STATISTICAL ANALYSIS OF PRE-EMPLOYMENT PREDICTIVE INDEXING WITHIN THE FARM CREDIT SYSTEM

by

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ABSTRACT

This thesis analyzes the hiring and selection processes of five Farm Credit Services (FCS) Associations within U.S. AgBank to determine the effectiveness of potential employee testing and profiling practices as a predictor of success (defined as tenure and retention) within the organization. The data provided by the five FCS Associations were used to analyze whether that the results are a successful tool in predicting the success of a potential employee.

Firm managers are acutely aware of the high cost of onboarding a new employee regardless of the industry in which the firm operates. Since employee training and education often takes months, and in some cases, years, it is critical that organizations select qualified, driven, and success oriented employees so that they can minimize the cost of hiring of new employees. To select the best candidates, many firms use personality profiling examinations to determine the candidate's fit, not only for the job, but also for the company culture. Analyzing past results can assist managers in evaluating the outcomes of the time and cost spent seeking the best employee possible.

Analysis was conducted by estimating a binomial logistic regression model using the test scores for loan officer hires from five Farm Credit Associations for the time period of 1999-2009. Each of the examined character traits was an independent variable, along with variables for gender and whether the candidate was a recommended-hire. The dependent variable is whether the employee is still employed with the Farm Credit Association. Results show that while some of the independent variables are statistically significant in predicting the success of an employee, others are not. The implications

therein justify the value of the predictive index as an asset to hiring managers, and also provides direction on which traits are most highly correlated with one another and with the overall composite score.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

CHAPTER 1: DISCUSSION OF FARM CREDIT AND THEIR HIRING PRACTICES

Farm Credit Services, is an agricultural based lending organization with a focus on providing operating, term, and real estate lending options to individuals that fall within their given scope of lending. Established in 1916 by the United States Congress, Farm Credit is set up as a member owned cooperative, each Association with their own board of directors, staff, and credit portfolio. As a Government Sponsored Enterprise (GSE), Farm Credit has federal guarantees for their funded securities, in case of system difficulties. As of 2010, the Farm Credit System was composed of 93 banks and associations and five Farm Credit Banks (FCB) that provide funding through the Farm Credit Funding Corporation to each of the individual associations.

As such, the Farm Credit System needs to recruit, retain, and continually develop employees in the areas of lending, analysis, appraisal, and support. As part of this process, Farm Credit Council Services (FCCS) provides services for pre-employment screening for applicants through the interview process. These exams, structured through an oral interview seek to measure individual scores on a set of character traits for one of four different test categories. The intention of this assessment is to better assist managers to predict potential employee success and longevity within the Farm Credit System. Previous research into the field of applicant selection as it relates to the retention of the employee has found that "Bank hired trainees retention rate for the last seven years is 13% higher than direct or association hired trainees" (Broeckelman 1988).

The tested traits vary depending on which of the four exams the applicant takes. The exams define the traits that are thought to make for a successful candidate for loan

officers, credit analysts, appraisers, and support staff employees. While an individual score is assigned to each trait by the examiner, they total to a composite score that is measured against a benchmark score to define the minimum score recommended for each test area. This defines whether or not a candidate is considered to be a "recommended hire" or a "non-recommended hire." While the examiner believes this to be a good predictive indicator of potential job success of the applicant(s), the manager and/or hiring committee can ultimately decide whether to place sufficient emphasis on the score in their hiring decision. That is, while a candidate may score "recommended", they may not be offered a job, and likewise, a candidate may score "non-recommended" and be offered a job with Farm Credit.

1.1 Explanation of Research as it Relates to Farm Credit Services

The purpose of this study is to analyze the hiring decisions of five Farm Credit Associations that agreed to participate in this project. The five associations vary in lending size, operations, and physical structure. All five associations are members of the U.S. Ag Bank, headquartered in Wichita, Kansas. U.S. AgBank serves Farm Credit Associations in Arizona, California, Hawaii, Nevada, Utah, Idaho, Kansas, Colorado, Oklahoma, and New Mexico (Figure 1.1; www.fca.gov). While all Farm Credit Associations in this study are located in U.S. AgBank's territory, it is the intent to find differences (or consistencies) that exist between the five associations. This may serve as a tool for future hiring decisions within the U.S. Ag Bank district. The associations studied represent a wide range of size with outstanding loan volume varying from $400 million to nearly $1.3 billion (third quarter 2009).

Figure 1.1: Map of the Farm Credit System
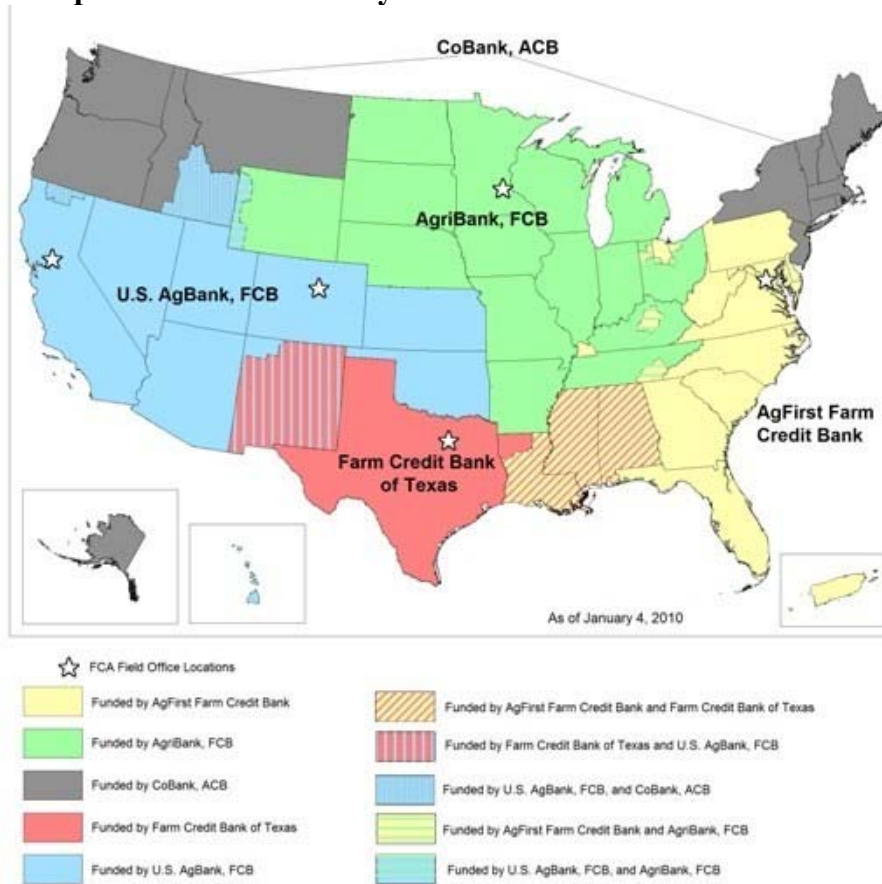
Given the nature of this study and the legal, personnel, and human resource elements therein, confidential data were made available for the thesis. None of the participating associations knew the identities of any of the other associations, and each association has been renamed as Association #1 through Association #5. As such, all of the information obtained from each participating association was sent from their respective Human Resource departments to FCC Services; the data were purged of names, and all other personal identification by the staff of FCC Services, and the information were provided for analysis.

This thesis will study the significance of each of the examined traits from the pre-employment screening as it relates to employee retention, as well as examine the correlation between each of the traits and the overall composite score. Results and analysis will discuss the statistical breakdown of each association as they relate to one another, as well as provide a discussion of opportunities for future research in the area.

CHAPTER 2: LITERATURE REVIEW

Significant resources are allocated to the process of bringing new employees into a firm, as new employees must be trained in the operations, processes, procedures, and policies of a company. The more times a company has to repeat this training, the more efficiencies the firm loses in time, capital, and loss of employee productivity. Gunter argues, "Getting that right fit reduces turnover costs--typically one year's salary--required to recruit and train each professional." Given the magnitude of this cost, much research has been completed on the value of proper employee selection and the impact it has on a company in terms of profitability, the value of employee fit into the corporate culture, and the overall impact of recruiting and retaining individuals in a company. Thus, taking time to find the right employee for the right job function will result in lower employee turnover rates, and in turn, improve overall performance of a company, and teams within it.

Most firms, regardless of the industry, have historically used a subjective process in their hiring decisions. Checking references, reading resumes, and even interviews may not allow a company to gain a complete picture of the potential employee. Two major limitations are identified through these subjective hiring procedures; they are not standardized, and, they do not accurately predict how employees will actually perform (Martin and Lehnen 1992, 46). In their research of Burger King Corporation, Martin and Lehnen (1992) identified features of a scientific selection procedure: 1) All applicants are asked the same questions, 2) All questions are related to the job, 3) The scoring of responses is the same for all applicants, 4) The procedure is accurate in predicting job related criteria, 5) The questions and scoring methods are legal, and 6) The benefits of using the procedure exceed the costs. During their trial of scientific selection

implementation, Burger King Corporation witnessed their average monthly turnover rate drop from 21.7% to 11.6%. After accounting for the costs of the new hiring and testing processes, they calculated their annual savings to be between $2 million and $3 million in turnover costs alone (Martin and Lehnen 1992, 46).

As previously stated, a critical element to employee testing is to match the skill set and personality traits of the applicant to the position being filled. In subsequent chapters of this thesis, a specific career path (and the respective character traits) will be discussed in accordance with the value placed upon each within the Farm Credit testing process. In a labor market with ample applicants and a limited number available positions, those seeking employment will likely find that testing methods are an additional step they will encounter prior to being granted a face to face interview, as "…more than 80% of mid-size and large companies use personality and ability assessments for entry and mid-level positions as either pre-employment or new-employee orientation tools…" (Gunter 2009). This is a new practice in employer/employee relations that both sides understand may be a permanent fixture in the labor market.

In their research, Schmidt and Hunter (1998) studied the practical value and the derived utility from employee selection methods, to determine the tangible benefits from these processes. They found that

> *"…the most important property of a personnel assessment method is predictive validity: the ability to predict future job performance, job related learning (such as amount of learning in training and development programs), and other criteria"*

…that strongly correlates to the tangible results so that

"…predictive validity leads to substantial increases in employee performance as measured in percentage increases in output, increased monetary value of output, and increased learning of job related skills" (Schmidt and Hunter 1998, p. 262).

In the case of Farm Credit, the greater retention that can be predicted from the pre-employment screening, the greater a manager should feel about the long term growth and value that the employee will bring to the association. Their research explains the growth of employee testing from its beginnings during World War I to the heavily quantitative techniques currently used. An index of nineteen personnel measures were studied and combined with a test of general mental ability (GMA) to estimate a multiple regression examining the validity of supplemental personality traits. The nineteen measures included items such as work sample tests, conscientiousness, peer ratings, integrity, job experience (years), years of education, age, as well as structured and unstructured interviews. Of all of the measures they used, they concluded "two stand out as being both practical to use for most hiring and as having high composite validity: the combination of a GMA test and an integrity test (composite validity of .65)" (Schmidt and Hunter, p. 272).

In an era of public scrutiny of corporate actions and behavior, a measure of a potential employee's knowledge along with their personal level of integrity may allow an employer to seek not only the most knowledgeable (or trainable) candidate, but also one with a moral character that is consistent with the corporate culture. This may allow the company to find the best candidate for not only the current position, but also for potential growth, allowing management to worry less about employee turnover due to job dissatisfaction or inability to handle the responsibility of the position.

CHAPTER 3: THEORETICAL MODEL

A critical piece of any successful organization or company is its employees. Employees drive revenue, revenue drives profit, and profit drives continued expansion opportunities. One of the most critical elements of any human resource function is the recruitment and retention of quality individuals whose personal characteristics align closely with those of the hiring firm. It is desired that the value derived from the employee outweighs the cost associated with hiring and maintaining that employee as a staff member. Although employee skill and characteristic testing has existed for roughly a century, only during the past few decades has increased emphasis been placed upon the results and outcomes of these examinations.

Some firms have opted to use testing while others have not. Since there is a cost associated with testing (time, capital resources, etc.), a firm must weigh the cost of testing with the expected benefit from implementation. Thus, it can be inferred that if a firm uses pre-employment testing, they should use the results to obtain the benefits, since they have invested capital into the process. Costs associated with replacement of an employee have been widely studied; "…companies routinely record and report costs such as wages and benefits, workman's compensation insurance, utilities, materials, and space, yet most companies have no report of the cost of employee turnover. It can be much higher than you think" (Blake 2006). The author continues

> *"…if their average annual pay is $40,000, multiply this by 1.25 (or 125%) of their annual pay, a reasonable cost estimate for supervisors. This means it costs $50,000 to replace just one employee. If a company loses ten supervisors a year, then 10 times $50,000 equals $500,000 in replacement costs for just supervisors. This is the bottom line cost. The top line cost? If the*

company's profit margin is 10%, then it costs $5,000,000 in revenues to replace these ten supervisors." (Blake 2006).

