DEVELOPING CREDIT RATING INDICATORS OF CUSTOMERS FOR ELECTRONIC COMPANIES

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ABSTRACT

In the past, the electronic business made the research on its customers' credit situation through the financial institutions so as to decrease the risk of bad debt and the cost. However, even seemingly normal, the situation of bill and check exchange does not necessarily mean that the company's credit condition is really plausible. This research, on the bases of literature review and the factors used by the credit institutions to examine the customers, constructs the index for the electronic business to review its customers, taking the content of this enterprise's examination of its internal customers as an important reference. Analytic Network Process Method (ANP) is used to find the factors and dimensions for this index. The result of this research includes that "the characteristics of the industry" does not possess influence, while the "financial aspects" are apparently more influential than the "scale of the business." Among these factors, the "cash flow, profitability, and assets turnover ratio" are the key points. This research suggests that the construction of the index for examining credit situation still has to include the scale of business, because the structure of the enterprise is also central to the examination.

Keywords: Credit Index, Credit Rating Indicators, Analytic Network Process Method (ANP)

INTRODUCTION

The continuation of 2011 debt disaster in Europe causes the setbacks of the economics of European countries. The financial markets confront great challenges. Duff and Eining (2009), on the basis of 2007 financial tsunami, finds in his research that the situations of the management, of the global evaluation, and of the national control have influences on the credit evaluation results. The second disaster, according to the researcher, will result in enormous loss to the global industries. Conscious of this threat, the domestic financial organizations seek the defense mechanism and the solution, hoping to decrease the risks. The industries in our nation have small domestic marker, relying on exportation to expand this

market. Therefore, international economics take the significant position in our economical environment. When the financial disasters take place, the decline of the global economics encloses the management system of some enterprises with weak financial structure. In order to prevent the influence of the enclosed clients, establishing the evaluation system of credits stands as an important topic.

The electronic industries in Taiwan for now stand as the major exportation; therefore, talking the pivotal positions, their profits and importance demand attention. Affected by the changing prosperity, the Product Life Cycle (PLC) of electronic industry is short and thus easily to be eliminated. The amount and the price of the products will receive the impacts from the international markets. Furthermore, under the stress of globalization, establishing and managing the Credit Rating Index and the Financial Commitment to Performance are significant, since the electronic enterprises cannot retrieve the financial statements from the clients like the financial organizations and credit evaluation units do so as to evaluate and analyze the clients' credit situations and abilities of paying the debt.

Current the studies on the analyses and the establishing of Credit Rating Index are not many. For the clients as listed companies, because of being controlled by the Financial Supervisory Commission (FSC), the chance of their violating the contract is relatively low. However, having difficulties in receiving the financial statements, the enterprises must evaluate the credit situations of the clients on the basis of their check transactions (by consulting the financial units), the business performance, and the credit personnel's past experiences and judgments. In this evaluation, one would ignore the property background, the financial structure, the work experience and qualifications, and the ability to hold the asset. Under the global distress, the model of evaluating the risks of the small and medium industries in Taiwan must be established in order to develop a mechanism of managing the credit risks and to keep these enterprises profiting. Therefore, establishing the credit evaluation rating index serves as the topic of this research to find the key influence.

This research takes the examples from the electronic industries to analyze how a credit rating index could be developed as an objective standard for the financial organization and credit-evaluating units to establish a Credit Policy. According to the different results of the investigation, different credit limits could be granted to the different clients. In this model, the risks of bad debts could be avoided. The goals of this research are as following:
1. On the basis of the structures of electronic enterprises, taking the past literature and the methods of the credit-evaluating units as the references, this research is to establish a model for the electronic enterprises to evaluate the credit situations of their clients.
2. Om the basis of the financial and non-financial data of the electronic industries, this research analyzes the reasons why the small and medium enterprises would violate the contract. The result of this analysis is contributive to the establishing of credit rating index.
3. Calculating the credit rating index and the clients' credit risks, this research provides a principle and references for the electronic industries and the credit-evaluating unit.

