrumental objective is significantly less important than the family and intrinsic objectives and this result is similar to the one found in Europe by Gasson and Errington (1993), Gasson et al. (1988). Overall, farmers as a whole enjoy spending time with their family, have a place to raise their family as well as working outside, being their own boss, more than having a high production farm with larger profits.

This explains why some of these farmers, who are not financially successful, are willing to be farmers if they had to choose a career again. The results emphasize once more the choice of farming by many of these people as a way of life more than a way of making a living. Even though making money is essential, it seems that the rewards of the farming life to go beyond pecuniary considerations.

Table 39: Importance of aggregated objectives/goals for the farmers of Iowa (whole sample)

Aggregated farm goals /objectives	Objective category	Mean scores	Rank
Family objective	Family	4.6111[1]	1
Intrinsic objective	Intrinsic	4.3646[2]	2
Social objective	Social	4.2593[3]	3
Instrumental objective	Instrumental	4.2049[3]	4
Intergenerational Transfer objective	Intergenerational Transfer	3.9171[4]	5

Note: The mean scores followed by same number are not significantly different.

d) Importance of objectives/goals for large farmers and small farmers

Since L/HP are large farmers and S/HP small farmers, the comparison of the ranking of objectives by L/HP and S/HP farmers can be extended to comparisons between large and small farmers. The volume of sales was used as a measure of the farm size. Farms that have $250,000 of sales or more are considered large farms (L/HP and L/LP). Farms with less than $250,000 of sales are considered small farms (S/HP and S/LP). The results of the comparisons of the importance of farm objectives/goals based on the size of the farm are presented in table 40.

Making money was ranked as very important by 95 percent of large farmers compared to 75 percent of small farmers. Not only making money is significantly more important to large farmers than being viewed as a good neighbor or being their own boss but, making money is significantly more important to large farmers than to small farmers, indicating that large farmers value "making money" more highly than small farmers.

Table 40: Importance of objectives/goals based on the size of the farm

Farm Goals /Objectives	Objective category	Large farmers			Small farmers		
		Mean score	% of "very important" score	Rank	Mean score	% of "very important" score	Rank
Making money	Instrumental	4.95[1]	95.0	1	4.71[2]	75.0	2
Place to raise a family	Family	4.75[1]	80.0	2	4.56[2]	73.1	5
Being viewed as a good neighbor	Social	4.65[2]	65.0	3	4.81[1]	82.7	1
Spending time with family	Family	4.60[2]	70.0	4	4.62[2]	73.1	4
Being my own boss	Intrinsic	4.55[2]	70.0	5	4.69[1,2]	75.0	3
Working outside	Intrinsic	4.45[2]	70.0	6.5	4.46[3]	57.7	6
High production farm	Instrumental	4.45[2]	65.0	6.5	4.08[3]	42.3	11
Ensuring adequate retirement	Instrumental	4.40[2]	60.0	8	4.33[3]	57.7	7
Being viewed as a conservationist	Social	4.30[3]	5.0	9	4.29[3]	44.2	8
Work with nature	Intrinsic	4.15[3]	45.0	10.5	4.23[3]	44.2	9
Passing farm on to children	Intergen. transfer	4.15[3]	55.0	10.5	3.67[4]	36.5	14
Maintaining a certain lifestyle	Intrinsic	4.10[3]	50.0	12	4.15[3]	44.2	10
Passing on a family tradition	Intergen. transfer	3.85[3]	45.0	13	3.73[4]	36.5	13
Vacations	Instrumental	3.80[3]	35.0	14	3.40[5]	23.1	15
Feeding the world	Social	3.35[4]	30.0	15	3.87[4]	34.6	12
Keeping my kids on the farm	Intergen. transfer	3.11[4]	22.2	16	2.71[6]	9.6	16

Note: The mean scores followed by same number within each column are not significantly different.

For small farmers, the social objective of "being viewed as a good neighbor" is the most important of the objectives; 83 percent rank it as very important and it has the highest mean score on the list of sixteen objectives. "Making money"(instrumental objective) is not statistically different from "being my own boss" (intrinsic objective), "spending time with family" or have a "place to raise a family". The mean scores of "being my own boss" and "being viewed as a good neighbor" are not statistically different while the mean scores of "being my own boss" and "making money" are statistically different; an explanation could be the difference in the variances.

These results are similar to the results of the comparison between L/HP and S/HP farmers and to the findings in European studies reported by Gasson and Errington (1993) which suggest that large farmers value the instrumental objective more than small farmers.

To conclude this section on the comparison of the importance of objectives based on farm size, an analysis based on aggregated objectives is performed (table 41). The aggregate family objective is the most important objective to both large and small farmers. To small farmers, the aggregated family, intrinsic or social objectives are significantly more important than the aggregated instrumental objective. For large farmers, the aggregated instrumental objective has a higher score than the intrinsic and social objectives but the only significant difference is with social objective (table 41).

Table 41: Comparison of the importance of aggregated objectives between larger and smaller farmers

Aggregated farm goals /objectives	Large farmers	Small farmers	Comparison large and small farmers (T-tests)
Family objective	4.6750[1] (1)	4.5865 [1](1)	T=0532, p-value=0.597
Intrinsic objective	4.3125[1,2] (3)	4.3846[2] (2)	T=0529, p-value=0.598
Social objective	4.1000 [3] (4)	4.3205[2] (3)	T=1.314, p-value=0.193
Instrumental objective	4.4000[2] (2)	4.1298[3] (4)	T=-1.817,p-value=0.074
Intergenerational Transfer objective	4.0000[3] (5)	3.8577[4] (5)	T=-1.013, p-value=0.315

Note: The means followed by same number in each column are not significantly different. The ranking of each objective is in parenthesis.

The fact that small farmers value significantly more intrinsic objectives than instrumental ones while large farmers value relatively more instrumental objectives than intrinsic objectives may be explained by the type of business arrangement of farms. Most of large farms are corporations, mainly family corporations, and small farms are more sole proprietorship. This could affect the values and objectives of farmers. As such, the pressure for making profit is likely to be more intense in

corporations than sole proprietorship business arrangements. Therefore, maximizing profits may be a priority to large farmers compared to small farmers.

Another explanation of the difference in objectives for the two groups may be the level to which ownership, management and labor intersect as suggested by Gasson and Errington (1993). Small farmers, compared to large farmers, are more likely to be owners, manager and provider of most of manual labor. Thus they may enjoy more the autonomy in the decisions, the freedom from supervision and the full control over the organization of the work and also over the fruits of labor. These assumptions offer an explanation to why small farmers value more intrinsic objectives than instrumental objectives.

Giles and Mills (1971) cited by Gasson and Errington (1993) found that regardless of the way farm size was measured, small farm managers were the most likely to find being their own boss the most rewarding aspect of the farm job.