Given the costs associated with employee turnover, one can see the immediate impact on a firm, the profit margin, as well as employee and customer morale.

"Certain causes associated with turnover in any specific job or organization can be managed. These include such things as non-competitive compensation, high stress, working conditions, monotony, poor supervision, poor fit between the employee and the job, inadequate training, poor communications, and organization practices" (Mushrush 2002).

One element of employee turnover is the fit between the position and the employee. With increased significance on the results of pre-employment screening, this may reduce employee turnover; "the average employee turnover rate is 14.4 percent annually, according to the Bureau of National Affairs" (Mushrush 2002).

Since pre-employment testing has become more prevalent in today's hiring processes, numerous FCS associations within U.S. AgBank began testing employees through a battery of predictive indexing modules nearly twenty years ago. Currently, the examinations have been expanded to become job specific including exams for Loan Officers, Loan Analysts, Appraisers, and Support Staff. The goal of each exam is to highlight the desired characteristics in that category to assess where a potential employee ranks on the predictive index of that job function, to determine the "recommended hires" from the applicant pool. These results tie back to the concept of improving employee fit, reducing employee turnover; thereby improving the profitability and revenue generation for the firm. In terms of consistency and accuracy, the examinations used in this thesis were conducted by the same team of individuals within FCC Services. Thus, assessments and

measurements are based from the same pool of trained individuals. While a complete set

of examination questions are not available from FCC Services due to their proprietary

nature, sample questions are available for Loan Officer applicants with a discussion of the

scoring of their responses.

Example Loan Officer Questions:

1. When you study financial data, do you ever get a hunch that something is missing

   or something is wrong? If so, please give me an example (Nikkel, 2010).

2. How well do you consistently make progress toward your goals? Please tell me

   how you consistently make progress (Nikkel, 2010).

While four tests exist for each job description (one for each unique pre-employment

test), only one is analyzed in the thesis. The data from FCC Services indicated that the

majority of the observations were in the category of Loan Officer, which one may argue,

most directly affects the earnings stream of an association. The complete set of

characteristics (critical factors) for the Loan Officer test is found in Table 3.1.

Table 3.1: Loan Officer Character Traits from FCC Services

Loan Officer
• Focus
• Persistence
• Ego Drive
• Competition
• Relator
• Command
• Discipline
• Critical Thinking
• Value Orientation

FCC Services has their own proprietary definitions for each of the examined traits.

<u>Focus:</u>

The loan officer high in focus is goal-oriented. Goals are clarified, then activities are organized in terms of their contribution to those goals. The loan officer may participate in community activities or personal hobbies, but his or her primary focus is on the management of credit for the farm community. A highly focused person is not easily distracted from the main activity that he or she has selected as a goal. Loan officers with high focus know what they want. They have objectives and think about how to achieve them. When necessary, they concentrate on a task and block out other issues until the task is complete. Focus for a loan officer is like an autopilot on a plane, whenever something changes its course, it corrects back and hones in on the destination. A low focused person can get off track and spend a great deal of time organizing, dreaming about something that might happen, visiting with friends, but not making sure that loans are collected (Atkins 2010).

Table 3.2: Matrix for Examining Focus Traits

☐ Dominant (4 - 5)	☐ Observable/Limited (2 - 3)	☐ Non-Response (0 - 1)
▪ Has a clear long-term vision of their career objectives. ▪ Strong planning skills. Will tend to map out weeks, even months in advance. ▪ A strong sense of work orientation - will come up with some of the best ideas outside of the workplace.	▪ Solid planning skills. Has both short and long-term objectives. ▪ Thrives in positions of planning that include deadlines or timeline coordination. ▪ Will have little or no long-term plans. Creates a problem for career planning. ▪ Will tend to become frustrated with timelines and deadline commitments. They need management in this area. ▪ Will need clear expectations set out for them to be successful.	▪ Long-term plans are hazy at best. They lack goal-setting skills. ▪ They rarely if ever work with a plan or list. Structure is needed for this person to succeed. ▪ May experience frustration in their job or career because they lack direction.

Persistence:

The loan officer high in persistence achieves goals. He or she never gives up. If there is an obstacle, there is only a moment of frustration, then the drive begins and the obstacle is overcome. Work is a way of life for the high persistence person and they generally put in more hours than their peers. There is an ongoing energy expression in the high persistence person that must be spent on constructive work. They tend to have a positive outlook because he or she will see in almost any situation, what will work rather than focusing on the problems. When low persistence people have success, they then feel they deserve a rest or a vacation. However, for the high persistence person, today's successes are quickly yesterday's successes and more successes are needed (Atkins 2010).

Table 3.3: Matrix for Examining Persistence Traits

☐ Dominant (4 - 5)	☐ Observable/Limited (2 - 3)	☐ Non-Response (0 - 1)
▪ Perseveres despite great resistance or objections. ▪ Thrives in an environment with constant challenges to overcome. ▪ Continually looking for opportunities.	▪ Can quickly formulate arguments to overcome objections in a sales situation. ▪ Does not allow rejection to bother him/her. ▪ Can be patient during a long sales process. ▪ Can become caught up in feelings of rejection and dwell on where they went wrong. ▪ Has difficulty beginning another sales call after a failure. ▪ Avoids challenges and does not get involved in situations that require long sales cycles.	▪ Takes an initial reflection as a final answer. ▪ Will eventually avoid situations with the potential for rejection. ▪ Has difficulty overcoming challenges and will avoid areas that have obvious obstacles. ▪ Difficulty handling pressure situations.

Ego Drive:

The loan officer with high ego drive likes a test, and thus, define himself or herself by overcoming challenges. Rescuing a business is an exciting adventure to the high ego-drive loan officer. There is a feeling that dealing with problems makes you stronger. High ego drive individuals are attracted to work that has pressure and they often prefer to clean up a mess rather than just have smooth sailing. High ego drive loan officers are willing to take a bad situation and turn it around. Recognition of success drives the efforts of the high ego-drive person. A low ego person is more likely to take the easy route and settle for less. When ego drive is low, loan officers are unlikely to commit to big goals, especially when there is some risk in attaining them. They would rather settle for average performance under the supervision of an undemanding manager than "put it on the line" for superior achievement (Atkins 2010).

Table 3.4: Matrix for Examining Ego Drive Traits

☐ Dominant (4 - 5)	☐ Observable/Limited (2 - 3)	☐ Non-Response (0 - 1)
▪ Thrives on individual achievement and accolades or recognition. ▪ Has a strong desire for independence/autonomy. ▪ A strong entrepreneurial drive. ▪ A strong drive for material possessions and other signs of success.	▪ Title and/or reward incentive will be a key driver for them. ▪ Will require little direct management, may require certain resources made available to them. ▪ Earning potential will be a strong incentive for them to succeed. ▪ Will prefer a team environment or a more anonymous form of contribution. ▪ Will require more direct supervision and need a support system to be successful. ▪ May have difficulty taking responsibility and leadership roles.	▪ Much more likely to be a "team" player than an individual producer. ▪ Will be less likely to stretch themselves or their goals for fear of failure. ▪ Will work better with more day-to-day interaction.

Competition:

Persons high in competition want to win. They struggle to be first, and they choose to compete where they will be tested, and where they know there is a chance of winning. Competition has a pervasive effect on their behavior because they typically observe those with whom they are working, and do more than others. Competition brings out the best. They like to measure themselves by doing things others can't. Thwarted in their drive to win, they may be frustrated, but most often they are graceful. Negotiating is an opportunity to win another over to his or her way of thinking. Although they work effectively with other people, in the end they are more likely to be individual achievers compared to team members. The person low in competition will be motivated more by comparing their achievement to their own expectation rather than comparing their achievement to that of

others. Not all loan officers are highly competitive, but most of the best loan officers are (Atkins 2010).

Table 3.5: Matrix for Examining Competition Traits

☐ Dominant (4 - 5)	☐ Observable/Limited (2 - 3)	☐ Non-Response (0 - 1)
▪ Naturally makes comparisons with others, regardless of there being an established system of competition. ▪ Strong goal orientation– will look for opportunities to "win" business. ▪ Thrives in contests or arenas of direct competition with others.	▪ Does not like to lose. Intensity and concentration will increase when faced with losing situations. ▪ Will seek competitive arena even if it exists outside of the workplace. ▪ May become discouraged or uncomfortable when pitted against others in direct competition. ▪ Will lose enthusiasm or interest when placed in a competitive arena. ▪ Will tend to set personal best goals rather than using peers as a barometer for their success.	▪ Will tend to lose interest or focus when contests are presented as a form of compensation/motivation. ▪ Avoids making direct comparisons and/or competing with others. ▪ Forms of competitions such as contests or sales meetings displaying rankings may be a de-motivator.

<u>Relator:</u>

The loan officer high on the relator scale responds to other people in a way that he or she builds relationships with them. Thinking individually about people, being sensitive to their feelings, and being a good listener are frequent behaviors of the person high in this characteristic. Learning the names of their customers, learning about their personal lives, and being available for counsel characterize persons high in the relator theme. They know that a good relationship with their customers will likely cause those farmers to perform on their loans. Their understanding of people leads them to work individually with farmers. Because they have a talent for building relationships, often they are chosen to provide

15

leadership. Loan officers that are low in the relator theme may miss the feeling dimension

of their borrowers and make them angry or give them the feeling of rejection, and thus

develop adverse rather than cooperative relationships (Atkins 2010).

Table 3.6: Matrix for Examining Relator Traits

☐ Dominant (4 – 5)	☐ Observable/Limited (2 – 3)	☐ Non-Response (0 – 1)
▪ Strong ability to develop long-term relationships. Sets few to no limits on working relationships. ▪ Strong tendency toward developing a positive work atmosphere. ▪ Likely to be perceived as very approachable, likeable, and caring.	▪ Will tend to have a number of friends in the workplace. ▪ Team-oriented individual. Very inclusive-willing to share responsibilities with others. ▪ The type of person that anyone can talk to about their concerns.	▪ May have more difficulty getting to the heart of an issue when it involves personal matters. ▪ May experience difficulty building loyalty among team members. ▪ May be less concerned with whether they are liked by others.

Command:

      With the command theme, loan officers are able to unilaterally assert their authority

based upon their personality rather than status or position. They are persuasive individuals

who can advocate a position to win others to their way of thinking. They create the

"followership" necessary to get people behind them. With loan officers high in command,

there is a genuine preference for convincing people to buy what they need rather than

simply "taking the order" for what they might want. While they can be sensitive to the

customer's needs, they also know that they must close the deal. Closing serves as both a

reward and motivation. They control the conversation when necessary and are likely to be

proactive in their sales efforts. When the command theme is low, the sales style is more

likely to be that of an "order taker" or one who responds to the instructions of the customer. With a reluctant or resistant prospect, there may not always be the ability to close the deal when the command theme is low (Atkins 2010).

Table 3.7: Matrix for Examining Command Traits

☐ Dominant (4 - 5)	☐ Observable/Limited (2 - 3)	☐ Non-Response (0 - 1)
▪ Has the ability to create urgency or a need through exposing a need. ▪ Feels very comfortable bringing up difficult or sensitive subjects in a discussion or meeting with employees.	▪ Tend to have a pretty noticeable level of intensity. ▪ It is easy to get straight answers to highly sensitive subjects or questions; won't dance around the issue. ▪ Will avoid or back down when confronted with a difficult situation. ▪ May have a difficult time taking the lead in discussions or meetings.	▪ Will likely experience call avoidance when faced with confrontation. ▪ Will struggle with situations in which they are required to be assertive.

Discipline:

The loan officer high in discipline can take charge of his or her own life. He or she has self-discipline. While they have a natural need for structure and routine in their life, they also have a capacity for implementing structure. When something works well, they develop it into a habit. The highly disciplined person likes systems and puts a great emphasis on doing things right. The highly self-disciplined person works out procedures for putting the best into practice. Loan officers high in self-discipline are likely to also be high in the Gestalt dimensions, where orderliness, timeliness and completion are characteristic behaviors. For the person low in discipline, procrastination may become a way of life (Atkins 2010).

Table 3.8: Matrix for Examining Discipline Traits

☐ Dominant (4 - 5)	☐ Observable/Limited (2 - 3)	☐ Non-Response (0 - 1)
▪ Strong detail-orientation. Attention to detail and organization. ▪ Strong planning skills. Will be suited for creating timelines and critical dates for projects. ▪ List maker- tends to write things down and know where they are.	▪ Good planner- will tend to work off a task list. ▪ Tends to have a need for organization and structure in their day/week. ▪ Record-keeper. Tends to have well organized filing system. ▪ Low attention to detail. Minor errors may pile up. ▪ Will have a difficult time understanding what step of a project comes next. ▪ May have a difficult time locating records or files.	▪ A tendency to have trouble showing up on time for appointments. ▪ Work without planning their day, week, or month. ▪ Will require support where paperwork and other administrative duties are needed.