LITERATURE REVIEW

The Introduction to the Electronic Industries

Taiwan electronic industries, with the high-quality human resource, the huge investment and flexible and fast integration of resources, take the central position in global electronic OEM system. Unlike traditional industries, the electronic industry holds the special position because of its short PLC, its unstable amount of stock and fund. With high risk, on the wave and with the intense investment, this industry must rely on huge fund to invest on the renewal of products. The structure of electronic industry, according to IEK, includes the material and the component factories in the mainstream, the equipment production, component model and the accessory factories in the middle reaches, and the service and the electronic OEM of a peculiar brand in the downstream (Lau, 2006). In addition, the products can be classified into eight categories: (1) consumer products and the components, (2) the computer equipment and components, (3) the communication equipment and components, (4) convey and control products, (5) the semiconductor products and components, (6) the cable and connector, (7) the monitor and storage equipment, (8) other products.

Credit Rating Index

Credit rating is an evaluating system for the various credit situations of a criticized organization. It is presented in simple signs. The evaluation is to understand whether the enterprise has a sound structure of finance and thus the ability to pay the debt, on the bases of leveling the debtor and analyzing the Default Risk. This evaluation reduces the imbalance of information and the cost of non-professional personnel collecting the data, so it achieves in the pre-caution. Most credit evaluations are related with the specific debt execution. The execution of the debt also considers the criticized side by its ability to pay the debt in the future. The method and model of this evaluation would take the prosperity of the market into consideration in the past. Following the financial changing and the risk management, especially when the evaluation of credit is to reflect the enterprise's transaction with a specific debt, an ideal evaluation should be independent from the prosperity cycling.

Chen, Chiang, Lai (2003) believe that credit evaluation is a system of background-checking evaluation, making use of statistics and setting up a leveling form. The factors for the leveling include the financial situation, the management ability, and the industry characteristics. Tsai Ming Shi states that the credit evaluation of an enterprise is a series of analyzing the enterprise's credit strength and of leveling (or scoring) the criticized company. Lin Chia Rong (2000) classifies the evaluation as Qualitative Model, which qualifies the evaluation into 5P and 5C principles: People, Purpose, Payment, Protection, and Perspective. 5C include Character, Capability, Capital, Collateral, and Condition.

The Relative Literature on the Financial Organizations' Credit Rating

Treacy and Carey (2000) points out that the banks in the US have designed the credit evaluation. The risks to be examined in this evaluation are reliable financial statements and analyses, the profiting, the total assets, the analysis of the enterprise and the enterprise positions, and the guarantee and the managements. Kim and Sohn (2008), processing data of

the Korean enterprises from 2000 to 2004 by multivariate analysis to build a credit rating index (according to the enterprises' characteristics, reserved profit, and the shareholder's rights), find that the high reserved profit causes the relatively high credit rating.

Chen (2005) researches on the small and medium enterprises in New Taipei City and comes to the factors of their credit situations: The more capital of the financial factor is there in an enterprise, the larger the management will be. The insufficient capital will result in the financial danger if the risk takes place in the enterprise. The result will cause the contract violation.

In the variables of the non-official terms, more enterprises to be connected with the banks indicate that the bank has not much confidence on the enterprises and thus is not willing to expand the loan credit. Therefore, the enterprise has to borrow the money from many banks and thus there is a higher chance for the enterprise to violate the contract.

The proportion of the enterprise's performance and the loan from the bank should be limited into 50%. More than this range, the violation of the contract is more possible. The asset from the stock sharer can also be classified as the profiting, affecting the violation of the contract. The higher this rate is, the more chance the client would violate this contract.

The Credit Rating Index of the Electronic Enterprises on Their Clients

The bad debt has great influence on the financial disaster in addition to the overall environment and the management. In current years the global electronic industries have been under the process of transformation, which also forces the Taiwan industries to change. Unlike the financial organizations, the electronic industries cannot retrieve the complete information of their clients. They can only get the information from the financial units to know whether the clients' credit situations are reliable and thus to build the credit rate index for a sound evaluation, for example, the time of credit, payment, and the limit of loan. The credit rate index stands as the internal documents in the enterprise; therefore, this evaluation is different from one enterprise to another. This research takes two enterprises and their clients as the examples. The transactions to be examined here are: (1) the type of management (company, cooperation, or solitary), (2) capitalization, (3) the performance last year, (4) the cost of transaction last year, (5) the supposed payment in the final term, (6) the year of business, (7) the place of business, (8) the relationships, (9) payments, (10) credit limit.

The credit rate index made by the electronic enterprise is focused mostly on the non-financial terms. To improve the financial index and eliminate the differences between the indexes made by different enterprises (which makes the data untrue), this research combines the data from the financial units, the credit-evaluation units and the current electronic enterprises to extract the proper index for the current electronic enterprise to evaluate their clients. This index serves as the principle and direction for the future.