Once more, it appears that making money is not always more important to farmers than non-monetary objectives.

e) Importance of objectives/goals for younger and older farmers

The comparison analysis of objectives, between S/HP and S/LP farmers, is extended to a comparison based on age, since S/HP farmers are on average younger than S/LP farmers. The sample average age of 53.47 justifies the selection of 53 as the cut of point; farmers who are 53 years old or more are classified as older farmers while younger farmers are those who are less than 53 years old.

An analysis of the original objectives provides more details on the nature of the difference in the values of younger and older farmers (table 42).

Compared to younger farmers (using t-tests), older farmers place higher value on:

- the intrinsic aspects of their work : being my own boss, working outside, work with nature, 3rd, 4th and 7th for older farmers versus 5th, 6th and 11th for younger farmers, respectively,
- social objectives; being a good neighbor, being viewed as a conservationist, 1st and 5th for older farmers versus 3rd and 10th for younger farmers, respectively,
- ensuring adequate retirement, an instrumental objective, 6th for older farmers versus 8th for younger farmers.

Instead, younger farmers value more being close to their family, "spending more time with family", "place to raise a family" than older ones, as expected. Younger farmers have relatively young children who most likely live with them as opposed to older farmers whose children are older and thus likely to live away from them.

Table 42: Importance of objectives/goals based on the age of the farmer

Farm Goals /Objectives	Objective category	Older Farmers (≥ 53 years old)			Younger Farmers (< 53 years old)		
		Mean scores	% of "very important" score	Rank	Mean scores	% of "very important" score	Rank
Being viewed as a good neighbor	Social	4.81	35.0	1.5	4.73	43.1	3
Making money	Instrumental	4.81	36.13	1.5	4.76	44.47	1.5
Being my own boss	Intrinsic	4.74	33.3	3	4.59	40.3	5
Working outside	Intrinsic	4.68	30.55	4	4.29	30.55	6
Being viewed as a conservationist	Social	4.58	27.76	5	4.07	19.45	10
Ensuring adequate retirement	Instrumental	4.58	31.94	6	4.17	26.38	8
Work with nature	Intrinsic	4.52	26.36	7	3.98	18.04	11
Place to raise a family	Family	4.48	31.94	8	4.71	43.06	4
Spending time with family	Family	4.42	27.77	9	4.76	44.45	1.5
High production farm	Instrumental	4.19	18.05	10	4.17	30.55	7
Maintaining a certain lifestyle	Intrinsic	4.13	22.21	11	4.15	23.59	9
Passing farm on to children	Intergen. transfer	4.00	25.02	12	3.66	16.68	13
Feeding the world	Social	3.90	18.04	13	3.59	15.26	15
Passing on a family tradition	Intergen. transfer	3.84	22.23	14	3.71	16.67	12
Vacations	Instrumental	3.34	12.51	15	3.61	13.89	14
Keeping my kids on the farm	Intergen. transfer	2.73	5.73	16	2.88	7.17	16

When considering the five first objectives, it appears that older farmers enjoy not only making money, but also their autonomy and working environment (in open air) as well as the social aspects; namely, the recognition in their community, that is, being perceived as a good neighbor and/or as a conservationist. While for younger farmers, in addition to enjoying making money, they appreciate spending time with their family, raising their families on the farm, as well as their autonomy and being viewed as good neighbors. The results obtained are similar to those obtained from the comparisons of S/HP and S/LP farmers.

When comparing these results to the results of the West Midlands Study, and the East Anglian Study, cited by Gasson and Errington (1993), there are similarities between the different sets of results. In Iowa, older farmers give more importance to social objectives than do younger ones: being perceived as good neighbors (1^{st}, 3^{rd} respectively) or conservationists (5^{th}, 10^{th} respectively).

Similarly, older farmers give more importance to intrinsic aspects of farming than younger ones; namely autonomy (3rd and 5th respectively) and working outside (4th and 6th respectively).

The emphasis on social objectives was observed with older East Anglian farmers (more than 45 years old) while emphasis on intrinsic and social objectives was observed in the West Midlands Study. Actually, in this West Midlands study, the authors found that the importance of financial objectives decreased with age while intrinsic and social objectives gained in importance with age (Robinson, 1984 cited by Gasson and Errington (1993)).

Further analysis has been carried out comparing aggregated objectives and the results are presented in table 43.

Table 43: Comparison of the importance of aggregated objectives/goals between older and younger farmers

Aggregated farm goals /objectives	Older farmers (≥ 53)	Younger farmers (< 53)	Comparison older and younger farmers (T-tests)
Family objective	4.4516[1] (2)	4.7317[1] (1)	T=-1.905, p-value=0.061
Intrinsic objective	4.5161[1] (1)	4.2500[2] (2)	T=2.229, p-value=0.029*
Social objective	4.4301[1] (3)	4.1301[3] (4)	T=2.009, p-value=0.048*
Instrumental objective	4.2419[2] (4)	4.1768[2] (3)	T=0.474, p-value=0.637
Intergenerational transfer objective	3.9194[3] (5)	3.4083[4] (5)	T=-0.855, p-value=0.396

Note: * significant at 5 percent. The means followed by same number in each column are not significantly different. The ranking of each objective is in parenthesis.

The main result of this comparison is that older farmers value intrinsic and social objectives more than younger farmers and it is similar to those obtained from the comparisons of S/HP and S/LP farmers. This result is consistent with the findings of the West Midlands study by Robinson in 1984 (cited by Gasson and Errington (1993)); that is, "older farmers are more conscious of the values held by the community" and that intrinsic and social goals become more important to the farmers as they grow older.

3. Estimation of a logistic model

One of the objectives of this study was to identify the relationship between profitability, farm objectives and success and more specifically, to characterize the farmers' perception of success (sub-objective 5). After the determination of the relationship between profitability and success, and between farm objectives and success, a logistic model was estimated to assess the effect of profit and farm objectives on the farmers' perception of success as well as the significance of those effects.

Due to the large number of objectives listed and ranked by farmers (sixteen) and the relatively small size of the sample (seventy-three farmers), it was necessary to have the model with a limited

number of explanatory variables and therefore consider a reduced number of objectives. The five farm objectives, Instrumental, Intrinsic, Social, Family, and intergenerational transfer objectives were used as explanatory variables. Other independent variables such as profit index, farm size, farmers' age and education level were also used. The value attributed to each new farm objective corresponds to the average of the values for the objectives listed under each category.

In the model, the dependent variable is the perceived success index (PSI). PSI is 0, if success score is equal to 1 through 5, and PSI is 1, if success score is equal to 6 or 7. The descriptive statistics of the variables are summarized in table 44.