Critical Thinking:

The loan officer high in critical thinking takes satisfaction out of studying a situation, such as a farmer who is in financial crisis, and trying to determine a way to make it work. Loan officers high in critical thinking know that they have to analyze information to understand a problem. It is their understanding that identifies their capacity for solving problems. A critical thinking orientation mitigates against making snap decisions. Sometimes skeptical, these loan officers have a degree of ambiguity tolerance, so they can live with unanswered problems until they get enough information for the insight to occur. Loan officers low in critical thinking are likely to have insufficient documentation in their files and are likely to make quick decisions and spend their time defending decisions rather than getting the information first and making the right decision (Atkins 2010).

Table 3.9: Matrix for Examining Critical Thinking Traits

☐ Dominant (4 - 5)	☐ Observable/Limited (2 - 3)	☐ Non-Response (0 - 1)
▪ Strong ability to map out strategies to overcome obstacles-contingency planners. ▪ Strong analytical sense-breakdown complex problems and simplify. ▪ Able to find solutions without having all the information provided for them—an investigator.	▪ May get bored when not challenged with a complex obstacle. ▪ Finds enjoyment in solving problems. May often look for problems, simply to solve them. ▪ Desire to take things apart to understand how they work. ▪ May tend to display limited tolerance when projects or tasks don't go as planned. ▪ May tend to get confused easily when encountering complexities in their work.	▪ Will tend to rely on more instruction rather than developing own strategy. ▪ Will require assistance whenever projects or tasks contain multiple layers or steps.

Value Orientation:

The loan officer high in value orientation knows the importance of keeping promises and knows that trust is built by being dependable. The loan officer high in value orientation knows the power of money for both developing and destroying people. Thus, he or she has a high concern for making the right decision. Being honest with a borrower is an absolute and having integrity that the borrower can relate to is a necessity. If there is an error, then an apology is not enough. There must be restitution which they know develops credibility and makes them stronger. The loan officer low in value orientation may exaggerate to borrowers or may not feel a need to fulfill agreements (Atkins 2010).

Table 3.10: Matrix for Examining Value Orientation Traits

☐ Dominant (4 - 5)	☐ Observable/Limited (2 - 3)	☐ Non-Response (0 - 1)
▪ Has a defined set of internal values and standards. ▪ Strong family orientation. ▪ Sensitive to the feelings and beliefs of others. ▪ Acts decisively in conflicts that require a clear, level headed judgment.	▪ A good sense of right and wrong. ▪ Tolerant to beliefs that may differ from their own. ▪ Low tolerance for dishonesty – will take on directly. ▪ May have a questionable value system – able to compromise values. ▪ More interested in self-gain or focused on self, as opposed to benefiting others ▪ May be less responsive to the needs of others.	▪ Not concerned with others feelings or sensitive to their beliefs. ▪ May not have an internal value system that drives them to do the right thing. ▪ Policy will dictate judgment and decision making.

The characteristics in Table 3.1 resemble traits that other corporations place value on when seeking employees. Koch Industries has ten guiding principles that they seek, and to cultivate in their employees: integrity, compliance, value creation, principled entrepreneurship, customer focus, knowledge, change, humility, respect, and fulfillment (Koch 2007, 81-82). With Koch Industries, one of the world's largest private companies, their hiring and selection process has likely led them along a path of industrial and financial success. In the case of Farm Credit, the value placed upon the pre-employment testing varies by each of the five U.S. AgBank Associations.

In their book, "Blue Ocean Strategy", W. Chan Kim and Renee Mauborgne (2005) use the concept that businesses are more successful if they operate in new Blue Oceans (creating new opportunities) as opposed to operating in Red Ocean environments, where old methods, concepts, and processes are continually rehashed and reformatted. The

tangible Blue Ocean element of this Farm Credit study arises through hiring practices. In an economy where potential employees often take a job that pays more than their next best option, the results of the predictive index should effectively allow managers to understand the process in such a manner that they can offer a compensation package to the desired applicant that is built off the assumed value the employee will bring to the firm based off their predictive index of characteristics from their individual strategy canvas.

Thus, it is the intention of this thesis to provide a statistical analysis to FCC Services, and through them, provide data back to each of the participating Farm Credit Associations, in such a manner to determine whether more emphasis should be placed on the pre-employment examination.

CHAPTER 4: METHODS

4.1 Conceptual Background

For the Farm Credit System (and each of the associations) to gauge their success in using the predictive index and testing tools, the analysis will use 145 observations from five participating associations from 1999-2009. Data were provided on each employed applicant including their individual character trait scores, as well as their composite score. Data were also provided on their hire date (year), departure date (year), both of which were used to track a timeframe for their tenure. In some cases, data were not provided for an employee's year of initial employment; for these cases, the year 1999 was used as the time the employee was on staff. While data were provided on whether a departure was voluntary, a termination, or due to some other circumstance (merger, etc.), it was not differentiated for the use of the regression model because it was not clear that all data providers were necessarily consistent with this code. For demographic purposes, the gender of each applicant was also included in the regression.

Given that data from five different associations are available, we can overlay the results from each association sample with the entire set to examine similarities/differences from one association to another. In addition, we test for differences in the regression analysis.

Given the nature of predictive testing, one goal is to provide FCC Services information for each of the associations in the sample, and to provide them with feedback that shows the cause-and-effect of using the pre-employment test in the final hiring decision. The results of this study may lead to firms that have not used the predictive index

results to place more weight on them in the future. This may help with matching job duties

and tasks, but also improve the profitability and revenue generation through greater

employee satisfaction and success and lower employee turnover for their office.

While there is a financial cost associated with administering each test, it is

important to determine that the utility gained from hiring the right people outweighs the

financial cost of screening and testing that applicant on the front side of the process. A

simple concept of invest now, benefit later. A business person with time value of money

training should be able to understand this bottom line decision should make sense.

Initial analysis of the data was a statistical breakdown of demographic information.

This included gender, percentage of applicants from each association, percentage of hires

"Not Recommended", as well as the overall turnover ratio for each association.

Additionally, analysis of the correlations between the tested characteristics was conducted

to see if they work in conjunction with one another, or, if some traits counter-act other

traits.

The final methodology used was a binomial logistic regression (Minitab, 2007)

using nine variables from the tested traits (Focus, Persistence, Ego Drive, Competition,

Relator, Command, Discipline, Critical Thinking, Value Orientation) as independent

variables. Additionally, dummy variables were included for each applicant that measured

whether they were a "Recommended" or "Not Recommended" hire, as well as a dummy

variable for the gender of the applicant. Each of these independent variables were included

in the regression to estimate their impact on the dependant binomial variable of whether

that employee was still employed within the Farm Credit System Association. An

estimated model was developed, and measurements of fit including Somers' D and Kendall's Tau-a were analyzed. Additionally, the statistical significance of each independent variable was tested.

A binomial logistic regression was used to analyze the data. A linear regression was not an appropriate method for analysis, as the predicted values will become greater than one and less than zero. Such values are theoretically inadmissible. The main interpretation of logistic regression results is to find the significant predictors of a binary decision (Brannick).

4.2 Correlation of Tested Traits

In an attempt to understand the inter-relationships of the nine character traits, the correlation between each of the nine characteristics and the composite score was examined. Providing information back to the hiring managers on the traits that are highly correlated with one another, as well as ones that are highly correlated with the overall composite score is important for them to use in comparing applicants for the loan officer positions. For example, if multiple applicants test a similar level, but their scores have a wider distribution between the traits, the hiring team may be able to see which of the traits have historically been correlated with one another, thus allowing them to be a better predictor of potential success of each of the applicants.

4.3 Regression Modeling and Structure

A set of independent variables has been provided by FCC Services for use in the regression analysis. The nine traits were defined in Chapter 3. Additionally, two binary

independent variables were used in the regression; they are recommended/not recommended and male/female.

Recommended/Non-Recommended Hire:

The composite score of each applicant was measured against the minimum score of 31 (out of a possible 45). If the applicant scored a 31 or higher, they were given a designation of "1" noting that they were a "Recommended" hire. If the composite score was 30 or lower, they were designated a "0". The impact of the Recommend/Not-Recommended score is tested against the dependant variable of whether or not the employee is still employed with Farm Credit.

Male/Female:

The gender of each applicant was provided by FCC Services so that an independent binary variable of male (1) and female (0) could be included for analysis in the regression, to test the impact that gender played on turnover.

Selection of the proper factors and placement of them into the analysis is essential in defining the null and alternative hypotheses for the study. Table 4.1 examines the variables measured in the regression.

Table 4.1: Regression Variables Used the Estimate Employer Retention

Dependent Variable:	
Employment Status	Binary Data
Independent Variables:	
Focus (F)	Test Data
Persistence (P)	Test Data
Ego Drive (ED)	Test Data
Competition (COMP)	Test Data
Relator (R)	Test Data
Command (COMM)	Test Data
Discipline (D)	Test Data
Critical Thinking (CT)	Test Data
Value Orientation (VO)	Test Data
Recommended/Not Recommended Hire (R/NR)	Binary Data
Male/Female (M/F)	Binary Data

The format for the logit regression followed Studenmund (2006). MiniTab was used to estimate the model. The expected signs for each parameter must be predicted before the regression can be estimated. As explained by Studenmund (2006), any regression can be estimated using the following format,

$Y=f(X_1, X_2, X_3,…X_n)$

where Y is the dependent variable that is impacted by a constant term as well as the independent variables X.

Given this structure, we hypothesize that the base regression model for this analysis is as follows:

EMPLOYMENT=f(F, P, ED, COMP, R, COMM, D, CT, VO, R/NR, M/F)

where F is focus, P is persistence, ED is ego drive, COMP is competition, R is relator,

COMM us command, D is discipline, CT is critical thinking, VO is value orientation,

R/NR is a "1" for those that are recommended and "0" otherwise, and M/F is a "1" for male

and "0" if a female.

With the information presented previously, the expected signs of the coefficients

are hypothesized and presented in Table 4.2.

Table 4.2: Expected Coefficient Signs on Variables

Dependent Variable:	*Expected Sign*
Current Employment	
Independent Variables:	
Focus (F)	+
Persistence (P)	+
Ego Drive (ED)	+
Competition (COMP)	+
Relator (R)	+
Command (COMM)	+
Discipline (D)	+
Critical Thinking (CT)	+
Value Orientation (VO)	+
Recommended/Not Recommended Hire (R/NR)	+
Male/Female (M/F)	?

All coefficients are predicted to have a positive impact on the retention of an

applicant. Since all nine character traits should positively reflect the desirability of a

candidate, positive signs are predicted on each. Also, a positive sign is predicted on the

"Recommended" variable because if a candidate scores an "R" score, this should positively

impact their retention; that is, the test results are useful. An expectation for the sign on the

gender variable was not predicted.

4.4 Alternative Models

To test the robustness of the regression model discussed in Section 4.3, alternative models were examined. These alternative models were derived from using differing variations of the variables to compare to the initial model.

The alternative models considered were:

- EMPLOYMENT=f(Composite Score, R/NR, M/F)

  where Composite Score is the sum of each of the individual tested trait scores, R/NR is a "1" for those that are recommended and "0" otherwise, and M/F is a "1" for male and "0" if a female. This model examines the strength of the composite score in retention prediction.

- EMPLOYMENT=f(F, P, ED, COMP, R, COMM, D, CT, VO, M/F)

  where F is focus, P is persistence, ED is ego drive, COMP is competition, R is relator, COMM us command, D is discipline, CT is critical thinking, VO is value orientation, and M/F is a "1" for male and "0" if a female. The R/NR variable was dropped from the base model to determine if that affects the individual variable information.

- EMPLOYMENT=f(Composite Score, M/F)

  where Composite Score is the sum of each of the individual tested trait scores, and M/F is a "1" for male and "0" if a female. This regression tests the strength of the composite score alone.

- EMPLOYMENT=f(F, P, ED, COMP, R, COMM, D, CT, VO, R/NR, M/F, Assn 1, Assn 3, Assn 4, Assn 5)

  where F is focus, P is persistence, ED is ego drive, COMP is competition, R is relator, COMM us command, D is discipline, CT is critical thinking, VO is value orientation, R/NR is a "1" for those that are recommended and "0" otherwise, M/F is a "1" for male and "0" if a female, Assn 1 is a "1" for those observations from Association 1 and "0" for all other associations, Assn 3 is a "1" for those observations from Association 3 and "0" for all other associations, Assn 4 is a "1" for those observations from Association 4 and "0" for all other associations, and Assn 5 is a "1" for those observations from Association 5 and "0" for all other associations. This model determines whether the results differ by association. Additional analysis of this alternative model is discussed in Chapter 5.