METHODOLOGY

The ANP

The analytic hierarchy process (AHP), as proposed by Saaty (1980), has received widespread attention and been applied to problems as diverse as decision analysis, forecasting, strategy formulation, and prediction of voting behavior (Zahedi, 1986). Multi-criteria (MCRA) resource problems involve allocation of limited resources to different activities keeping in mind many conflict criteria. The AHP has emerged as a useful decision making technique for solving MCRA problems (Wedley, 1990) (Schoner and Wedley, 1989) and has been widely used in multiple criteria decision making (MCDM) to evaluate/select alternatives (Ou Yang et al., 2008). However, users of the AHP must assume that the information sources involved are non-interactive/independent which is not realistic in many real-world applications (Ou Yang et al., 2008). In order to solve this problem, Saaty (1996) proposed a new MCDM method, the ANP, to overcome the problems of inter-dependence and feedback between factors and the alternatives.

The ANP is a nonlinear structure, while the AHP is hierarchical and linear, with the goal at the top and alternatives at lower levels (Saaty, 1999, 2001, 2003). The ANP is an extension of the AHP; indeed, it is the general form of the AHP (Ou Yang et al., 2008), and ANP is presented as a potentially valuable method to support the selection of projects in research and development environments (Meade and Presley, 2002). ANP is a method able to analyze or assess relevant decision-making problems under complex inter-dependence relationships within the decision making and factors levels (Saaty, 1996, 2001, 2003; Meade and Sarkis, 1999). There have been many studies using ANP in selection, assessment, and sorting decision-making models of dependent relationships (Cheng and Li, 2005; Eddie et al., 2005; Wolfslehner et al., 2005; Wu and Lee, 2007; Yurdakul, 2003).

Moreover, the ANP has been successfully applied in many practical decision-making problems, such as project selection (Meade and Presley, 2002; Lee and Kim, 2000). Wu and Lee (2007) used the characteristics of ANP to assist in the assessment and selection of knowledge management strategies. When evaluating project problems, group opinions should be collected to determine the inter-dependence relationship among factors, which is very important in considering project problems (Lee and Kim, 2000). Application of the ANP method in the assessment of alternative programs considers problems of practical respects of inter-dependence relationships between various programs and factors and evaluates the selection results, in order to achieve the requirements of the program selection goals (Saaty, 1996, 2001, 2003). This research is to identify the fact that various strategies of credit rating indicators take place according to different motives. Therefore, the making of those strategies is not out of single motive, when the inner and outer motives are highly inter-dependent. This research, taking the vantage points of ANP, analyzes the models of the decision making of credit rating indicators, the result of which might have found the essential connection between the motives and the strategies. The ANP method contains two parts: (1) one is composed of control clusters of network and motives for inter-dependence relationship control; and (2) another is composed of the inter-dependent relationship network between the elements and the clusters (Saaty, 1996). Hence, different structural patterns can be established for ANP problems according to different problem types, and in a network structure, the

importance of factors determines the importance of alternative programs,which in turn affects the importance of factors.

In addition, the ANP method defines the scope of decision-making problems by the modeled planning groups. Based on the relevant fields, experts from related fields are invited to form decision-making groups of five to 15 people (Saaty, 1996). The ANP method has five steps and the details of the steps involved may be found in Ou Yang et al. (2008).

The operation of the credit rating indicators decision-making model established in this study is divided into four stages: (1) collection of experts and scholars for questionnaire design and survey data, construction of problem hierarchy, and inter-dependence model; (2) construction of pairwise comparison matrices and calculation of eigenvalues and eigenvectors; (3) construction of supermatrices; and (4) calculation of factors importance weights and evaluation of the most competitive credit rating indicators decision making (Saaty, 1996; Meade and Sarkis, 1999; Cheng and Li, 2005; Wu and Lee, 2007; Lin and Wu, 2008).

EMPIRICAL RESULTS

This research deals with the past researches on the financial organizations and the credit-evaluation units, inviting seven experts who had participated in the activities of credit evaluation and setting up the questionnaire in two periods. The first period is to design three dimensions and the relativeness not only of them but also of the dimensions and the factors. The initial questionnaire for the samples is compared with the most suitable dimension and the factors. The second period of questionnaire, on the basis of the first, analyzes what the experts believe as the best factors and dimensions for the credit rate index. The initial design of the 3 dimensions and the 18 factors are conducted into the 18 principles as the basis for this research, as shown in Table 1, The Clients' Credit Evaluation Principles.