Table 44: Variables descriptive statistics for the logistic model

	Minimum	Maximum	Mean	Standard deviation	N
Age	33	75	53.48	11.97	73
Education (1)	1	3	1.85	0.88	73
Farm size ($ of sales)	45,020.25	643,450.88	212,404.70	124,956.30	73
Family objective	2.50	5.00	4.61	0.63	72
Intrinsic objective	3.00	5.00	4.36	0.52	72
Instrumental objective	2.25	5.00	4.20	0.57	72
Social objective	3.00	5.00	4.26	0.64	72
Intergenerational transfer objective	1.00	5.00	3.46	1.08	70
Profit index (PI)	0.59	1.61	1.05	0.23	73
Perceived success index (PSI) (2)	0.00	1.00	0.50	0.50	72

Note: (1) 1 high school/technical school/GED or less (N_1= 34), 2 some college education (N_2=16), 3 college or graduate degree (N_3= 23).
(2) 0 not successful (N_0= 36), 1 successful (N_1=36).

The farm objectives, farm size, age and profit index were entered in the model as continuous variables but PSI and education level were included as categorical variables.

The fitted logit response function from the estimation is:

$\hat{\pi}' = b'X$ where $\hat{\pi}' = \log_e(\hat{\pi} / 1 - \hat{\pi})$

Let Xi increase of one unit from Xi_1 to Xi_2 ($Xi_2 = Xi_1 + 1$). Then the difference between the two fitted values is bi; $bi = \pi'(Xi_2) - \pi'(Xi_1)$

$\hat{\pi}'(Xi_1) = \log_e(\hat{\pi}1 / 1 - \hat{\pi}1) = \log_e(\text{estimated odds1})$, for convenience it is written $= \log_e(\text{odds1})$,

$\hat{\pi}'(Xi_2) = \log_e(\hat{\pi}2 / 1 - \hat{\pi}2) = \log_e(\text{estimated odds2}) = \log_e(\text{odds2})$

The parameter estimate bi measures the effect of a change, say an increase of one unit, in the explanatory variable Xi from Xi_1 to Xi_2.

$bi = \pi' (Xi_2) - \pi' (Xi_1) = \log_e(\text{estimated odds2}) - \log_e(\text{estimated odds1}) = \log_e(\text{odds2}) - \log_e(\text{odds1}) = \log_e(\text{odds2/odds1}) = (\pi 2/1 - \pi 2) / (\pi 1/1 - \pi 1)$

Where:

1) Odds = $\pi i/1 - \pi i$, πi being the probability of success perception (Yi =PSI =1)and $1 - \pi i$, the probability of non success perception ((Yi =PSI =0).
2) Odds2/odds1 = exp(bi) and odds2/odds1 is the estimated odds ratio.

The results of the estimations are presented in table 45. The parameter estimates **b** and the odds ratios given by **exp (b)** are reported as well as the significance levels (p-values), The details for the logistic model are in appendix 2.

The goodness of fit test gives a chi-square value of 9.5723 and a p-value of 0.2963 for the model meaning that the null hypothesis Ho: The model is appropriate, can not be rejected since 0.2963 > 0.05.

The odds that farmers will feel successful increase by over 40 fold with a unit increase in profit index, ceteris paribus. That is, the odds that a farmer with a profit index of 1.59 feels successful are 40 times greater than the odds of a farmer with a profit index of only 0.59. Therefore profit has a positive significant effect on farmers' perception of success, as expected.

The odds that farmers perceive themselves as successful increases by about 8 percent with each additional $10,000 of sales, ceteris paribus. That is, the odds that a farmer with $100,000 of sales feels successful are 8% greater than the odds of a farmer with only $90,000.

Thus, the farm size has a positive significant effect on farmers' success perception. It is not surprising because farmers often consider big farm, big machinery/equipment as prestigious. In addition, large farms are more likely to get more income too.

The odds that farmers who have a high school/technical school/GED degree or less, perceive themselves as successful are 2 times as great as that of farmers with a college or graduate degree. The odds of farmers who have some college education to perceive themselves as successful increases by 58 percent compared to the odds of farmers who hold a college or graduate degree. This result suggests that the higher the education, the less likely will farmers perceive themselves as successful. It could be that farmers with high education levels have a higher opportunity cost of labor and due to the low returns to labor or management in the agricultural sector, they might feel unsuccessful. This could illustrate why some S/HP farmers who are financially successful, still do not perceive themselves as successful.

Table 45 : Summary of the results of the logistic model (PSI = dependent variable)

Variables	Estimated regression coefficients (b)	Estimated Odds Ratio (Exp (b))
Age (10^1)	0.0014 (0.9967)[1]	1.0014
Education [2]		
Education (1)	0.8931 (0.2413)	2.4427
Education (2)	0.6158 (0.4488)	1.8512
Farm size (10^4)	0.728 (0.183)	1.0755
Family objective	0.5112 (0.4136)	1.6674
Intrinsic objective	2.2191 (0.0353)*	9.1989
Instrumental objective	-0.9816 (0.1245)	0.3747
Social objective	0.1392 (0.8547)	1.1493
Intergenerational transfer objective	-0.6382 (0.0455)*	0.5282
Profit index (PI)	3.7099 (0.0453)*	40.8514
Constant	-12.3893 (0.0179)*	-
-2 log likelihood	76.021	
Goodness of Fit	63.638	
Chi- Square		
Model	20.963	
Significance	0.0214	
Percent correct predictions:	68.57%	
Goodness -of -fit test		
Chi- Square	9.5723	
Significance	0.2963	

Note: * significant parameters at level of significance 5 percent.

1 P-values are placed in parentheses below parameter estimates (b).

2 1 high school/technical school/GED or less, 2 some college education, reference group; farmers with a college or graduate degree

The odds of farmers feeling successful increase by over 9-fold with a unit increase in the value (mean score) they attribute to the intrinsic objective. Lets consider a farmer who scored 5 (very important) to the intrinsic objective; that is, a score of 5 to each of the intrinsic objectives, working outside, working with nature, being my own boss, maintaining a certain lifestyle.

The odds that such a farmer feels successful are 9 times greater than the odds of a farmer who scored 4 to the intrinsic objective (that is, a score of 4 to each of the intrinsic objectives listed above) to feel successful.

The odds of farmers feeling successful increase by 67 percent and 15 percent with a unit increase in the mean score they give to the family and social objectives, respectively.

Farmers who highly value intrinsic objective (being own boss, working outside, working with nature, maintaining a certain lifestyle), family or social objectives are more likely to feel successful even though they don't make profit. For these people, farming is more a way of life than a way of making a living.

Conversely, for a unit increase in the mean score attributed by farmers to instrumental and intergenerational transfer objectives, the odds of feeling successful decrease by 63 percent and 48 percent, respectively. The farmers who highly value making profit compared to other non-monetary objectives are more likely to be frustrated or disappointed by the low levels of prices/returns in the agricultural sector, by the price fluctuations and thus the odds that they will feel successful are reduced. Similarly, farmers who highly value the intergenerational transfer are more likely to feel not successful. It could be that the children or other relatives of these farmers are not interested in taking over the farm business or that conditions for a transfer of the farm are not interesting.