- EMPLOYMENT=f(Composite Score, Composite Score Squared, M/F)

  where Composite Score is the sum of each of the individual tested trait scores, Composite Score Squared is the square of the original composite score, and M/F is a "1" for male and "0" if a female. This model examines whether the composite score relationship is non-linear.

CHAPTER 5: STATISTICAL ANALYSIS OF DATA

As discussed in Chapter 4, the data were analyzed in multiple formats. This chapter presents the findings of the research. Initial presentation of findings will focus on demographic information, followed by a discussion of the correlation analysis for each of the tested traits. The findings and outcomes from the regression conclude this chapter.

Analysis will show that Association #3 has results that are significantly different from the others. This is due to the fact that Association #3 participated in a merger during the examined timeframe, thus, their data and results are influenced by that action.

5.1 Statistical Demographics of Observed Data

The data used for the analysis consists of information provided by five different Farm Credit Associations within the U.S. AgBank district. The breakdown of the 145 observations from the five associations is shown below in Figure 5.1.

Figure 5.1: Number of Tested Loan Officer Candidates by Association; 1999-2009
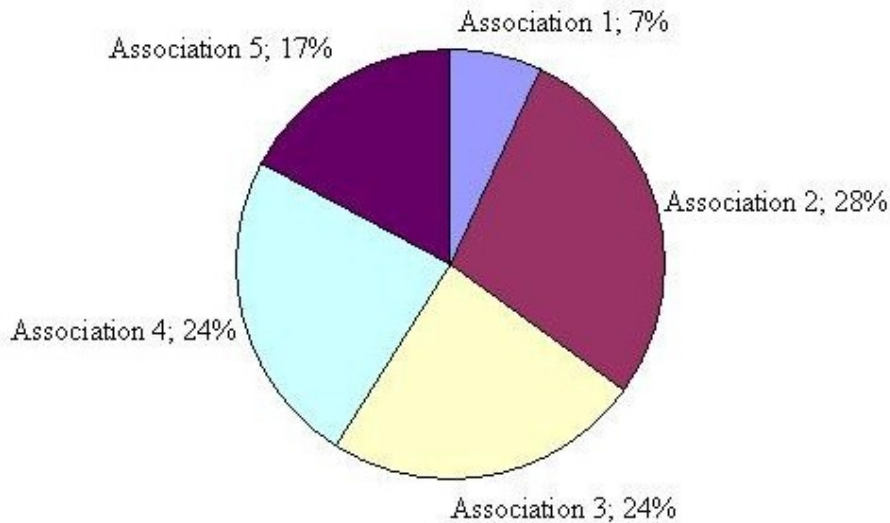
Association 1 had the lowest number of observations, followed by Association 5. Associations 2, 3, and 4 supplied more observations.

Figure 5.2 illustrates the gender makeup of the observations. This data may be insightful in analyzing the eventual recruitment and subsequent turnover information for each association, given the desired traits for a perceived successful loan officer applicant. All associations except for Association 3 hired more men than women during the period.

Figure 5.2: Gender Breakdown of Tested Applicants; 1999-2009

	1	2	3	4	5
Female	1	12	19	8	5
Male	9	29	16	26	20
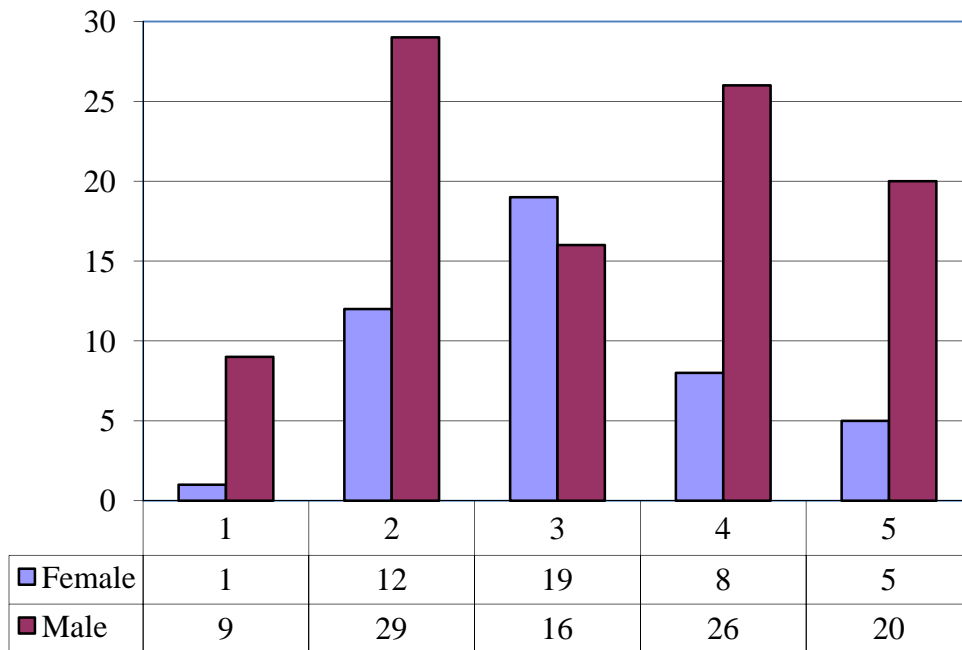
An initial analysis of the number of hired applicants from the observation pool is shown below in Figure 5.3. This better illustrates the number of hired employees that have left the Farm Credit association through termination, voluntary departure, or any other reason (ie: merger, position eliminated, not known, etc.). Association 3 is the only one that had more than 50% of loan officers hired during the period leave.

Figure 5.3: Breakdown of Employed vs. No Longer Employed with FCS

	1	2	3	4	5
☐ No Longer Employed	4	16	23	15	12
■ Still Employed	6	25	12	19	13
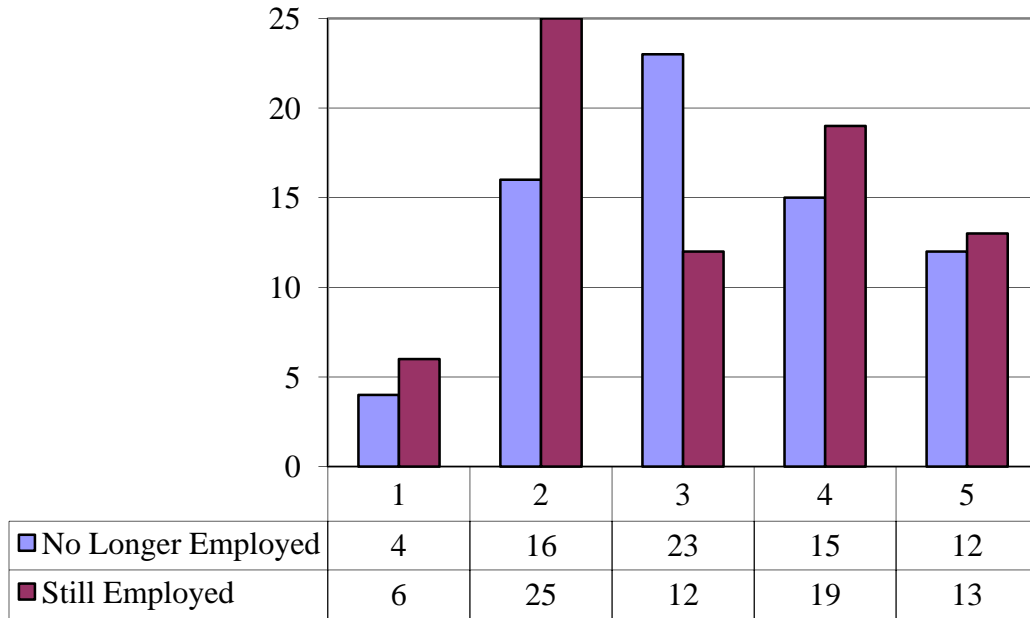
Figure 5.4 illustrates the number and percent of the hired loan officers for each association for the ten year period that received a composite score of "Not Recommended" (N/R). While each association did hire N/R candidates, some hired significantly higher percentages than others. Associations 1 and 5 had the highest percentage of hires that were not recommended.

Figure 5.4: Not-Recommended Hires as a Percent of Total Hires

	1	2	3	4	5
▪ Not Recommended	3	4	7	5	9
▪ Recommended	7	37	28	29	16
▲ % NR	30%	10%	20%	15%	36%
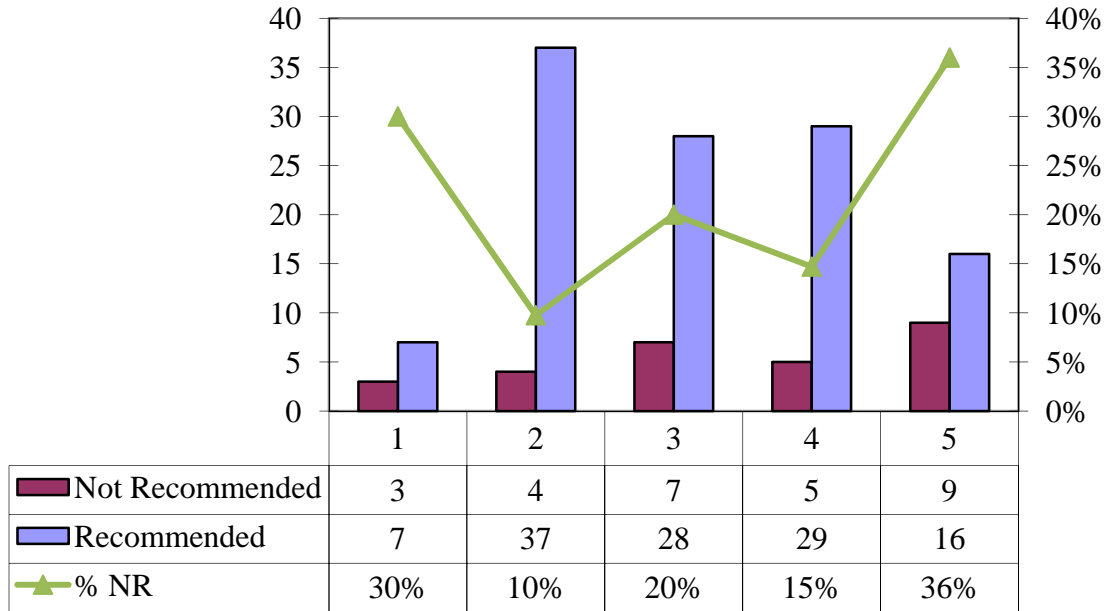
Figure 5.5 illustrates the overall turnover ratio, defined as the percentage of hired loan officers that are no longer currently employed for each association, in comparison to the percentage of N/R hires employed. Overall, the turnover ratio follows a similar, although not perfect trend, of increase/decrease based upon the increase/decrease in number of employed N/R candidates. The lack of a precise trend in this figure reinforces the value of research in this field.

Figure 5.5: Overall Turnover Ratio vs. N/R Hire

	1	2	3	4	5
Turnover Ratio (Overall)	40%	39%	66%	44%	48%
% NR	30%	10%	20%	15%	36%
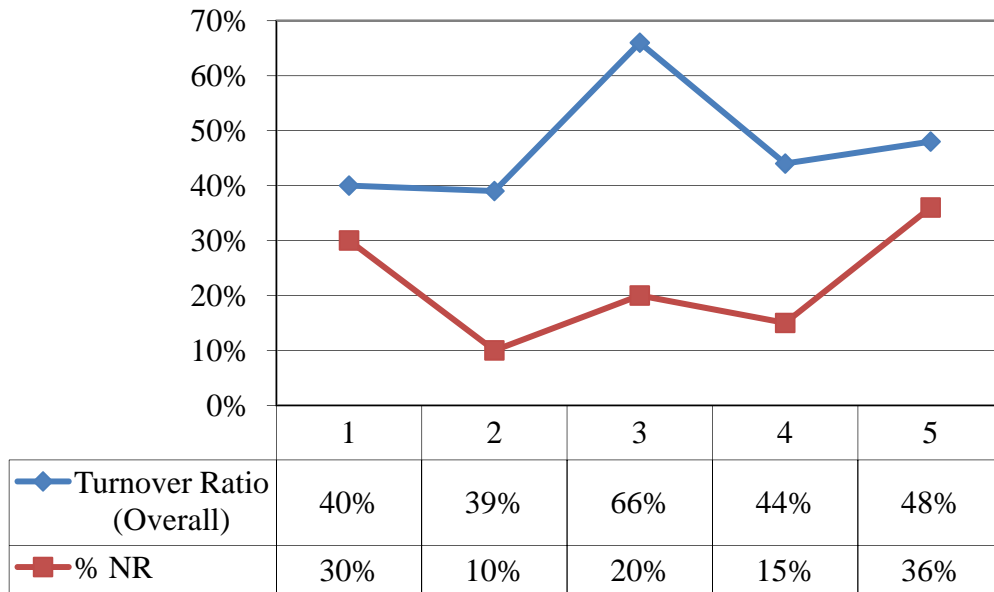
In Figure 5.6, the turnover ratio is measured in comparison to the number of loan officers that were terminated, voluntarily resigned, or coded as "other" for departure reason, as well as the number of applicants that are still employed with Farm Credit. This illustrates the impact of turnover on each association and whether those departures were the result of a poorly performing employee, or, if it was the employee's choice to voluntarily leave his/her position with Farm Credit. A terminated departure means that Farm Credit chose to end the employment. A voluntary departure means that the employee chose to end the employment. Finally, a departure code of "other" means that the reason behind the departure is unknown.