Table 1 The Principles for the Client's Credit Evaluation

Dimension Major Principle		Factor Monor Principle	Definition
A. The Scale of the Enterprise	A1	Capital	The amount of the money the enterprise registers in the government.
	A2	The years	The years since the enterprise has been established.
	A3	The structure of the enterprise	Whether or not the enterprise has the subordinate branches.
	A4	The style of the enterprise's organization	The structure of the holdsharer: solitary, cooperation, or the connection.
	A5	The management of the leader	The leader's ability in dealing with the production, sales, human resource, research and the finance.
B. Financial structure	B1	The profiting capability	The capability of increasing the property and decreasing the debt.
	B2	The cash current	The flow of the cash into or out of the enterprise.
	B3	The level effect	The balance between the risk, debt and the assets.
	B4	The bridge loan of the stocked products	The sales of the stocked products in a peculiar period of time.
	B5	The bridge loan of the supposed payment	The supposed payments between the production and the receiving.
	B6	The loan to sales ratio	The proportion between the business performance and the loan.
C. The characteristic of the enterprise	C1	The management environment	The environmental factors the enterprise must face, which also influence other enterprises.
	C2	The competitiveness	In the market with competition, the enterprise must effectively provide the products and services so as to make the opportunity of profiting.
	C3	Major client	The value of the customer, different clients have different contribution to the enterprise's profiting.
	C4	The marketing of the products	Whether the products are produced under the considerations of the market requirement and the enterprise's situations
	C5	The potential of the product development	The performance of the products in the future.
	C6	The changing prosperity	The turbulence of the economic situation.
	C7	The inventiveness of the products	Whether the newly-invented products would be accepted and applied in the market.

The Initial Questionnaire for the Credit Evaluation

This research sifts out the initial dimensions and factors. The interviewed people have to be the supervisors of the electronic enterprises for at least 3 years, and the experts on the credit evaluation. The relative analysis of the factors and dimensions has the result that the experts believe that the C dimension (environment for the management) is not relative with the client's credit rate index in electronic industries. Therefore, this research rules out this dimension and holds the index A dimension (the scale of the enterprise) and the B dimension (financial structure) and their 11 factors. On the basis of these factors and dimensions received from the initial questionnaires, this research design the second phase of expert questionnaire.

The Weight of the Credit Rate Index and the Leveling Analysis

This research on the second phase of questionnaire proceeds the analysis of the interactions of the dimension and the factors, with the experts answers for the questionnaires. The qualifications for those experts are the experiences in the electronic enterprise as a supervisor for at least 3 years and the personal working in the credit evaluation, which are helpful to learn the interactions of the principles and the relative wrights. The client's credit rate index and the leveling analysis show that "the scale of the enterprise" and the "financial structure" form the index for the credit evaluation when compared with their relativeness.

The consistency of the questionnaire in this research examines the consistency of the answerers. When C.I. < 0.1, the answerers are inclined to be consistent, or they have to do the questionnaire again, or revise their answers. In addition, if the consistency is no more than 0.1, ($C.R. \leq 10\%$), which means that the analyzer's mistake is within the rational range when comapring the weights since the result has the consistency. (As shown in Table 2)

Table 2. The Credit Rate Index C.I.

Credit Rate Index		C.I.	R.I.	C.R
A1	The Capital	0.0898	1.12	0.0802
A2	The years	0.0884	1.24	0.0713
A3	The structure of the enterprise	0.0227	0.9	0.0252
A4	The styles of the organization	0.0656	1.24	0.0529
A5	The leader's management	0.0396	1.12	0.0354
B1	The profiting capability	0.0759	1.12	0.0678
B2	The cash current	0.0543	1.24	0.0438
B3	The level effect	0.0949	1.12	0.0847
B4	The bridge loan of the stocked products	0.0988	1.12	0.0882
B5	The bridge loan of the supposed payments	0.0884	1.12	0.0789
B6	The loan to sales ratio	0.0926	1.12	0.0827