4. Conclusion

The objective guiding the analysis in this section was to identify and characterize the relationship between farms' profitability, non pecuniary motivations reflected through farm goals and farmers' perception of success.

The results bring enough evidence to state that the farm objective of making money is not always more important to farmers than any non-monetary objective. For the whole sample of farmers, making money is as important as being viewed as a good neighbor, as being one's own boss, or as the objective of spending time with family. For large farmer in general and for large and profitable farmers (L/HP) in particular, making money is the most important the objectives. For younger farmers too, making money is the most important objective (along with spending time with family).

While for small farmers in general, and for S/HP and S/LP farmers in particular, the social objective of "being viewed as a good neighbor" is the most important.

Except for old farmers, the aggregated family objective is the most important to farmers, regardless of farm size. Large farmers place more value on instrumental objectives compared to small farmers. Old farmers, farmers 53 years old and more, place more value on intrinsic and social objectives compared to younger farmers.

It is apparent that farmers, as a whole, act in such a way to find a balance, an equilibrium between a set of objectives-instrumental, social, family related, intrinsic- that sometimes are conflicting objectives, in order to maximize their utility. They are for most of them "lifestylers" and some of them are in addition competitive entrepreneur, especially the small and profitable farmers (S/HP).

For most of the farmers studied even though they have motivations related to making profits, they also value highly some other benefits of being a farmer, such as the independence (being their own boss), the open air lifestyle, spending time with family and the recognition in the community. Therefore, the definition of farming success is not just restricted to financial success since most of them value highly non profit objectives and thus attribute indirectly the definition of the farming success also to non-financial qualitative criteria.

The specific case of small non-profitable farms illustrates this assertion; even though they have non-profitable farms, more than a fourth of them perceive themselves as successful. More than three fourth of small non-profitable farms would choose farming if they had to choose a career again meaning that even with low profit, they enjoy their farming life very much. For them, the definition of success uses qualitative criteria in addition to the profit dimension.

The results of the analyses on perceived farm success emphasize the fact that not only each farmer has a specific system of values that may differ from that of others but in addition farmers' objective functions evolves with age and other variables such as farm size, education. The definition of success would remain an individual issue and difficult to be generalized in order to be applicable to all the individuals.

The best we could do in this study was to identify the common values and the major objectives/goals shared by farmers within a certain age group, or with a certain farm size or combination of profitability and farm size. The results showed that success is definitely not a matter of profitability alone but rather a combination of making profit and also enjoying the rewards of the farming life such as the independence, the open air lifestyle and the connections with the neighbors and farming community.

V. CONCLUSION

A. Summary and Conclusion

The main objectives of this study were (1) to determine the major factors, which affect farm profitability (financial success), especially for small farms, and (2) to identify the reasons that affect the farmers' perception of success. Consequently, this study consisted of two main parts: the first part on farm key factors of success and the second part on the definition of success as perceived by the farmers themselves. The five specific objectives (sub-objectives) of the study were: (1) to characterize and profile the small profitable farms; (2) to identify the similarities and differences between small and large profitable farms; (3) to identify the similarities and differences between small profitable and non profitable farms; (4) to verify the effects of major factors identified through the comparisons of small profitable farms to other farms groups, on farm financial success and their significance, and also to report the farmers' subjective factors for farm success; (5) to identify and characterize the relationship between farms' profitability, non pecuniary motivations reflected through farm goals and farmers' perception of success.

The first major objective was achieved through descriptive statistics, pair wise comparisons (successful large and small farmers, small successful and unsuccessful farmers) using t-tests and though a regression model. For the second major objective, descriptive statistics, t-tests, Kruskal Wallis and Mann-Whitney-Wilcoxon were used as well as a logistic model. The data used came from the Farm Business Association database for the period 1991-1996, for farm management related variables and also from a survey for socioeconomic variables.

The results of the first part of the study show that small profitable farmers (S/HP) like large profitable farms (L/HP) are young farmers who have high education levels. More than other farmers studied, they rent most of the land they use. Small profitable farmers (S/HP) also have the highest proportion of rent expenses of all the farmers studied. In addition, they have on average the lowest financial leverage of all farmers. Small profitable farms (S/HP) are as productive, cost efficient and financially efficient as large profitable farms (L/HP). In fact, the results show that S/HP have used most efficiently their investment capital than any other farmers group studied. Small successful farms (S/HP) could be as profitable as large successful farms (L/HP) but due to difference in farm size, it appears that the only advantage of large profitable farmers (L/HP) on small profitable farmers (S/HP) is the extra income the former gets from the larger amount of sales.

The results show that the major factors of farm financial success are high percentage of rented land, high machinery and labor use efficiency (dollars amount spent on machinery and labor per gross profit), high crop yields and high percentage of revenue coming from livestock. From pair wise comparisons, education was a significant factor of farm financial success. But, due to correlation between education and other variables in the regression model (such as labor expenses per gross profit, or corn yield per acre), education was not significant in the regression model. The factors of farm financial success identified are dependent on good management because the choice of a profitable mix of enterprises, of rented and owned resources such as land and/or machinery/equipment presupposes that farmers have above average managerial skills. Castle et al. (1987), Errington (1998) have pointed out that given the challenges faced in the farm sector, the development of top managerial skills in farm business is crucial. Technical skills are important but more and more, financial and marketing management are increasingly important.

The importance of management is stressed further by the farmers' perception of the most important factors explaining farm success. Farmers as a whole ranked hard work as the most important factor for success but statistically the importance they attributed to hard work is not significantly different from that of timing, attention to details and getting accurate information. All three factors relate to management. This confirms the claim that excellent managerial skills are necessary for farm success and more so for small farmers who face more adversities and challenges in capital requirements, labor and machinery/equipment efficiency, excess capacity for machinery/equipment or labor, ownership versus alternative options such as lease etc.

The second part of this study was about the identification and characterization of the relationship between farms' profitability, non-pecuniary motivations reflected through farm goals and farmers' perception of success; that is ultimately the identification of the factors that affect the farmers' perception of success. Unlike the first part of the study, which was carried out based on the traditional approach followed by most farm success research, this part of the study was more an exploratory study.

The results of this second section of the study show that profitability significantly affects farmers' perception of success. The higher the profit, the higher the odds are that the farmer will feel successful. But almost two fifth of farmers with high profit (29 percent of large profitable farmers, L/HP and 43 percent of small profitable farmers, S/HP) did not perceive themselves as successful while one third of not profitable farmers (50 percent of large non profitable farmers, L/LP and 29 percent of small non profitable farmers, S/LP) perceived themselves as successful. While the latter could be labeled as "non profit maximizers", the former might not necessarily be labeled as "non

profit maximizers". As a whole, farmers value being viewed as good neighbors, being their own boss and spending time with their family as much as they value making money. Overall, except for older farmers, aggregated family objective is the most important for farmers, regardless of farm size. Aggregated family, intrinsic and social objectives are valued more than instrumental objective. It was noted that the importance attached to objectives by farmers might vary depending on the farm size and the age of the farmer. Larger farmers value the instrumental objective more than small farmers do. Older farmers value intrinsic and social objectives more than younger farmers do.