Figure 5.6: Overall Turnover Ratio and Departure Reasoning
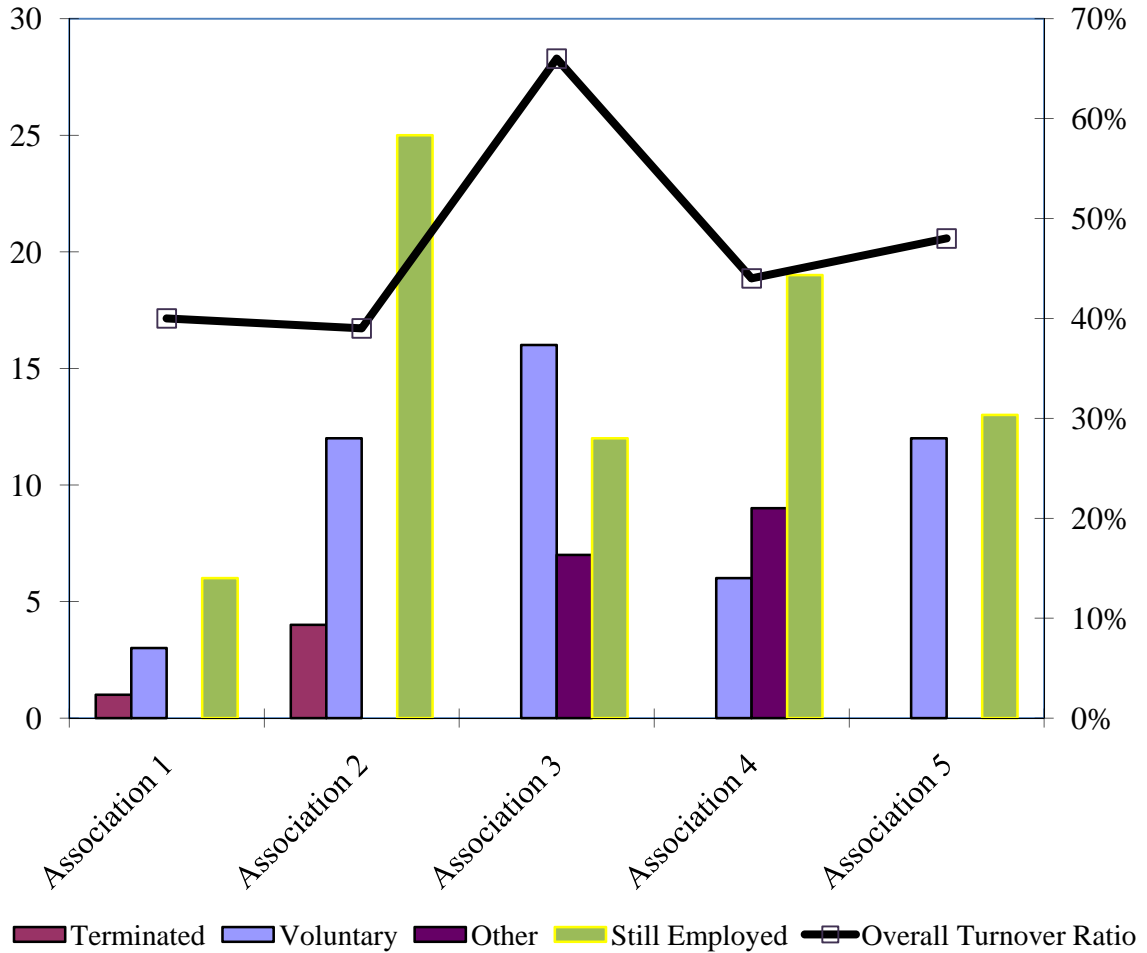
Figure 5.7 graphically represents the number of employees from each association that were recommended as well as not recommended, and those that are still employed next to those that are no longer employed. The differences reflect the impact placed upon the test scores in the final hiring decision, while also reflecting turnover within each association. A difference occurs in Association 3, in that they had the highest turnover ratio, yet none of those departures were coded as terminations. One may infer, given this situation, that the departures coded "other" may partially explain unknown terminations. We also find that Association 2 had the lowest turnover ratio, and also hired the least

percentage of non-recommended hires. We can understand as an example, that if an

employee departs that has a salary of $75,000, the cost to replace that employee to that

association would roughly be $93,750 according to the study done by Blake (2006). Since

true salary information was not provided for any position or association, this is merely a

representative example.

Figure 5.7: Recommended and Non-Recommended with Employed and No Longer Employed Observations by Association
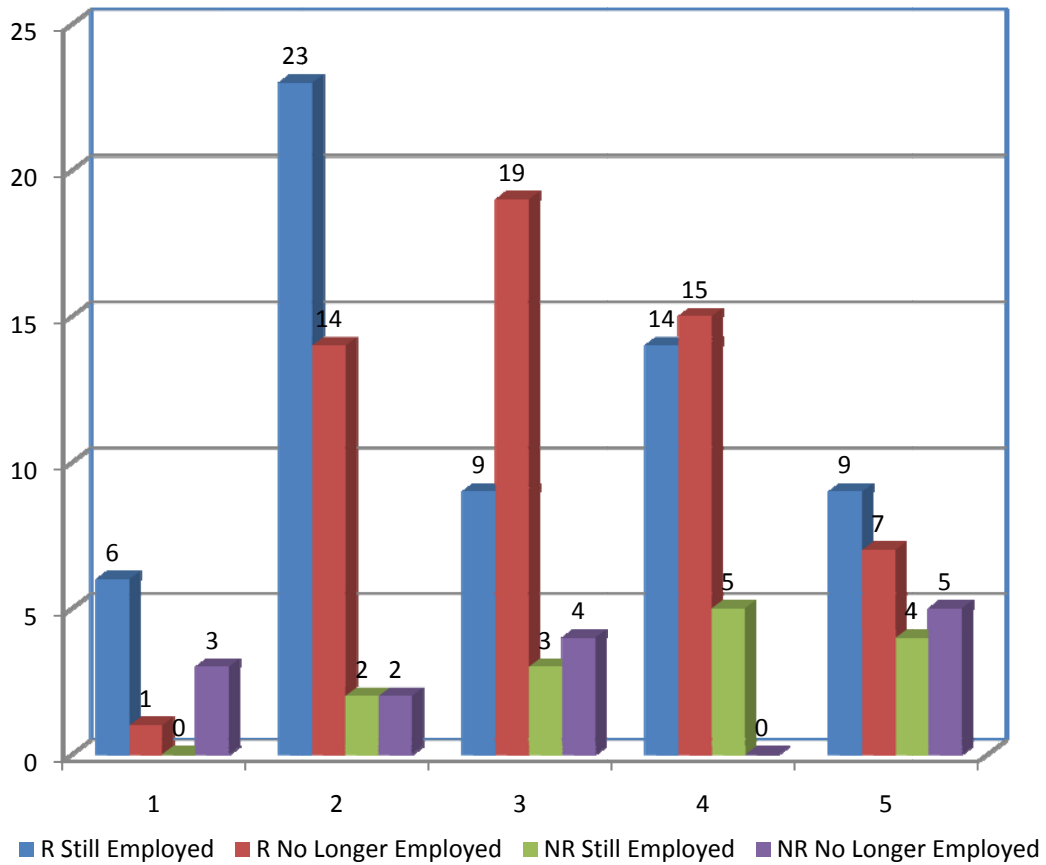
The information presented provides an explanation of the employment decisions.

While some associations hired a greater percentage of non-recommended hires than others,

a higher turnover ratio shows that in general it is related to a higher number of non-recommended hires that were employed.

5.2 Explanation of Correlations between Tested Characteristics

In Table 5.1, the mean scores for each examined trait are shown so as to examine the differences in scoring that are seen between each association. Table 5.1 also shows the overall mean score for each tested category when examining all of the observations together. Association #1 demonstrates, on average, lower scores in most of the tested trait categories in comparison to the other associations, as well as the overall mean. Associations #2, #3, and #4 demonstrate similar means per category, suggesting that they recruit and employ a similar type of individual. In terms of lowest trait scores, we see that overall, Command and Ego Drive average the lowest score.

Table 5.2 reports the correlation between the tested character trait scores. The correlations of all the variables are statistically significant. The correlation scores provide information on traits that work in conjunction with one another and influence one another at a higher rate. Thus, a manager can look at high or low scores for these specific traits and be able to understand the impact they have on one another for a potential employee.

Table 5.1: Mean Test Scores by Association and Overall

	Focus	Persistence	Ego Drive	Competition	Relator	Command	Discipline	Critical Thinking	Value Orientation
Assn. #1	3.90	3.70	3.10	3.30	3.70	2.90	4.10	3.60	4.00
Assn. #2	4.17	4.24	3.41	3.56	3.73	3.44	4.42	3.86	4.44
Assn. #3	4.31	3.97	3.37	3.46	3.97	3.11	4.23	3.74	4.34
Assn. #4	4.09	4.09	3.41	3.59	3.56	3.00	4.30	3.68	4.47
Assn. #5	4.04	3.76	3.44	3.28	3.48	3.00	4.16	4.04	4.32
Overall	4.14	4.02	3.39	3.48	3.70	3.14	4.28	3.80	4.37

Table 5.2: Correlation Between Tested Character Traits

	Focus	Persistence	Ego Drive	Competition	Relator	Command	Discipline	Critical Thinking	Value Orientation	Composite Score
Focus	1.000									
Persistence	0.386	1.000								
Ego Drive	0.457	0.577	1.000							
Competition	0.312	0.366	0.537	1.000						
Relator	0.216	0.273	0.369	0.348	1.000					
Command	0.321	0.534	0.518	0.487	0.309	1.000				
Discipline	0.194	0.378	0.388	0.394	0.299	0.319	1.000			
Critical Thinking	0.214	0.251	0.373	0.254	0.202	0.335	0.351	1.000		
Value Orientation	0.347	0.327	0.324	0.338	0.297	0.269	0.384	0.263	1.000	
Composite Score	0.575	0.706	0.792	0.715	0.568	0.725	0.627	0.539	0.575	1.000

None of the character traits are negatively correlated with one another (Table 5.2). Given the difference in traits, it may have been possible that some scores would actually contradict one another due to nature of the traits being measured. However, that was not the case.

The most highly correlated traits (Table 5.2) are Persistence with Ego Drive (.577), Persistence with Command (.534), Ego Drive with Competition (.537), and Ego Drive with Command (.518). Considering the nature of the lending business and how it relates to sales and the perceived impact of a successful candidate, it makes sense to infer that a greater ego is also going to denote a heightened sense of competition and persistence with it.

The least correlated traits (Table 5.2) are Focus with Relator (.216), Focus with Discipline (.194), and Focus with Critical Thinking (.217). Again, given the sales mentality of a loan officer, the lack of correlation between Focus and these traits makes sense. The traits most highly correlated with the overall composite score are Ego Drive (.792), Command (.725), and Competition (.715).

5.3 Logistic Regression Analysis

The following logistic regression equation is estimated:

$$\text{EMPLOYMENT} = \beta_0 + \beta_1 F_{1i} + \beta_2 P_{2i} + \beta_3 ED_{3i} + \beta_4 COMP_{4i} + \beta_5 R_{5i} + \beta_6 COMM_{6i} + \beta_7 D_{7i} + \beta_8 CT_{8i} + \beta_9 VO_{9i} + \beta_{10} R/NR_{10i} + \beta_{11} M/F_{11} + \varepsilon_i$$

Table 5.3 below reports the regression output for the model. Four of the character trait independent variables show negative signs on the coefficients, thus contradicting the expected hypotheses. The variables of Ego Drive (ED), Relator (R), Command (COMM),

and Value Orientation (VO) all have a negative coefficient, indicating that higher scores in those areas actually have a negative impact on the retention of an employee. This may be reflective of the fact that these individuals may progress or move on to new challenges and opportunities. Subsequent analysis and discussion demonstrates that not all of these variables are statistically significant to the model.

