

# Evaluation of Characteristic of Venture Business Companies Using Self-Organizing-Map

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**ABSTRACT:** It is expected that the activities of venture business companies bring the activation of Japanese economy. However, it is difficult to establish continue the venture business companies successfully, because they have various problems should be solved such as the financial affairs, staff training, business development, etc. In this study, the characteristic analysis of successful venture business companies is performed to consider some new effective support programs. In analysis, the text mining method is used to extract hidden information from a large amount of text data, and then the general features are evaluated using the Self-Organizing-Map (SOM) that can analyze multi-dimensional information. Several schemes are proposed through the characteristic analysis of seventy successful venture business companies.

**KEYWORDS:** Venture business companies, Characteristic analysis, Text mining method, Self-Organizing-Map (SOM)

## 1. INTRODUCTION

In the new century, it is hoped that new venture business companies such as environment, energy, information, bioscience, ergonomics, and so on are founded in order to contribute sustainable development of global society. A lot of venture business companies have been founded in Japan.

However, the managers of venture business companies are holding various difficulties such as raising funds, securing and encouraging the talent and so on. They need effective supports from the government. An important thing in considering about effective support plans for them is to analyze the features of successful venture business companies, and then to extract the succeeding factors. And, it should be executed effective support plans reflected such succeeding factors.

In this study, the features of various types of successful venture business companies are analyzed and extracted the succeeding factors using the

interview articles in a magazine. In analysis, first, the text mining method is used for extracting the features. Key words related to business concept, management policy and idea, etc. in interview articles on the entrepreneur who makes the venture business companies succeed are selected, and then the features data set is made. These features data set and the financial data set of companies are analyzed and assessed by using the Self-Organizing Map (SOM).

The text mining method can extract various hidden information from a large amount of text data. The SOM is a kind of the unsupervised neural network, and it has an excellent ability analyzing the features of multi-dimensional data. Using these two soft computing techniques such new features of the venture business companies are evaluated that they could not be clarified by conventional analyses. Based on the results of analysis, effective support plans for each venture business company are proposed.

## 2. Venture business companies

### 2.1. Definition of venture business companies

In Japan, Tsukuda Chikao who was an officer of the Ministry of International Trade and Industry first used the word “venture business” and “venture business company” in the paper<sup>1)</sup> presented in the 2nd Boston College management seminar held in May, 1970.

The word of venture has several meanings such as "It adventures, it runs the risk, and start boldly". Therefore, it can be said, the venture business is "A company that runs the risk, and does a drastic business". In a management glossary, a venture business company is assumed to be that it is a kind of medium-sized and small companies. It has such features that the manager has entrepreneur spirit, and is not worry about the risk. It develops businesses from a strategic standpoint to succeed for a short term comparing existing companies that have specific identity and policy for service.

However, the definition of venture business companies is not clearly, there is different definitions using each researcher. Shuichi Matsuda has expanded the range of the definition such as young companies that challenge a new area without fearing the risk. In this study, it is defined that the venture business companies are the young companies don't fear the risk and their owners have strong desires and challenges.

### 2.2. Problems of venture business companies

For the establishment and management of venture business companies, there are a lot of problems. In Fig.1 seven factors related to of the administrative crisis of venture business companies such as vision and purpose, management team and employee, consultation of finance, business model, products and service, selected marketplace and client, and entrepreneur are shown <sup>2)</sup>. If these factors of successful venture business companies are clarified, effective support plans are proposed to companies

that have such problems.