The farmers' perception of success is significantly and positively affected by the profitability of the farm business, the farm size (large farms, big machinery and equipment seem to be perceived by farmers as symbols of prestige) and the importance/value farmers attach to intrinsic objective (independence, open-air lifestyle). The results of the logistic model suggest that education affects negatively but not significantly farmers perception of success. Another factor that affects negatively the farmers' perception of success is the value they place on intergenerational transfer.

Profit is not the only motivation of farmers but one of multiple goals of farmers. Therefore, the concept of success includes the financial aspect but also non-financial considerations such as independence (being their own boss), open-air lifestyle (working outside, working with nature) and recognition by the community (being viewed as a good neighbor or as a conservationist). A small farmer may well decide not to increase the size of his farm to obtain more profits because he is happy with what he gets; that is, a decent income to satisfy his needs and the needs of his family and most of his objectives are fulfilled.

In conclusion, many studies on farm success factors have been conducted. Even with the diversity observed in the analysis approach; measures of profitability (net farm income, Return on assets (ROA), Return on equity (ROE), Management return, etc) or measures of farm size (acres, number of animals, gross sales, etc), the findings about the factors of farm success do not vary extremely. Education, percent of rented acres, crop yields, machinery and labor efficiencies have a positive impact on farm success while age of the farmers has a negative impact. There are nevertheless some variations across time probably due to changes in market and economic conditions; in the seventy's, high financial leverage was cited as having a positive impact of farm success (Luckham, Drache 1976) while later, it was reported to have a negative impact instead (Mishra,et al. (1999), castle et al (1987). Keep the debt to a low level seems to be one of the most important measure of cost control. The percentage of livestock production was reported in some studies to have positive effect in some studies but negative effects in some others.

In most of these studies, financial success was mainly defined based on economic criteria: financial efficiency, profit level and such. None of the studies did incorporate the farmers' own perception of success. In addition, one of the assumptions used by researchers was the assumption of profit maximization by farmers. These factors could explain why most of the findings of farm success researches were similar. The first part of this study was similar to all these others studies mentioned in the literature in the analysis approach and assumption of profit maximization. The findings, consequently, were similar.

But the second part of the present study, which was about the farmers own perception of success shows that some of the financially successful farmers perceived themselves as not successful or only somewhat successful while some non financially successful farmers perceived themselves as successful. Financial success or financial efficiency does not necessarily translate into perception of success because farmers who value making money also value being their own boss, spending time with their family or being viewed as good neighbors among other objectives. Profit is only an argument in their objective function. There is a necessity to initiate new types of farm success studies using a different approach from the traditional one. This means building up a theoretical framework that will guide future research on farm success.

After all if the well being of farmers and their contribution to rural communities' development and to the quality of life in these communities is at stake, the definition of success should be done by the farmers themselves.

B. Limitations to the Study and Suggestions

A larger sample size would produce more robust results. The small size of the group of large non-profitable farmers (L/LP) did not allow a detailed study of this group. The recommendation for further analyses is to consider a larger sample when possible.

Another possible limitation was the non-randomness of the sample. The sample of farmers was constituted of farmers who are members of the Farm Business Association (FBA). While some researchers think that the non randomness of the sample of farms may impair the validity of the results, many others think that results from such a sample are useful and would not be much different from the one obtained with random sample of farms (Casler, 1993).

The time frame for the present study ranges from 1991 to 1996. The recent changes in the farms and agricultural sector were not included. This is a limitation to the study. Despite the time frame limitation, the quality and the detail of financial database should be noted.

The results showed that almost half (43 percent) of small profitable farmers were involved on other farms belonging mainly to relatives. Even though they claim sole proprietorship as the predominant farm business arrangement, further research on real arrangements (family corporations, formal or informal) prevailing would be interesting. More investigations are needed about the cooperation between farmers and their relatives also in farming, the nature of the cooperation, namely exchange of machinery, labor, management skills and services, the extent of the cooperation and the impact of such cooperation on farm success and especially small farms.

Rent/Lease option appeared to be a key factor of farm success; finding similar to the ones of other studies. Further research should be carried out to study issues related to land or machinery/equipment rent/lease and simulate the effect of potential policies that could be designed in relation to lease of capital inputs. A policy to facilitate the lease of land and machinery equipment to increase financial performance of farmers should be designed as suggested by Mishra et al. (1999).

APPENDIX 1: CORRELATION MATRIX

	Profit index	AGE	EDUCATION	LVSTKPCT	CRNYLDAC	SBNYLDAC	RENTTOTA
Profit index (PI)	1.000						
AGE	-0.597**	1.000					
EDUCATION	.243*	-.340**	1.000				
LVSTKPCT	.204	-.155	.007	1.000			
CRNYLDAC	.368**	-.260*	.225	-.045	1.000		
SBNYLDAC	.444**	-.350**	.161	.293*	.287*	1.000	
RENTTOTA	.313*	-.512**	-.075	-.059	.086	.158	1.000
RENTTXP	.417**	-.288*	.052	.055	.093	.397**	.225
LABGRSPF	-.646**	.434**	-.284*	.042	-.300**	-.373**	.147
LABGRPFS	-.626**	.423**	-.271*	-.002	-.297*	-.360**	.172
MACEGRPS	-.586**	.320**	.044	-.271*	-.057	-.284*	-.036
MACEQGRP	-.592**	.327**	.017	-.296*	-.073	-.318**	-.018
C-MACHIN	-.299*	.108	-.262*	.092	-.101	-.189	.085
C-MACHSQ	-.313**	.134	-.205	.094	-.090	-.168	.048
S-MACHIN	-.214	.020	-.237*	.130	-.111	-.124	.088
S-MACHSQ	-.204	.029	-.184	.156	-065	-.074	.035
H-MACHSQ	-.005	-.077	.075	-.082	-.039	.140	.144
HG-MACHI	-.087	-.048	-.096	.005	-.089	.092	.171
S-LABSQ	-.106	.009	-.066	.244*	-.119	-.168	.094
SO-LABOR	-.141	.039	-057	.240*	-.135	-.155	.124
CO-LABOR	-.291*	.153	-.030	.177	-.227	-.275*	.247
C-LABSQ	-.259*	.127	-.007	.184	-.195	-.282*	.221
HG-LABOR	-.378*	-.117	.066	-.169	-.060	-.013	.035
H-LABSQ	-.420*	-.194	0.109	-.140	-.069	-.074	.070
FARM SIZE	.375*	-.158	.280*	.324**	.151	.174	-.202

N.B.: * Significant at 5%, ** significant at 1%

The variables' codes and their explanation are listed on the last page of this appendix.