Table 5.3: Regression Variables, Hypothesis, Means, and Results

Predictor	*H.O.*	*H.A.*	*Coefficient*	*Standard Error*	*P-Value*
Intercept			-0.024	1.647	0.988
Focus	β=0	β≠0	0.301	0.263	0.251
Persistence	β=0	β≠0	0.149	0.265	0.573
Ego Drive	β=0	β≠0	-0.404	0.282	0.152
Competition	β=0	β≠0	0.195	0.219	0.372
Relator	β=0	β≠0	-0.020	0.226	0.930
Command	β=0	β≠0	-0.745	0.242	0.002
Discipline	β=0	β≠0	0.277	0.253	0.273
Critical Thinking	β=0	β≠0	0.165	0.255	0.517
Value Orientation	β=0	β≠0	-0.506	0.305	0.096
R (1) / NR (0)	β=0	β≠0	1.207	0.798	0.131
M (1) / F (0)	?	?	1.137	0.426	0.008

			P-Value of Overall Model:		
Log-Likelihood	-90.467				0.047

Measures of Association:		
Pairs:	**Number**	**Percent**
Concordant	3675	70.00%
Discordant	1544	29.40%
Ties	31	0.60%

Summary Measures:	
Somers' D	0.41
Kendall's Tau-a	0.2

Pre-employment screening procedures utilized by FCC Services, and thus, by each of the participating Farm Credit associations is a statistically relevant process in assisting to predict the retention of loan officer candidates. While not all of the individual variables that

were included in the regression analysis were statistically significant, each nonetheless plays a role in providing Farm Credit with additional options to consider when looking for loan officers that will show the potential for career success.

Given that this study focused on only a smaller cross section of a much larger population of tested applicants, one may find that some of these variables would be deemed more statistically significant in a larger sample. The results do, however, indicate correlations between many of the tested character traits and retention.

A pre-selected significance level of 0.10 allows us to test the statistical significance of each variable. Given that alpha is 0.10, coefficients having a p-value of 0.10 or less would be statistically significant. Thus, we see that Command, Value Orientation, and M/F are statistically significantly different from 0 (Table 5.3). The variables of Focus, Persistence, Ego Drive, Competition, Relator, Discipline, Critical Thinking, and Recommended are not significant variables in predicting the retention of a loan officer candidate, while Command, Value Orientation, and M/F are significant variables in predicting the retention of a loan officer candidate.

The measures of association for the estimated model allow us to better understand the information as presented and how it measures the goodness of fit. For each employee, the fitted model can be used to predict the possibility that they would stay employed in the Association. Using a cut-off of 50%, the pair is concordant if the employee that was retained had a higher fitted probability of staying employed; the pair was discordant if the employee had a lower fitted probability of staying employed. The percent of concordant pairs (70%) is a direct measurement of association (Table 5.3). Somers' D is the difference between the

proportions of the concordant and discordant pairs if the ties are removed from analysis. In this case, Somers' D is 0.41. The measurement tool of Kendall's Tau-a defines the difference between the unique proportion of concordant and discordant pairs out of all measured pairs; in this case, Kendall's Tau-a is 0.20. All measurements of association should fall between 0 and 1, with higher values showing a greater goodness of fit and being better predictors. With outcomes of 0.41 and 0.20, respectively, Somers' D and Kendall's Tau-a tell us that the estimation does not have as good of fit as it could have had.

The log likelihood of the model is maximized by the process that computes the value for the B_i parameters. The Log-Likelihood is -90.467, which is the maximum value possible given the data set observed (Table 5.3). The P-Value of the regression model, 0.047, tells us that the model is significant at the 95% level, thus we can reject the case that all parameter estimates are equal to zero. This is a joint significance test of all the coefficients. In all, we can infer that the data presented by Farm Credit, FCCS Services, and each of the five unique associations is mostly a good fit and measurement of predictability of employee success.

Figure 5.8, Figure 5.9, and Figure 5.10 graphically represent the three statistically significant variables in the estimated model and the probability of retention of each given each potential response that could be used for calculation. The estimated model was used to calculate the retention probability if each variable was set at their mean score (probability of 60.241%). To obtain the probability, the regression equation is used to predict the log-odds ratio (ln(probability/(1-probability))) using the means of the different variables and the most likely independent variable for the binary variables. Next, the anti-log of that prediction is

calculated. Next, the probability is determined by taking the anti-log of the prediction divided by 1 plus the anti-log of the prediction.

Keeping all things equal, each of the statistically significant traits (Command, Value Orientation, Male/Female) were then calculated based on the possible scores of 0-5 (Command and Value Orientation) and 0-1 (Male/Female). Those retention probabilities are graphed to show their individual ranges given based on this estimated regression model. Using the mean score for each variable, and then modifying only the score for each of the independent variables one at a time (per each individual graph), we are able to examine the impact of potential retention given a one unit change in the score of the variable.

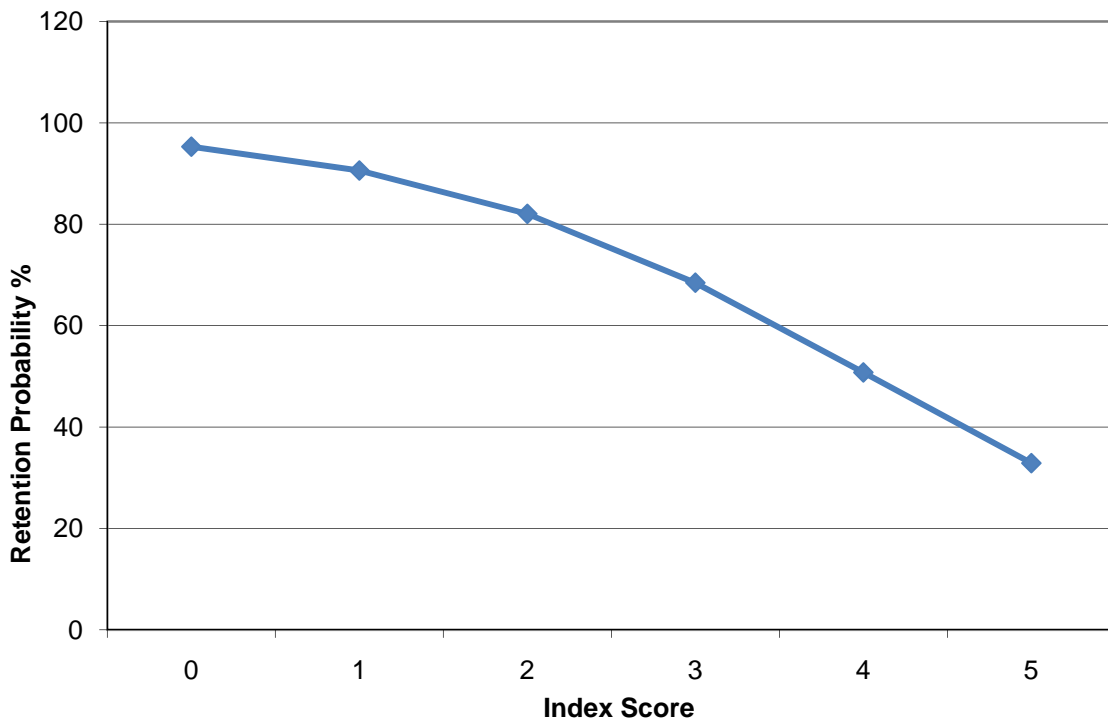**Figure 5.8: Probability of Command on the Retention of an FCS Employee**

Figure 5.8 shows the probability of retention of an FCS loan officer for each of the possible numeric scores for the variable of Command, holding all other variables in the estimated model at their average.

Figure 5.9: Probability of Value Orientation on the Retention of an FCS Employee
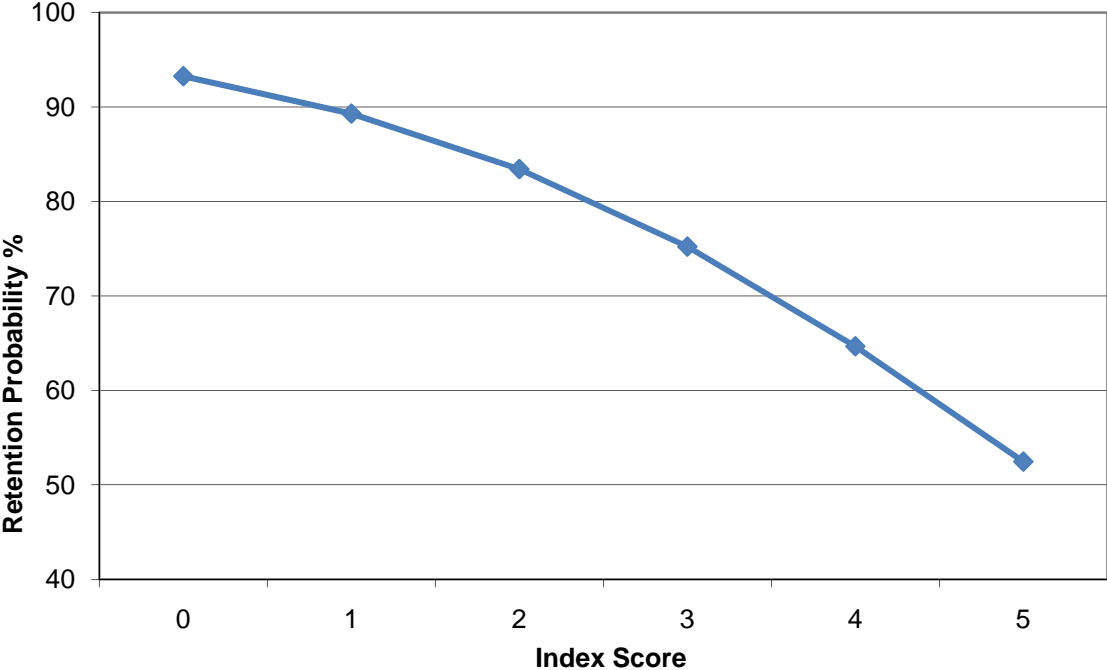

Figure 5.9 shows the probability of retention of an FCS loan officer for each of the possible numeric scores for the variable of Value Orientation, holding all other variables in the estimated model at their average.

Figure 5.10: Probability of M/F on the Retention of an FCS Employee
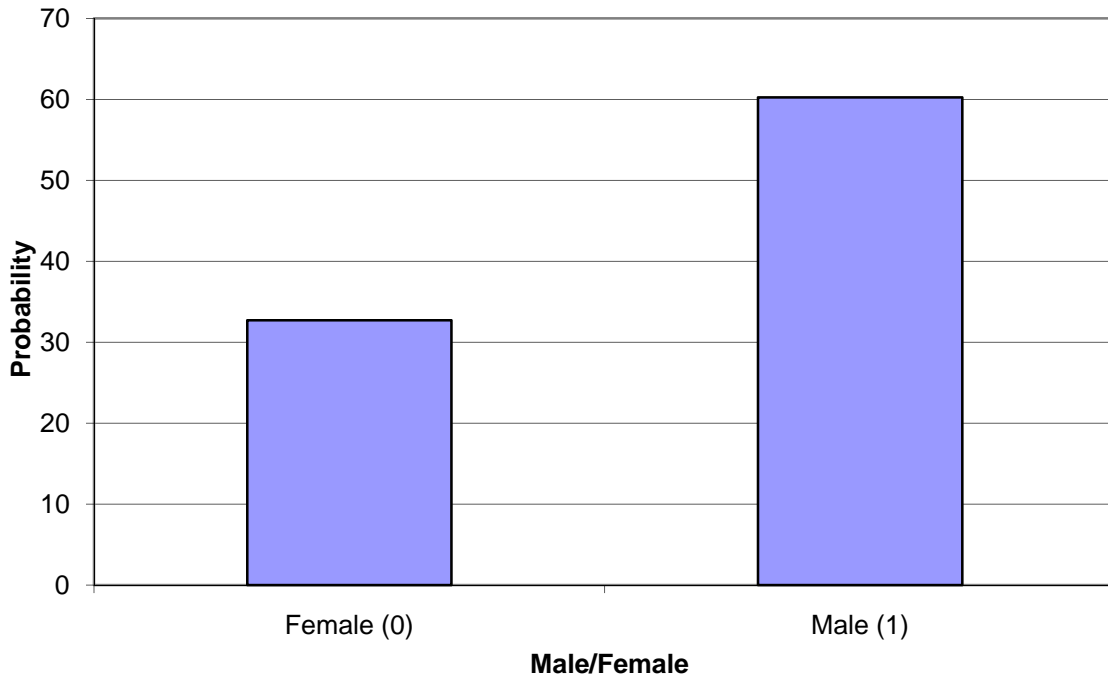
Figure 5.10 shows the probability of retention of an FCS loan officer for both the designation of male as well as female, holding all other variables in the estimated model at their average.

Additionally, a probability of retention calculation was built using the Recommended/Not Recommended score (0-1) and is represented in Figure 5.11. While not a statistically significant variable in the estimated model, from an economic standpoint, it is relevant in considering the cost of employee turnover to a firm.