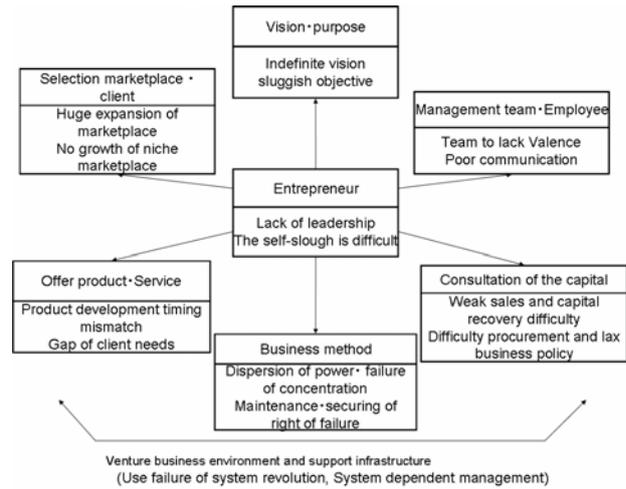


Fig.1 Factors of administrative crisis of venture business companies

### 2.3. Support systems to venture business companies

There are several support plans for venture business companies from the civilian venture capital agencies as well as the governmental organizations. However, these plans mainly support to them from the financial aspects. Features of the support plan of each organization are shown in Table 1.

Table 1 Features of each support plan

Organizations	Features of support plan
Venture capital agencies	The investment to the venture business companies is affairs. Not only the establishment capital but also the growth capital and the capital for the government finance constitution strengthening are offered.
Investment business unions	The capital contribution is received from the investor, and the investment in the share of the venture business companies. The investment recovery such as the listing of stocks of the company is distributed to the investor and the capital is operated.
Angel	It invests privately. Moreover, it not only invests but also it has advisor's role.
Local government	Support system that makes the best use of characteristic in region, and becomes regional revitalization.
University and incubation	Support of school venture. Course establishment of knowledge and motivation of establishment against student.

### 3. Extracting features of venture business companies using by text mining method

#### 3.1. Outline of text mining

The text mining is a comparatively new technology that frequently appeared in research papers from around 1997. It is a technology that searches out hidden information, trends, features, and correlations from a large amount of text data. This technology is remarkable for its ability obtaining only profitable information leads to the best marketing and the technology development in the contemporary community where various information are overflowing.

The text mining is one of the data mining technologies that obtain profitable information from a large amount of data. Generally, the data mining treats the numerical data obtained from statistics and the database of numerically straightening. On the other hand, there is a big feature of the text mining in analyzing the text data composed by sentences. Therefore, the text mining is useful for obtaining new knowledge from sentences while the data mining is good at pattern discovery of numerical data sets. Fig 2 shows the application area of the text mining<sup>3)</sup>.

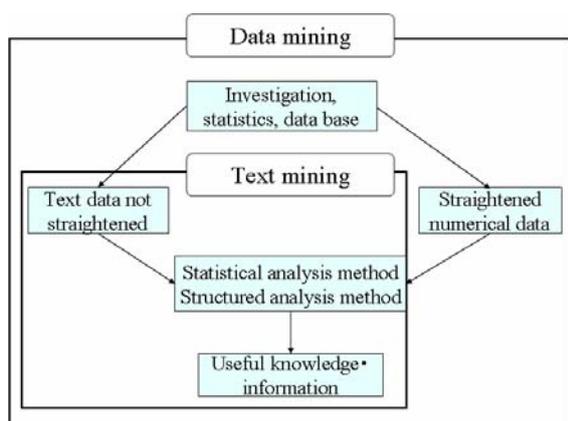


Fig. 2 Application area of text mining

#### 3.2. Procedure of extracting features data

In this study, the features data are extracted from the interview articles to 70 successful entrepreneurs of the venture business companies published in an economic magazine<sup>4)</sup>. First of all, 21 keywords are

selected from the interview articles and shown in Table 2.

For each keyword the frequency is counted and is given a score from 0 to 2. If a certain keyword is not appeared in the interview articles, the score is 0. If it is appeared over one time, the score is 1. If the keyword is frequently appeared for example over three times, the score is 2. Thus, 70 successful venture business companies are characterized, and the quantified data are used for analysis.