RENTTXP	LABGRSPF	LABGRPFS	MACEGRPS	MACEQGRP	C-MACHIN	C-MACHSQ	S-MACHIN
1.000							
-.513**	1.000						
-.455**	.976**	1.000					
-.218	.385**	.452**	1.000				
-.220	.420**	.499**	.987**	1.000			
-.268*	.431**	.436**	.092	.125	1.000		
-.199	.435**	.447**	.137	.168	.968**	1.000	
-.277*	.258*	.231	.074	.079	.877**	.841**	1.000
-.216	.241*	.215	.093	.094	.852**	.864**	.972**
-.202	.202	.220	.061	.113	.312	.341*	.135
-.161	.283	.292	-.001	.061	.359*	.384*	.185
-.144	.265*	.286*	.073	.066	.191	.192	.137
-165	.333**	.346**	.106	.096	.209	.206	.152
-.287*	.542**	.537**	.147	.157	.382**	.407**	.174
-.277*	.472**	.473**	.129	.142	.391**	.430**	.176
.343*	.422*	.413*	.276	.321	.371*	.375*	.032
-0.41	.530**	.544**	.405*	.470**	.456**	.491**	040
.268*	-.570**	-.532**	-.231**	-.201	-.198	-.185	-.167

N.B.: * Significant at 5%, ** significant at 1%
The variables codes and their explanation are listed on the last page of this appendix.

S-MACHSQ	H-MACHSQ	HG-MACHI	S-LABSQ	SO-LABOR	CO-LABOR	C-LABSQ	HG-LABOR	H-LABSQ
1.000								
.095	1.000							
.143	.940**	1.000						
.143	.089	.179	1.000					
.148	.083	.168	.973**	1.000				
.178	.232	.288	.779**	.816**	1.000			
.193	.230	.300	.797**	.788**	.970**	1.000		
-.032	.103	.121	-.113	.115	.054	.048	1.000	
-.024	.213	.241	.051	.071	.323	.308	.908**	1.000
-.145	-.174	-.198	-.101	-.153	-.198	-.152	-.312	-.305

N.B.: * Significant at 5%, ** significant at 1%
The variables codes and their explanation are listed on the last page of this appendix.

VARIABLES CODES AND THEIR EXPLANATION

Profit index (PI)	Profit index (PI)
AGE	Age
EDUCATION	Education
LVSTKPCT	Percentage of revenue coming from livestock
CRNYLDAC	Corn yield per acre
SBNYLDAC	Soybean yield per acre
RENTTOTA	Percentage of rented crop acres
RENTTXP	Percentage of rent expenses
LABGRSPF	Dollars spent on labor per dollars gross profit
LABGRPFS	Dollars spent on labor per dollars gross profit, squared
MACEGRPS	Dollars spent on machinery per dollars gross profit
MACEQGRP	Dollars spent on machinery per dollars gross profit, squared
C-MACHIN	Machinery expenses per corn acre
C-MACHSQ	Machinery expenses per corn acre, squared
S-MACHIN	Machinery expenses per soybean acre
S-MACHSQ	Machinery expenses per soybean acre, squared
H-MACHSQ	Machinery expenses per hundred weight production (cwt)
HG-MACHI	Machinery expenses per hundred weight production (cwt), squared
S-LABSQ	Labor expenses per soybean acre, squared
SO-LABOR	Labor expenses per soybean acre
CO-LABOR	Labor expenses per corn acre
C-LABSQ	Labor expenses per corn acre, squared
HG-LABOR	Labor expenses per hundred weight production (cwt)
H-LABSQ	Labor expenses per hundred weight production (cwt), squared
FARM SIZE	Farm size measured in terms of sales ($)

APPENDIX 2: LOGISTIC MODEL

```
      Total number of cases:      73 (Unweighted)
      Number of selected cases:   73
      Number of unselected cases: 0
      Number of selected cases:                73
      Number rejected because of missing data:  3
      Number of cases included in the analysis: 70

Dependent Variable Encoding:
Original        Internal
Value           Value
     .00        0
    1.00        1
                          Parameter
                Value     Freq  Coding
                                  (1)     (2)
EDUCAT2
                 1.00       33  1.000    .000
                 2.00       16   .000   1.000
                 3.00       21   .000    .000

Dependent Variable..   PSI        Perceived success index

Beginning Block Number  0.  Initial Log Likelihood Function

-2 Log Likelihood    96.983455

* Constant is included in the model.

Beginning Block Number  1.  Method: Enter

Variable(s) Entered on Step Number
1..         EDUCAT2
            FAMILOBJ
            INST_OBJ
            INTR_OBJ
            SOC_OBJ
            TRANSOBJ
            PI          profit index
            SALE10MI
            AGE10
Estimation terminated at iteration number 4 because
Log Likelihood decreased by less than .01 percent.
 -2 Log Likelihood          76.021
 Goodness of Fit            63.638
 Cox & Snell - R^2            .259
 Nagelkerke - R^2             .345
                     Chi-Square     df Significance

 Model                   20.963     10         .0214
 Block                   20.963     10         .0214
 Step                    20.963     10         .0214
```

---------- Hosmer and Lemeshow Goodness-of-Fit Test----------

	PSI = .00		PSI = 1.00		
Group	Observed	Expected	Observed	Expected	Total
1	7.000	6.535	.000	.465	7.000
2	6.000	5.935	1.000	1.065	7.000
3	3.000	5.133	4.000	1.867	7.000
4	4.000	4.485	3.000	2.515	7.000
5	6.000	3.609	1.000	3.391	7.000
6	2.000	3.058	5.000	3.942	7.000
7	4.000	2.564	3.000	4.436	7.000
8	2.000	2.274	5.000	4.726	7.000
9	1.000	1.614	6.000	5.386	7.000
10	1.000	.793	6.000	6.207	7.000

	Chi-Square	df	Significance
Goodness-of-fit test	9.5723	8	.2963

Classification Table for PSI
The Cut Value is .50

		Predicted .00 (0)	Predicted 1.00 (1)	Percent Correct
Observed				
.00	0	23	13	63.89%
1.00	1	9	25	73.53%
			Overall	68.57%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
EDUCAT2			1.4411	2	.4865	.0000	
EDUCAT2(1)	.8931	.7622	1.3732	1	.2413	.0000	2.4427
EDUCAT2(2)	.6158	.8130	.5737	1	.4488	.0000	1.8512
FAMILOBJ	.5112	.6254	.6684	1	.4136	.0000	1.6674
INST_OBJ	-.9816	.6390	2.3598	1	.1245	-.0609	.3747
INTR_OBJ	2.2191	1.0544	4.4289	1	.0353	.1583	9.1989
SOC_OBJ	.1392	.7599	.0335	1	.8547	.0000	1.1493
TRANSOBJ	-.6382	.3190	4.0018	1	.0455	-.1437	.5282
PI	3.7099	1.8534	4.0070	1	.0453	.1439	40.8514
SALE10MI	.0728	.0309	5.5633	1	.0183	.1917	1.0755
AGE10	.0014	.3454	.0000	1	.9967	.0000	1.0014
Constant	-12.3893	5.2326	5.6060	1	.0179		

