

The Establishment of Composite Index System for Corporation Control Using Principal Component Analysis: A Fundamental Research

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1. Introduction

It is very important to establish a composite index system for an enterprise to control and safeguard its operations under the market economic circumstances. This paper will take Qilu Co. Ltd. as an example in order to set up a composite index system by principle component analysis.

2. The application

We have picked out 10 indexes and gather their data from 1993 to 2000 in order to form a controlling index system for the Qilu Co. Ltd. We assume that current indexes highly influence the operational status quo than old indexes did. Due to the current accounting methodology reform, the relative data are chosen as follows to maintain their accountability.

The composite control and safeguard index of Qilu in 1993-2000

| Years Index | X ₁ | X ₂ | X ₃ | X ₄ | X ₅ | X ₆ | X ₇ | X ₈ | X ₉ | X ₁₀ |
|-------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| 1993 | 23.10 | 3.19 | 11.70 | 0.57 | 60.0 | -13.10 | 93.4 | 71.4 | 4.15 | 103.3 |
| 1994 | 25.90 | 3.02 | 0.49 | 0.53 | 59.8 | -33.70 | 81.2 | 66.3 | 4.68 | 84.2 |
| 1995 | 20.40 | 2.44 | 6.90 | 0.45 | 60.0 | -5.30 | 94.1 | 96.8 | 3.13 | 69.7 |
| 1996 | 67.12 | 2.28 | 12.72 | 0.41 | 66.0 | 1.20 | 101.7 | 100.8 | 4.24 | 76.9 |
| 1997 | 15.71 | 2.23 | 17.11 | 0.41 | 73.6 | 0.10 | 100.2 | 78.4 | 5.41 | 74.6 |
| 1998 | 4.50 | 2.51 | 20.30 | 0.39 | 68.9 | 0.70 | 101.7 | 81.9 | 4.39 | 77.8 |
| 1999 | 14.50 | 2.26 | 22.93 | 0.37 | 65.9 | 1.50 | 103.1 | 104.1 | 4.01 | 85.7 |
| 2000 | 2.04 | 1.87 | 23.0 | 0.39 | 62.0 | 1.58 | 103.8 | 109.3 | 3.53 | 86.9 |

Thus, the scoring result of individual index of Qilu in 1993-2000 is as follows:

The scoring result of individual index of Qilu in 1993-2000

| Years Index | X ₁ | X ₂ | X ₃ | X ₄ | X ₅ | X ₆ | X ₇ | X ₈ | X ₉ | X ₁₀ |
|-------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| 1993 | 1 | 3 | 1 | 3 | 2 | 1 | 1 | 1 | 2 | 3 |
| 1994 | 1 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 |
| 1995 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 3 | 1 |
| 1996 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| 1997 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 |
| 1998 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 1 |
| 1999 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| 2000 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 2 |
| \bar{x}_i | 1.375 | 2.250 | 1.375 | 1.500 | 1.375 | 1.625 | 1.625 | 1.500 | 2.125 | 1.625 |
| s_i | 0.518 | 0.463 | 0.518 | 0.756 | 0.518 | 0.518 | 0.518 | 0.535 | 0.641 | 0.744 |

Out of the above scoring matrix, we derive a relative matrix:

The relative matrix

| | |
|--------|-------|
| 1.000 | |
| -0.447 | 1.000 |