Table 2 Selected keywords

No	Key word	No	Key word	No	Key word
1	Advice	8	Leadership	15	Idea
2	Action power	9	Ambition	16	Business ability
3	Confidential relations	10	Contribution	17	Planning ability
4	Networks	11	Talent	18	Educational system
5	Challenge	12	Swift decision	19	Strategy
6	Conversion	13	Independent intention	20	Individuality
7	Toughness	14	Coordination	21	Adhesion

### 4. Analysis of venture business companies using the SOM

In this study, the features data for successful venture business companies obtained in the previous chapter as well as the basic data such as type of business, number of employee, seat, financial data and so on are analyzed using the self-organizing map, and the special characteristics of successful companies are evaluated in this chapter.

#### 4.1. Outline of the SOM

The SOM (Self-Organizing Map) is one of the neural network learning algorithms that do not require supervisors, it was advocated by Kohonen in around 1981.

The SOM voluntarily collects information that have similar features from a large amount of compound information, and outputs the result by the map form. Thus, it has an excellent ability for visualizing the features between data.

#### 4.2. Input data

As the input data used in analysis, there are the

features data extracted by the text mining, the following basic data on companies including the financial data<sup>5)</sup>.

- 1) Number of employee (the consolidated number of employee)
- 2) Seat (city in placing the headquarters)
- 3) Sex of the founder
- 4) Previous occupation of the founder (office worker, student, housewife, etc.)
- 5) Capital stock (the consolidated capital stock)
- 6) Sales (the consolidated sales)
- 7) Number of staff member at establishment

In this study, a soft wear package "SOM analyzer" (C·A·E)<sup>6)</sup> was used. This package has high-level statistics analysis tools as well as the SOM, and it has useful functions that the line is easily drawn on the map of the result of analysis, and the confirmation and the amendment of the training data are easily carried out.

The learning parameters setting in this analysis are shown in Table 3.

Table 3 Learning parameters for SOM analyzer

Initial learning rate	0.2
Final learning rate	0
Initial neighborhood area	5
Final neighborhood area	0
Inclination of sigmoid function	1
Number of learning	500
Seed of random number	11042

### 4.3. Results of analysis

The results of analysis are shown in Fig.3 and Fig.4. Fig.3 is a feature map obtained by the SOM analyzer<sup>6)</sup> and represented corresponding five clusters analyzed by the Ward's clustering method. Fig.4(a)~Fig.4(g) show weigh maps of 7 keywords

selected from 21 keywords shown in Table 2 related to Fig.3.

It is clearly seen from Fig.3 and Fig.4 that the successful venture business companies are first classified two big groups with connection with the keyword "planning ability" shown in Fig.4(a). In the left-hand side group the companies that emphasize the planning ability are arranged, on the other hand the companies that do not emphasize the planning ability in the right-hand side group.

Moreover, each group is classified two and three groups, respectively. The left-hand side group is classified two groups with related to the keyword "idea" shown in Fig. 4(d). In the upper part group the companies that emphasize the idea as well as the planning ability are arranged, and the lower part group companies do not emphasize the idea but the planning ability.

The right-hand side group is classified three groups with related to such keywords as "action power" shown in Fig. 4(c), "challenge" shown in Fig. 4(e), "business ability" shown in Fig. 4(f) and "leadership" shown in Fig. 4(g). In the upper part group the companies that do not emphasize the planning ability but the action power and the business ability are arranged. In the middle group companies that do not emphasize the planning ability but the challenge are arranged. In the lower part group companies that do not emphasize the planning ability but the leadership are arranged.

From these results of analysis the successful venture business companies are classified 5 groups, and then the various features of them are grasped and evaluated quantitatively. The main features of them are arranged in Table 4 by listing up emphasizing keywords.

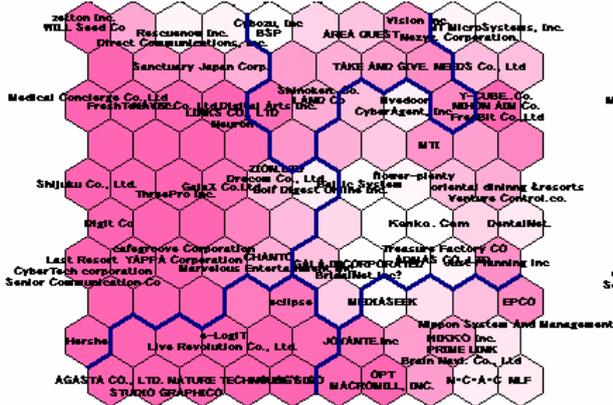
Companies that emphasize planning ability