Figure 5.11: Probability of R/NR on the Retention of an FCS Employee
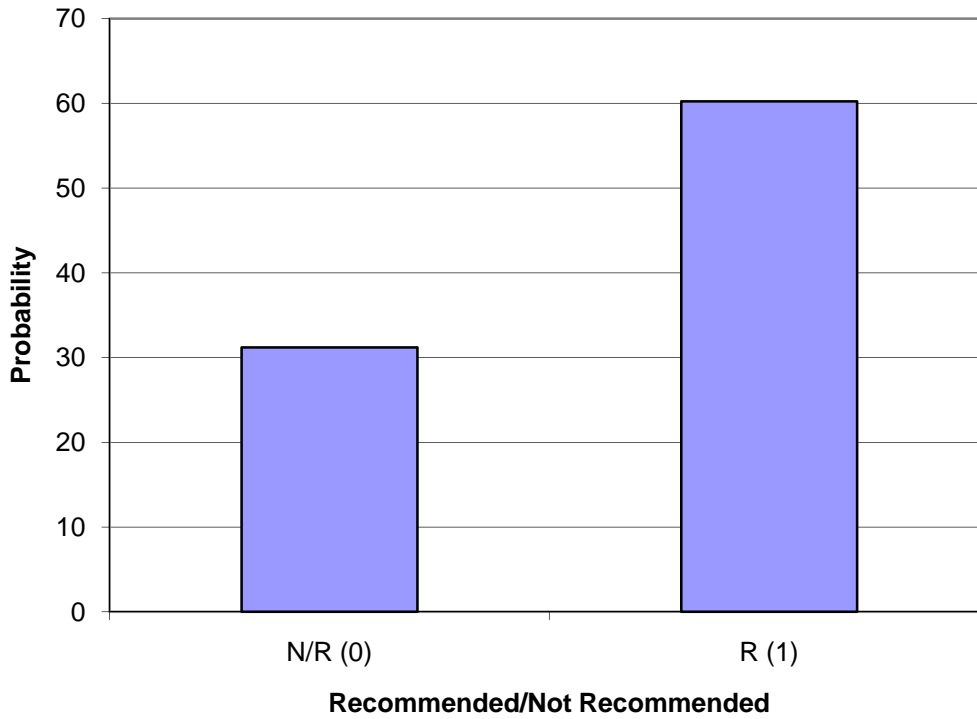
5.4 Alternative Model Analysis

Five additional alternative models were used in an attempt to measure the robustness

of the initial model and the data therein to alternative models of the data and

inclusion/exclusion of certain variables. Table 5.4 shows the measurements of goodness of

fit from the alternative models.

Table 5.4: Summary of Alternative All Models

Alternative Model:	Log-Likleihood	P-Value	Somer's D	Kendall's Tau-a
EMPLOYMENT=f(Composite Score, R/NR, M/F)	-97.743	0.148	0.18	0.09
EMPLOYMENT=f(F, P, ED, COMP, R, COMM, D, CT, VO, M/F)	-91.639	0.063	0.39	0.2
EMPLOYMENT=f(Composite Score, M/F)	-98.418	0.135	0.13	0.07
EMPLOYMENT=f(F, P, ED, COMP, R, COMM, D, CT, VO, R/NR, M/F, Assn 1, Assn 3, Assn 4, Assn 5)	-88.085	0.055	0.46	0.23
EMPLOYMENT=f(Composite Score, Composite Score^2, M/F)	-98.299	0.236	0.25	0.12

The P-Values of each of the alternative models (Table 5.4) show that none are significant at the 95% level, thus, in each case we would fail to reject the case that the values are equal to zero. Although none of these alternative models are statistically significant in predicting the retention of a candidate, alternate model #4 is relatively close to being significant at the 95% level. The regression output for the alternative model is shown in Table 5.5 for comparative purposes.

Table 5.5: Alternative Model #4 Complete Regression Output

Predictor	H.O.	H.A.	Coefficient	Standard Error	P-Value
Intercept			0.248	1.702	0.884
Focus	β=0	β≠0	0.394	0.274	0.151
Persistence	β=0	β≠0	0.125	0.274	0.648
Ego Drive	β=0	β≠0	-0.368	0.293	0.210
Competition	β=0	β≠0	0.196	0.223	0.475
Relator	β=0	β≠0	0.089	0.238	0.710
Command	β=0	β≠0	-0.756	0.247	0.002
Discipline	β=0	β≠0	0.264	0.258	0.306
Critical Thinking	β=0	β≠0	0.179	0.263	0.496
Value Orientation	β=0	β≠0	-0.054	0.314	0.087
R (1) / NR (0)	β=0	β≠0	0.988	0.835	0.237
M (1) / F (0)	?	?	-0.444	0.455	0.040
Association 1	?	?	-0.444	0.782	0.571
Association 3	?	?	-1.150	0.543	0.030
Association 4	?	?	-0.393	0.522	0.451
Association 5	?	?	-0.399	0.589	0.498
Log-Likelihood	-88.085		**P-Value of Overall Model:**		0.055

Measures of Association:		
Pairs:	**Number**	**Percent**
Concordant	3813	72.60%
Discordant	1410	26.90%
Ties	27	0.50%
Summary Measures:		
Somers' D	0.46	
Kendall's Tau-a	0.23	

The results presented in Table 5.5 show the estimated alternative model that was the most significant out of all alternative models that were considered. Again, while not all of the individual variables that were included in the regression analysis were statistically significant, we did see similarities to the original model.

A pre-selected significance level of 0.10 allows us to test the statistical significance of each variable. Given that alpha is 0.10, coefficients having a p-value of 0.10 or less

would be statistically significant. Thus, again we see that Command, Value Orientation, and M/F are statistically significantly different from 0. Additionally, the variable of Association #3 is also significant indicating that the results of the observations from Association #3 are different in nature from those of the other associations.

The percent of concordant pairs (72.6%) is a direct measurement of association. Somers' D is the difference between the proportions of the concordant and discordant pairs if the ties are removed from analysis. In this case, Somers' D is 0.46. The measurement tool of Kendall's Tau-a defines the difference between the unique proportion of concordant and discordant pairs out of all measured pairs; in this case, Kendall's Tau-a is 0.23. All measurements of association should fall between 0 and 1, with higher values showing a greater goodness of fit and being better predictors. With outcomes of 0.46 and 0.23, respectively, Somers' D and Kendall's Tau-a tell us that this alternative model would have a better goodness of fit than the results of the initial model.

The log likelihood of the model is maximized by the process that computes the value for the B_i parameters. The Log-Likelihood is -88.085, which is the maximum value possible given the data set observed. The P-Value of the regression model, 0.055, tells us that the model is not significant at the 95% level, but is very close to being significant there. It would, however, be significant at the 90% level.

Figure 5.12, Figure 5.13, and Figure 5.14 graphically represent the three statistically significant variables in the alternative model and the probability of retention of each given each potential response that could be used for calculation. The alternative model was run to calculate the retention probability output if each variable was set at their mean score

(probability of 76.82%). Keeping all things equal, each of the statistically significant traits (Command, Value Orientation, Male/Female) were then calculated based on the possible scores of 0-5 (Command and Value Orientation) and 0-1 (Male/Female). Those retention probabilities are graphed to show their individual ranges given this estimated regression model.

The implications of the study, as well as the graphs, tell us that there are significant differences between the data derived from the observations from Association #3 in comparison to the observations from Associations #1, #2, #4, and #5. While the coefficients on Command and Value Orientation from the initial model maintained a negative sign on the coefficient, the sign switched from positive to negative on the gender variable in the alternative model. Additionally, we see that the impact of the variable of Association #3 also carries a negative effect, denoting employees are less likely to be employed in that association.

Figure 5.12: Alternative Model Probability of Command on the Retention of an FCS Employee
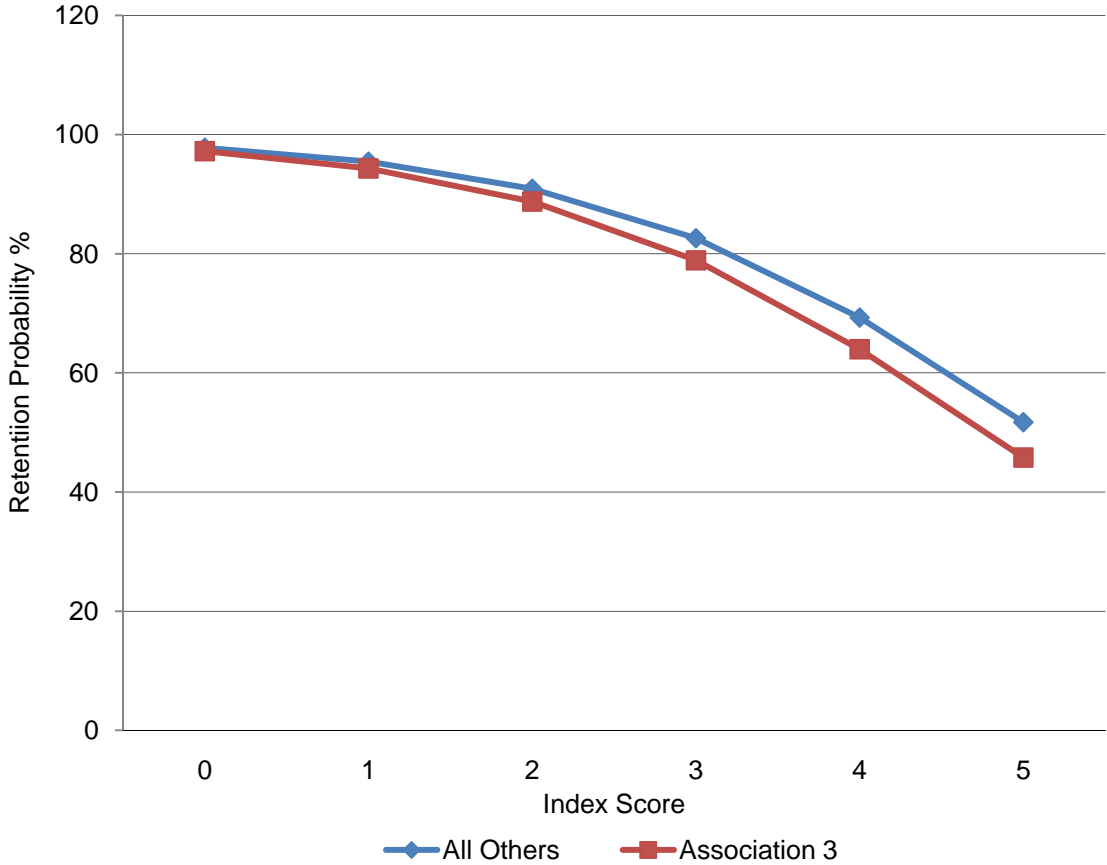

Figure 5.12 shows the probability of retention of an FCS loan officer for each of the possible numeric scores for the variable of Command, holding all other variables in the estimated model at their average. The red line denotes the difference in expected probability for Association #3, while all other associations do to their similarity, are represented by the blue line.

Figure 5.13: Alternative Model Probability of Value Orientation on the Retention of an FCS Employee
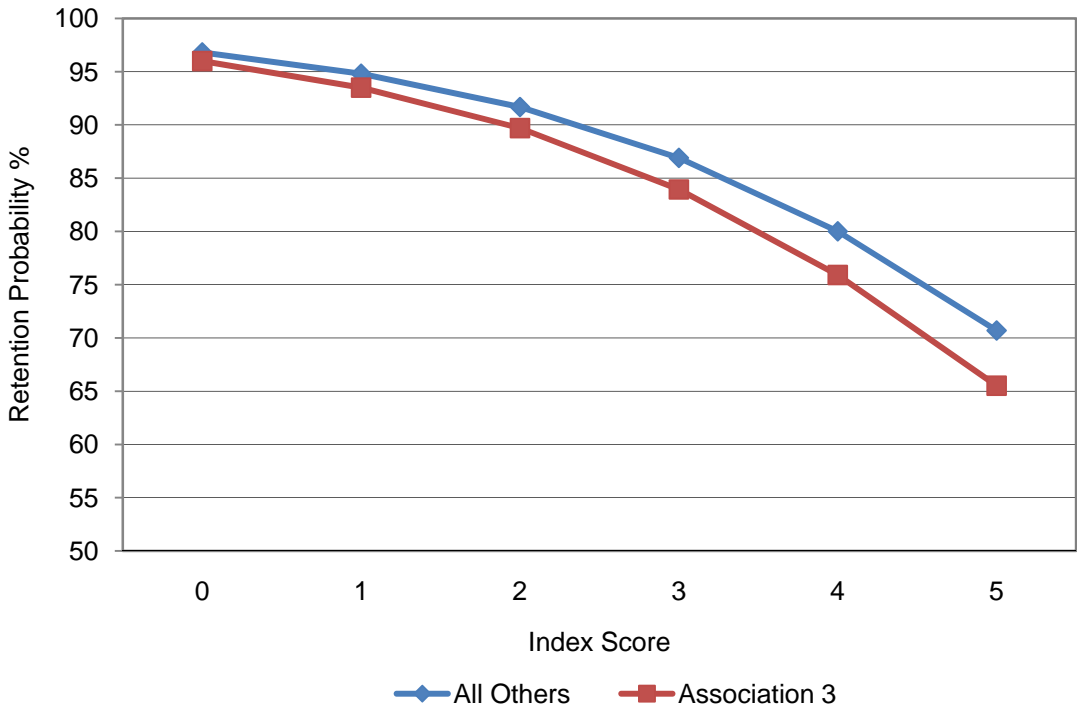

Figure 5.13 shows the probability of retention of an FCS loan officer for each of the possible numeric scores for the variable of Value Orientation, holding all other variables in the estimated model at their average. The red line denotes the difference in expected probability for Association #3, while all other associations are represent by the blue line.