The result of this research, according to the credit evaluation index, shows that the experts believe that the electronic enterprises evaluate the clients' credit situation with the dimension more of "financial structure" (the weight is 0.62709) than of the "scale of the enterprise" (the

weight is 0.37291). As for the factors, the sequence of the importance is the "cash current" (the weight is 0.19398), the "profiting capability" (the weight is 0.18119), the "payment" (the weight is 0.16492), the "the structure of the enterprise" (the weight is 0.11066), the "storage exchange" (the weight is 0.10468), the styles of the company and organization (the weight is 0.08018), the owner's leadership (the weight is 0.04513), the level rate (the weight is 0.02410), the capital (the weight is 0.03103), the management (the weight is 0.02410), and the years of business (the weight is 0.02119). As shown in Table 3, the weight more than 10% includes 5 factors. Except for the structure of the enterprise, which does not belong to the scale of the enterprise, the other four factors belong to the financial structure. Among them, the cash current, the profiting capability, and the payment are more than 15%.

Table 3. The weights of the factors in credit rate index

	Factors	Dimensions	Weight	Proportion
B2	The cash current	Financial structure	0.19398	19.40%
B1	The profiting Capability	Financial structure	0.18119	18.20%
B5	The bridge loan of the supposed payments	Financial structure	0.16492	16.49%
A3	The structure of the enterprise	The scale of the enterprise	0.11066	11.07%
B4	The bridge loan of the stocked products	Financial structure	0.10468	10.47%
A4	The styles of the enterprise's organization	The scale of the enterprise	0.08018	8.02%
A5	The leader's management	The scale of the enterprise	0.04513	4.51%
B3	The lever effect	Financial structure	0.04294	4.30%
A1	The capital	The scale of the enterprise	0.03103	3.10%
B6	The loan to sales ratio	Financial structure	0.02410	2.41%
A2	The years	The scale of the enterprise	0.02119	2.12%
			Sum=1	100%

CONCLUSION AND IMPLICATION

This research takes the financial units and the credit evaluation organizations as the references to analyze the factors in the credit evaluation. With ANP questionnaire, and the interviewing with the experts, this research figures out the interactions of the principles through ANP Super Decisions. As the results have shown:

1. The financial structure is more than the scale of the enterprise: in the client's credit rate index, the financial structure is 0.62709, more than the scale of the enterprise, whish is 0.37291. Among them, the cash current, the profiting capabilities, and the payment exchange are more than the scales of the enterprise, more than the other factors by 50%.

2. The characteristic of the enterprise does not have much influence. The experts believe
    that in the proceeding of the credit evaluation, the environment, the competitiveness, the
    major client, the marketing of the product, the product potential, the changing of the
    prosperity, and the inventiveness of the product (all of which can be classified into the
    characteristics of the enterprise) do not have much affections. This result is different
    from what the credit evaluation organizations have anticipated.

3. Current credit evaluation, as The Banks of Associations of Republic of China has set up
    as SME Credit Scoring in 1987, should include the financial situation (40%), manage-
    ment (40%), the enterprise characteristic and expectations (20%). This research shows
    that this index is not proper for the electronic industry in Taiwan.

In the past, the electronic industries evaluate the clients' credit situations through the data
provided by the financial organizations, ignoring the fact that even the client with normal
check transaction is not necessarily in good credit situation and with good management.
Especially in the electronic industry, the payment takes place after the exportation of the
products instead of using promissory note. In addition, when the payment is lasted for more
than 180 days, the contract is inclined to become a bad debt, creating greater risks for the
industry. However, when the industry imitate the working of the financial organizations, the
cost for the management would be increase.

Many enterprises are undergoing the management of groups. Sometimes the clients have the
financial threats, with bad management and investment. So, in addition to the credit situation,
the financial and non-financial terms of the enterprise should also be taken into consideration.
The current credit index for the electronic industries in Taiwan tales the scale of the enterprise
as the major concern, which stands not as the major dimension of this research. The possible
reason is that the analyzing factors for the scale of the enterprise are easier to be retrieved
with their statistic data. The enterprises apply this easy information as the major concern for
the evaluation. In addition, in the research on the credit evaluation, most analyses on how the
financial organizations evaluate the clients ignore the individual enterprise's applications of
the credit rate index. The high cost of the eternal evaluation also cannot help the urgent need
of information. In addition to reviewing the past literature, this research also includes the
experts' opinion and the practical operation. It explores the evaluation of the credit condition
to be applied in the management, creating the index with the correct prediction, contributive
to the following research on similar topics.

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