Companies that do not emphasize planning ability

Fig. 3 Feature map resented with five clustering groups

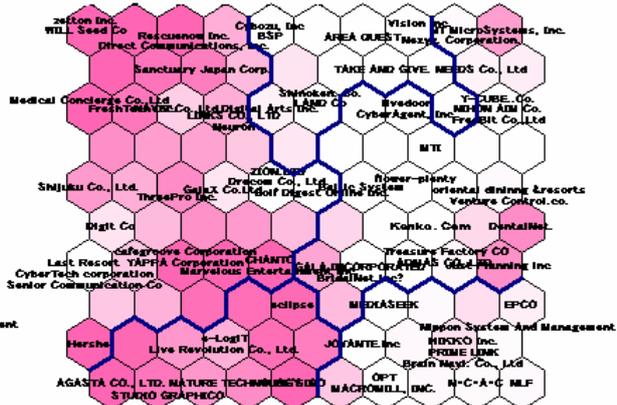
Companies that emphasize planning ability



Companies that do not emphasize planning ability

(a) Weight of planning ability

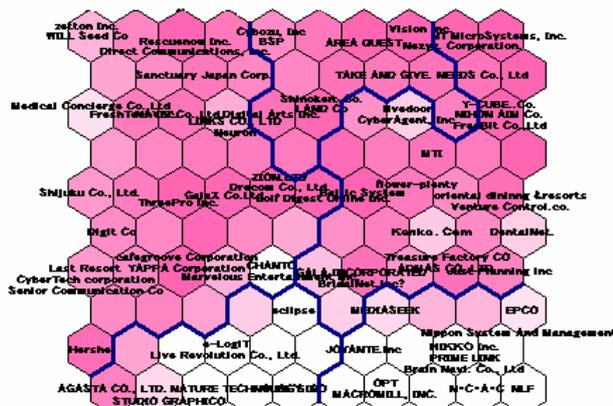
Companies that emphasize planning ability



Companies that do not emphasize planning ability

(b) Weight of talent

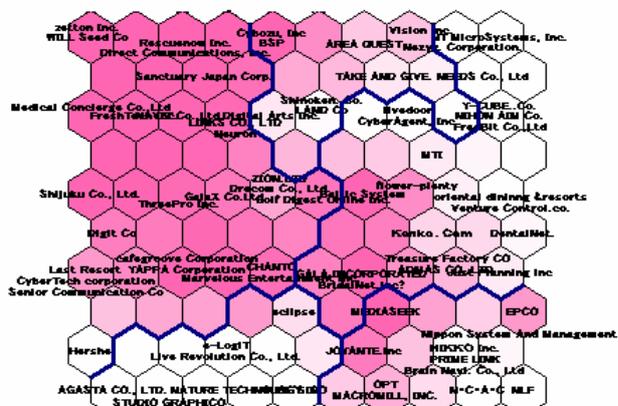
Companies that emphasize planning ability