Figure 5.14: Alternative Model Probability of M/F on the Retention of an FCS Employee
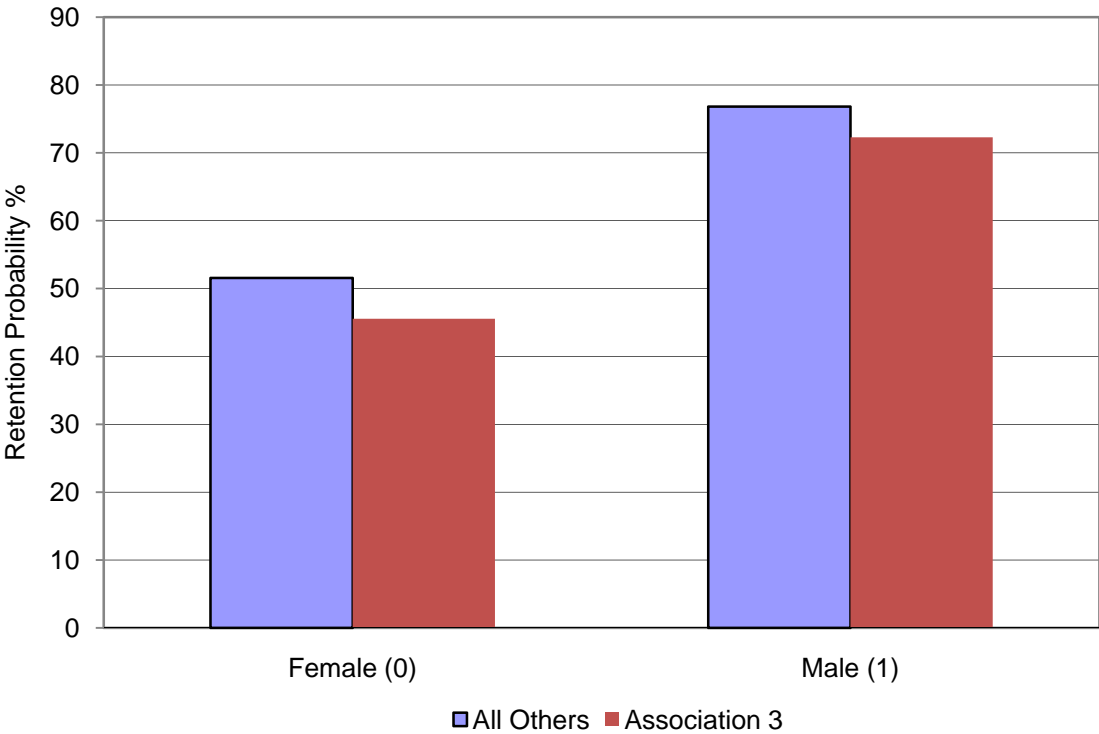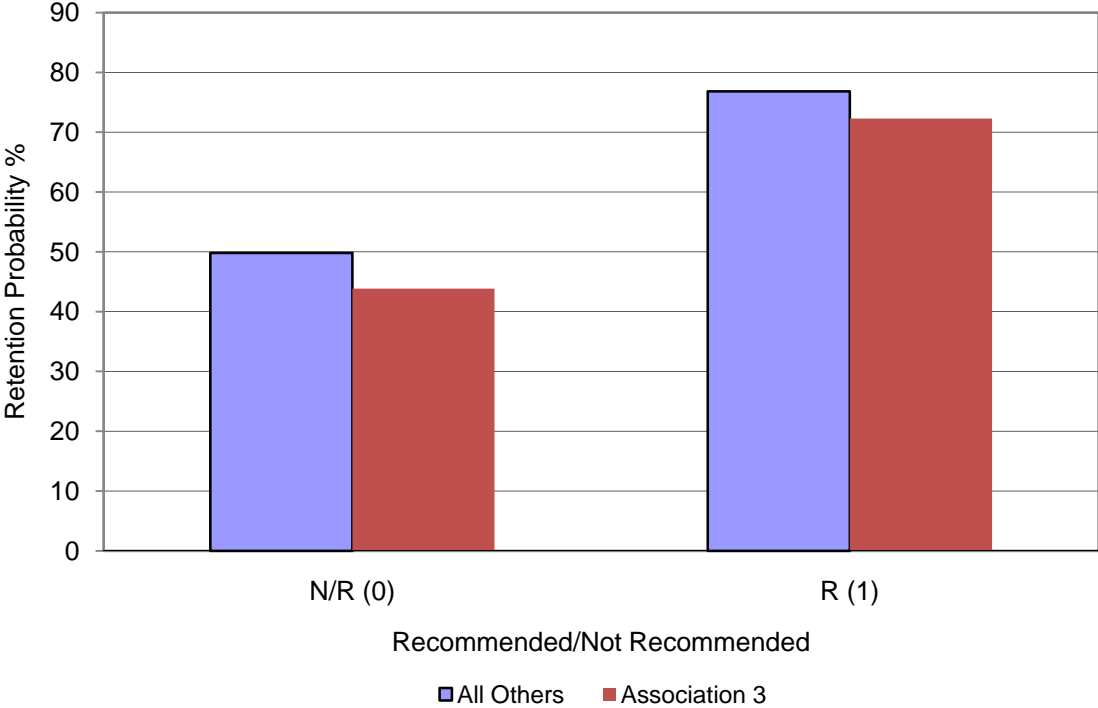

Figure 5.14 shows the probability of retention of an FCS loan officer for both the designation of male as well as female, holding all other variables in the estimated model at their average. The red bars denote the difference in expected probability for Association #3, while all other associations are represent by the blue bars.

Figure 5.15: Probability of R/NR on the Retention of an FCS Employee

Additionally, a probability of retention calculation was built using the

Recommended/Not Recommended score (0-1) and is represented in Figure 5.15. While not

a statistically significant variable in the estimated model, from an economic standpoint, it is

relevant in considering the cost of employee turnover to a firm.

CHAPTER 6: CONCLUSIONS

Analysis conducted through the estimated binomial logistic regression model using the test scores for loan officer hires from five Farm Credit Associations for the time period of 1999-2009 showed that while some of the independent variables are statistically significant in predicting the retention of an employee, others are not. Each of the examined character traits was an independent variable, along with variables for gender and whether the candidate was a recommended-hire. The dependent variable was whether the employee is still employed with the Farm Credit association. As hypothesized, the regression model is a significant predictor of employee retention within the Farm Credit associations that participated in the study.

As discussed in Chapter 5, the results of the model show that while Command, Value Orientation, and Male/Female are significant variables in predicting the retention of a loan officer candidate, Focus, Persistence, Ego Drive, Competition, Relator, Discipline, Critical Thinking, and Recommended/Not Recommended are not significant predictors.

Alternative model analysis validated the initial model findings that the variables of Command, Value Orientation, and Male/Female are statistically significant in predicting employee retention. It was also determined that the impact of which association the observations were derived from had an impact on retention in the alternative model, as Association #3 had results that varied from all others in the data sample.

The results confirm the research findings of Schmidt and Hunter (1998) that there is validity in the use of pre-selection methods in the hiring process. While research into the field and how it impacts Farm Credit has not been visited in nearly twenty years, the results

of the model in this research validate that the tools used by FCC Services do increase the predictability of retention in the loan officer candidates.

6.1 Tangible Use of Analysis

The findings allow managers within each of the participating Farm Credit associations to better understand the conceptual framework that goes on behind the pre-employment testing utilized by FCC Services, and to understand the use of the examination as a tool in defining the best candidate for the position they seek to fill.

While many other sources of verification are used in the interview process within Farm Credit to find the best candidate, testing is a valuable tool that can be used to support, confirm, and in some circumstances, allow managers to seek clarification from a candidate to better understand their qualities regarding potential fit in the Farm Credit System.

The outcome of this study may also help FCC Services in refining certain sections of the examination to better clarify the desired results from a candidate given the significance of each tested section. Knowing that some traits are more significant than others, coupled with the understanding of which traits are correlated, may allow FCC Services to examine sections of the test that may be added to, or in some cases, decreased in structure to place a greater emphasis on those that are more significant in the validity of the predictive index. Additional consideration may be provided by hiring managers based upon the turnover ratio by gender (with full understanding of the many legal implications of gender based employee hiring and analysis). Additionally, questions could be modified to better understand the applicants, or to better assist in clarifying the information being sought. Moreover, given the cross section of Farm Credit Associations used in the study, FCC Services may derive value

from seeing the loan officer turnover ratios for each of the participating associations, and use that information to better coach hiring managers in each of the respective offices to better utilize all of the pre-employment resources that are available (including this battery of questions) to find the best person for the job, thus working to decrease the turnover ratio for each association.

Given the high cost of employee turnover and replacement, it is clearly to the benefit of the individual association to use every tool at their disposal to ensure that they can not only hire, but also retain, the best people for the job. With the study done by Blake (2006), an association can estimate their expenses in replacing all of the employees they lost given this timeframe (or, any time) by using the 125% calculation of each employee's salary, and then comparing that to the company profit, in an attempt to better understand employee replacement cost as a percentage of annual revenue.

6.2 Criticisms

The observed data for this study were gathered over several months with the assistance of the staff of FCC Services, as well as the hiring managers and Human Resource departments from each of the participating associations. Given the confidentiality of the data utilized, it passed through multiple channels before ending up in a format able to be analyzed. Obtaining performance metrics for each employee (ie: annual review information) from each association could have assisted in adding other quantitative variables to the estimated model.

Since each Farm Credit Association was kept confidential (between one another, as well as with the author); the manner in which the data were coded could leave room for

individual interpretation. For example, when each association was asked to code the

departure reasoning for those loan officers who left Farm Credit, the option of defining a

departure reason as "other" left room for many elements. While one Association may have

used "other" to denote the loss of an employee to a different Farm Credit Association, others

may have used it to show a departure due to a merger, while yet another may have used it to

denote that they genuinely didn't know the reasoning behind the departure of the employee.

Another improvement for future study could be found in the scope of the study.

While data were initially sought for all four examined pre-employment tests (loan officer,

credit analyst, appraiser, and support staff) analysis was performed on only one of the four

categories. Given the smaller observations for the other categories; narrowing the scope of

this study to loan officers neglects assistance for participating associations and FCC Services

to understand the fit and correlation of the traits for the other three job functions.

Finally, the data observed represents only five Associations in the entire U.S.

AgBank district for a ten year period. More employees were hired than were analyzed for

this study. As such, the analysis presents a picture of a set of a larger population. Expanding

the study to other Farm Credit Associations would allow for a deeper understanding of the

impact of the hiring processes. In addition, it would also be useful to have data on those

tested applicants that went through the testing process, but did not receive job offers.

6.3 Suggestions for Continued Analysis

Should additional study in this field be desired by FCC Services, or any specific

Farm Credit Association, there exists ample opportunity to do so. An initial assumption

would be to perform the same analysis on the three other testing job functions (credit analyst,

appraiser, support staff) and examine the turnover ratios and correlations of those

examinations. Additionally, significant value could be derived by retaining this analysis and

the data therein, and adding additional metrics from each of the candidates regarding the

level of their formal education, institution of high education, degree(s) held, number of years

of work experience prior to coming into the Farm Credit System, background (or lack

thereof) in the production agriculture industry, and any other number of variables that could

provide a more clear picture of each applicant. In doing so, FCC Services and any

association with the desire to participate and use the outcomes of the analysis could then

have at their disposal a significantly powerful map to target potential employees that would

be the best overall fit for their needs and that would provide them with the best possibility for

long term employee retention. Finally, gathering salary data or other performance measures

for each applicant would allow for analysis of their test scores as it pertains to their

performance, with the belief that the higher an employee scores, the greater value they

should bring to their association.

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