CASE	Observed PSI	Pred	PGroup	Resid	ZResid
44	S 0 **	.8456	1	-.8456	-2.3404

S=Selected U=Unselected cases
** = Misclassified cases

* Cases with studentized residuals greater than 2 are listed.
The Cut Value is .50

APPENDIX 3: SURVEY INSTRUMENT

Demographic/Family/Farm Information

GENERAL FARM INFORMATION

1. Please tell me approximately what percent of your total farm sales are from each of the following enterprises?

   a. Cash grain _____
   b. Swine, farrow-to-finish _____
   c. Swine, finishing _____
   d. Beef raising _____
   e. Beef feeding _____
   f. Mixed _____
   g. Other _____ _____
   (please specify)

2. How many acres of :

	Row Crop	Hay	Permanent Pasture
Owned	_____	_____	_____
Rented	_____	_____	_____

3. What types of rental arrangements do you use and how frequently?

Cash rent	% of acres rented	_____
Crop share	% of acres rented	_____
Custom farm	% of acres	_____
Flexible rent	% of acres	_____
Other _____	% of acres rented	_____

(please specify)

4. What is the type of business arrangement of your farm?

   Sole proprietorship _____
   Family corporation _____
   Partnership _____
   Corporation _____
   Other _____ *(please specify)*

PERSONAL INFORMATION

5. How many years have you been farming? _____
6. How many years have been on current farm? _____
7. Is farming your principal occupation? Yes □ No □
8. If *NO*, what do you consider your principal occupation? _____

9. How did you acquire this farm?
   - Inherited _____
   - Purchase from relative _____
   - Purchase from non-relative _____
   - Combination of inherit and purchase _____
   - Combination purchase from relative and nonrelative _____
   - Other _____ *(please specify)*

10. What is your marital status?
    - Single _____
    - Divorced _____
    - Married or living with a domestic partner _____
    - Widowed _____

IF MARRIED or Living with a Domestic Partner

11. How many years have you been together? _____

		You		**Spouse/ Domestic Partner**	
12.	What is your age?	_____		_____	
13.	Where you raised on a farm?	Yes □	No □	Yes □	No□
14.	Do you work off the farm? ***(IF NO, GO TO QUESTION 18)***	Yes □	No □	Yes □	No □
15.	How many hours per week do you work off the farm?	_____		_____	
16.	How many weeks per year do you work off the farm?	_____		_____	
17.	How many years have you worked off the farm?	_____		_____	
18.	What is the highest level of education attained?				
	Less than high school	_____		_____	
	High school/GED	_____		_____	
	Technical school	_____		_____	
	Some college	_____		_____	
	College degree	_____		_____	
	Graduate school	_____		_____	

19. Please rank your spouse's or domestic partner's involvement with the following activities on the farm?

		Not Involved				Very Involved
a.	Daily chores	1	2	3	4	5
b.	Fieldwork on the farm	1	2	3	4	5
c.	Plan day-to-day work	1	2	3	4	5
d.	Make annual crop/livestock plans	1	2	3	4	5
e.	Decide the mix and type of enterprises in the long run	1	2	3	4	5
f.	Decide the level of inputs to use	1	2	3	4	5
g.	Decide timing of operations	1	2	3	4	5
h.	Decide when to sell crop/livestock	1	2	3	4	5
i.	Negotiate sales of crops/livestock	1	2	3	4	5
j.	Decide when to pay bills	1	2	3	4	5
k.	Decide type and make of machinery and equipment	1	2	3	4	5
l.	Negotiate purchase of machinery and equipment	1	2	3	4	5
m.	Decide when to hire more help	1	2	3	4	5
n.	Recruit and select employees	1	2	3	4	5
o.	Supervise employees	1	2	3	4	5
p.	Decide work method/way jobs are done	1	2	3	4	5
q.	Decide and plan capital projects	1	2	3	4	5
r.	Identify sources and negotiate loans and financing	1	2	3	4	5
s.	Livestock management	1	2	3	4	5
t.	Keeping farm records	1	2	3	4	5

20. Do you have any children? Yes □ No □ ***(IF NO, GO TO QUESTION 23).***

21. Tell us about your children. *(Please list all children even if they no longer live at home)*

SONS

	Age	Marital Status	Work on Farm		Hrs. Working on Farm	Primary Occupation
Child 1	____	_____	Yes □	No □	____	_____
Child 2	____	_____	Yes □	No □	____	_____
Child 3	____	_____	Yes □	No □	____	_____
Child 4	____	_____	Yes □	No □	____	_____
Child 5	____	_____	Yes □	No □	____	_____

DAUGHTERS

	Age	Marital Status	Work on Farm		Hrs. Working on Farm	Primary Occupation
Child 1	____	_____	Yes □	No □	____	_____
Child 2	____	_____	Yes □	No □	____	_____
Child 3	____	_____	Yes □	No □	____	_____
Child 4	____	_____	Yes □	No □	____	_____
Child 5	____	_____	Yes □	No □	____	_____

22. For the children involved with your farming operation, which best describes their level of involvement in:

	Not Involved				Very Involved
a. Daily chores	1	2	3	4	5
b. Fieldwork on the farm	1	2	3	4	5
c. Plan day-to-day work	1	2	3	4	5
d. Make annual crop/livestock plans	1	2	3	4	5
e. Decide the mix and type of enterprises in the long run	1	2	3	4	5
f. Decide the level of inputs to use	1	2	3	4	5
g. Decide timing of operations	1	2	3	4	5
h. Decide when to sell crop/livestock	1	2	3	4	5
i. Negotiate sales of crops/livestock	1	2	3	4	5
j. Decide when to pay bills	1	2	3	4	5
k. Decide type and make of machinery and equipment	1	2	3	4	5
l. Negotiate purchase of machinery and equipment	1	2	3	4	5
m. Decide when to hire more help	1	2	3	4	5
n. Recruit and select employees	1	2	3	4	5
o. Supervise employees	1	2	3	4	5
p. Decide work method/way jobs are done	1	2	3	4	5
q. Decide and plan capital projects	1	2	3	4	5
r. Identify sources and negotiate loans and financing	1	2	3	4	5
s. Livestock management	1	2	3	4	5
t. Keeping farm records	1	2	3	4	5

OTHER FARMING INFORMATION

23. Are there other families involved with the management of this farm?
Yes □ No □

24. If yes, what is their level of involvement?
Slightly □ Somewhat □ Very □

25. What is their relationship to you?
Parent or Parents-in-law _____
Siblings or siblings in-law _____
Aunts or uncles _____
Cousins _____
No relation _____