Companies that do not emphasize planning ability

(c) Weight of action power

Companies that emphasize planning ability

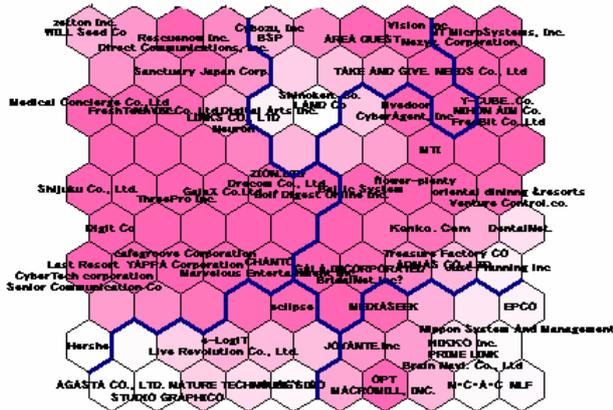


Companies that do not emphasize planning ability

(d) Weight of idea

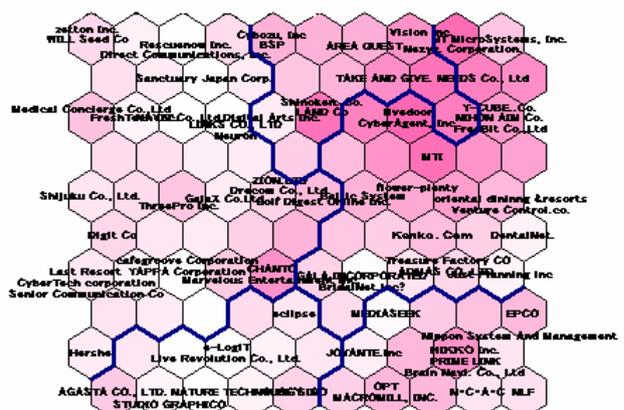
Fig 4 Weight map for each keyword related to Fig. 3

Companies that emphasize planning ability



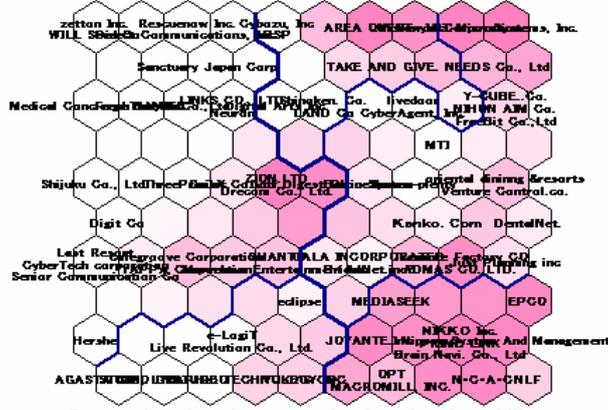
(e) Weight of challenge

Companies that emphasize planning ability



(f) Weight of business ability

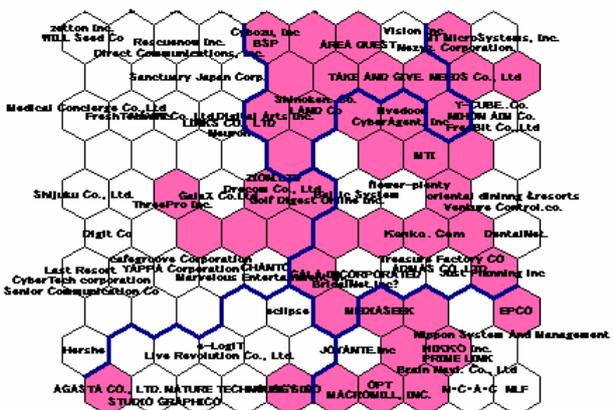
Companies that emphasize planning ability



(g) Weight of leadership

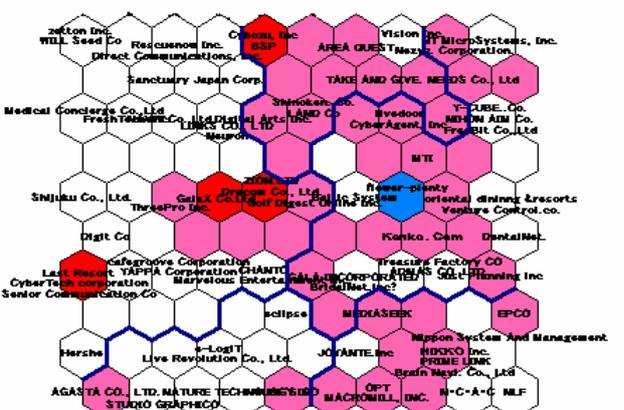
Fig 4 Weight map for each keyword related to Fig. 3

Companies that emphasize planning ability



(a) Labeling map for listed companies (2004)

Companies that emphasize planning ability



(b) Labeling map for listed companies (2005)

Fig 5 Results of labeling analysis for listed companies

Table 4 Main features of successful venture business companies

Main-group	Sub-group	Features(emphasizing key-words)
Companies that emphasize planning ability	①	Planning ability, idea, action power, challenge, talent, independent intention
	②	Planning ability, talent, strategy, network, ambition
Companies that do not emphasize planning ability	③	action power, confidential relations, network, ambition, independent intention, coordination, business ability
	④	action power, challenge, strategy
	⑤	Leadership, coordination, strategy, educational system

On the basis of results mentioned above, the labeling analysis is carried out for the following two cases:

- 1) 2004 listed companies
- 2) 2005 listed companies

These results of the labeling analysis are shown in Fig. 5. It is seen that there are a lot of listed companies in the group that emphasize the planning ability from Fig 5(a) and (b), and the number is increase in 2005 compared with 2004.

According to another business and economical data, most companies that boost sales belong to the group ③ and group ④, on the other hand most companies that belong to group ① and group ② are considered to be non-listed companies as well as companies of short standing.

If a successful company is defined that it is a high listed company and it boosts sales, in order to produce successful venture companies it is necessary to plan such support schemes that do not give priority to the planning ability but action power, confidential relations, network, challenge, business ability, coordination, strategy, and so on.

In Fig 5(b) four companies that newly listed are shown in the dark gray color (red color in full color

representation). These four companies belong to the group ①, but three of them are located near the listed companies. Furthermore, one company that went bankrupt is shown in light gray color (blue color in full color representation). It belongs to the group ④, it is considered that companies arranged in this group ④ have a high successfulness but a high risk for bankrupt. Therefore, it is very important how to plan and manage the effective support schemes adjusting to features of each group on the basis of the results obtained in this study.

## 5. Proposal of new support schemes

The features and the current states of the venture business companies could be understood from the results of the business analysis by SOM in Chapter 4. On the basis of these results, current support schemes by the central government and the local government are discussed. First of all, the feature of the venture business companies and necessary supports are enumerated in Table 5. Moreover, some problems subsisted in the current support schemes are shown in Table 6.

It is seen from these two tables that the current support schemes have been suggested uniformly with no considering the corporate identity of each company. It is thought that the support schemes for each company are presented according to its request. Specifically, the management advices such as how to learn expanding strategies of business, how to construct educational system for employee, how to gain credibility with customers, and so on will become very important in the future.

Therefore, a lot of brilliant management consultants who have expertise and the experience for venture business companies. However, the management consultants are insufficient now in Japan. Then, the environment of the venture society is straightened more by positively working on the

encouraging and securing the superior management consultants. while enhancing the support policies.

Table5 Features and necessary supports

Forms	Features	Necessary supports
Growing companies	Management policy on acting with great force	Supports after growing
Stability companies	<ul style="list-style-type: none"> <li>• Management of cooperation with surroundings</li> <li>• Community-based companies</li> </ul>	Supports for strategies for further growth
Growth stagnation companies	Despotic management policy on emphasizing planning power, action power, idea, talent etc.	Training programs and advices for managers

Table 6 Problems in current support schemes

Necessary supports	Problems of current support schemes
Supports and advices after growing and stabilizing	There are many supports at establishing and until listing, but the subsequent supports have not been enhanced.
Supports for manager's promotion training	The promotion training supports for the employee and the entrepreneur applicant are prepared, but there is no similar supports after entrepreneuring

## 6. Conclusions

In this study, the keywords were extracted from the interview articles on the entrepreneurs who made the venture business companies succeed, and in addition these data set the financial data set of

companies were analyzed and assessed by using the Self-Organizing Map (SOM). On the basis of results obtained from this analysis, some support plans for venture business companies were proposed.

Main results obtained by this study are shown as follows:

- (1) The 21 keywords that characterized the features of successful venture business companies were extracted as successful factors.
- (2) Financial data sets were added to the keywords data, and were analyzed and evaluated by using SOM.
- (3) The successful venture business companies were classified into five groups, and then the features of each group were clarified.
- (4) New supports schemes for venture business companies were proposed taking account of these features.

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