26. Do you work on another farm? Yes □ No□

27. If yes, what is your level of involvement?
Slightly □ Somewhat □ Very □

28. What is your relationship to the owner of the other farm?
Parent or parents in-law _____
Siblings or siblings in-law _____
Aunts or uncles _____
Cousins _____
No relation _____

FARM GOALS AND OBJECTIVES

29. How would you rank the importance of each of the following objectives for your farm?

		Not				Somewhat				Very
a.	Making money	1	2	3	4	5
b.	Maintaining a certain lifestyle	1	2	3	4	5
c.	Spending time with the family	1	2	3	4	5
d.	High production farm	1	2	3	4	5
e.	Vacations	1	2	3	4	5
f.	Place to raise a family	1	2	3	4	5
g.	Work outside	1	2	3	4	5
h.	Being my own boss	1	2	3	4	5
i.	Feeding the world	1	2	3	4	5
j.	Working with nature	1	2	3	4	5
k.	Passing farm on to children	1	2	3	4	5
l.	Passing on a family tradition	1	2	3	4	5
m.	Ensuring an adequate retirement	1	2	3	4	5
n.	Being viewed as a conservationist	1	2	3	4	5
o.	Being viewed as a good neighbor	1	2	3	4	5
p.	Keeping my kids on the farm	1	2	3	4	5
q.	Other _____	1	2	3	4	5

30. Now taken all together, how would you rate the success of your farm?

Not successful			Somewhat successful			Very Successful
1	2	3	4	5	6	7

COST CONTROL

31. Please rate the following cost control measures on your farm.

	Not		Somewhat		Very
a. Use integrated pest management	1	2	3	4	5
b. Use integrated crop management	1	2	3	4	5
c. Use soil test	1	2	3	4	5
d. Member of a buying group	1	2	3	4	5
e. Use forward purchasing	1	2	3	4	5
f. Minimize the use of hired labor	1	2	3	4	5
g. Keep debt low	1	2	3	4	5

32. Please rate the following sources of information.

	Not		Somewhat		Very
a. Trade journals	1	2	3	4	5
b. Farm magazines	1	2	3	4	5
c. Newspapers	1	2	3	4	5
d. Extension	1	2	3	4	5
e. Commodity organizations	1	2	3	4	5
f. Radio	1	2	3	4	5
g. Television	1	2	3	4	5
h. Neighbors	1	2	3	4	5
i. Data Transmission Network (DTN)	1	2	3	4	5
j. Other _____	1	2	3	4	5

FINANCIAL

33. Do you borrow money for your farming enterprise?
    Operating Yes □ No □
    Long-term Yes □ No □

34. What is your most important source of operating capital?
    Bank _____
    Farm Credit _____
    Dealer _____
    Farm Services Agency _____
    Other _____ *(please specify)*

35. What is your most important source of long-term capital?
    Bank _____
    Mortgage Company _____
    Relative _____
    Farm Credit _____
    Insurance Company _____
    Other _____ *(please specify)*

36. The following are several financial management practices. Please indicate the level to which you use each of them?

		Never		Somewhat		Considerable
a.	Prepare annual financial statements	1	2	3	4	5
b.	Accrual accounting	1	2	3	4	5
c.	Use a computer	1	2	3	4	5
d.	Calculate per unit costs of production	1	2	3	4	5
e.	Prepare and use cash flow projections	1	2	3	4	5
f.	Evaluate new alternative production strategies	1	2	3	4	5

OVERALL MANAGEMENT

37. How much do you use the following sources of information when evaluating a new production technology?

		Never		Somewhat		Considerable
a.	Company representatives	1	2	3	4	5
b.	University research	1	2	3	4	5
c.	Magazine/journal articles	1	2	3	4	5
d.	Neighbors	1	2	3	4	5
e.	Other farmers	1	2	3	4	5
f.	Other _____ *(please specify)*	1	2	3	4	5

38. Do you use production contracts? ***(IF NO, GO TO QUESTION 40)***
Yes □ No □

39. If yes, please rank the following reasons in terms of their importance in your decision.

		Not		Somewhat		Very
a.	Less capital investment	1	2	3	4	5
b.	Less risk	1	2	3	4	5
c.	Less marketing involved	1	2	3	4	5
d.	Enjoy the work but not the financial aspect	1	2	3	4	5
e.	Other _____ *(please specify)*	1	2	3	4	5

MARKETING

40. How often do you use the following marketing tools for your marketing?

		Never		Somewhat		Frequently
a.	Forward cash contract	1	2	3	4	5
b.	Price later contracts	1	2	3	4	5
c.	Minimum price contracts	1	2	3	4	5
d.	Futures market	1	2	3	4	5
e.	Options	1	2	3	4	5
f.	Market advisors					
g.	Other _____ *(please specify)*	1	2	3	4	5

41. How much time in an average week will you spend on marketing? _____
(including pricing, evaluating contracts, and other such activities but **DO NOT** *include hauling)*

42. How important are the following in your marketing system?

	Not		Somewhat		Very
a. Getting the highest price	1	2	3	4	5
b. Spreading income	1	2	3	4	5
c. Reducing risk	1	2	3	4	5
d. Profits	1	2	3	4	5
e. Other _____ *(please specify)*	1	2	3	4	5

43. How much assistance have you received from the following?

	None		Somewhat		Considerable
a. Spouse/DomesticPartner	1	2	3	4	5
b. Members of your immediate household *(excluding your spouse)*	1	2	3	4	5
c. Family members not living in your immediate household	1	2	3	4	5
d. Neighbors	1	2	3	4	5
e. Educators *(i.e., Cooperative Extension educators and vocational agriculture teachers, etc.)*	1	2	3	4	5
f. Agricultural professionals *(i.e., representatives for commodities, seed companies, co-ops, etc.)*	1	2	3	4	5
g. Someone not listed _____ *(please specify)*	1	2	3	4	5

44. How important have the following activities or occurrences been to the success of your farm?

	Not		Somewhat		Very
a. Hard work	1	2	3	4	5
b. Formal education and training	1	2	3	4	5
c. Attention to detail	1	2	3	4	5
d. Timing *(i.e., sales, beginning or ending production efforts)*	1	2	3	4	5
e. Luck	1	2	3	4	5
f. Accurate information about the farming operation	1	2	3	4	5
g. Off-farm employment	1	2	3	4	5
h. Intuitive decision-making	1	2	3	4	5
i. Collaborative decision-making	1	2	3	4	5
j. Careful consideration of available options	1	2	3	4	5
k. Government policies	1	2	3	4	5
l. Other activities _____ *(please specify)*	1	2	3	4	5

45. What will be the biggest challenge facing your farm in the future?

46. If you had it to do over again would you still choose farming as a career?
Yes □ No □ Unsure □

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