Management,
Knowledge and Learning
International Conference 2012

RANKING AND VISUALIZING THE KEYWORDS IN MISSION STATEMENTS OF SLOVENIAN COMPANIES

Kristijan Breznik
International School for Social and Business Studies, Slovenia
kristijan.breznik@mfdps.si

Abstract:
Mission statements usually define the scope of company's operations, and also address other issues like company philosophy, concern for customers, corporate values, markets, concern for survival, growth, profitability, and others. The paper aims to explore the contents of mission statements in Slovenian companies. We tried to identify and analyse the most important words emerging in these mission statements. The network of (key)words is presented and some preliminary results are discussed and visualized. The use of various algorithms for network visualization is implemented in the research. For words' ranking purposes traditional network centrality measures are accompanied with a special ranking technique called PageRank algorithm.

Keywords: mission statement, social network analysis, ranking, visualization.

1. INTRODUCTION AND PRELIMINARY RESULTS

Mission statements play very important role in order to set the position of an individual stakeholder. They define the scope of company's operations and distinguish the company from similar ones (David, 2007). In the past, authors address mission statements not only as vision statement component but some mission statements among them additionally address values and beliefs as well (Falsey, 1989; Collins & Porras, 1991; Ireland & Hitt, 1992). In the paper the main focus will be on the contents of mission statements. More precisely, the most important (key)words in mission statements will identified and visualized.

Keywords can be grouped or clustered together using various statistical methods. Exploratory factor analysis is frequently used in this way to demonstrate which words belong to which component. The number of components to be included in mission statement varies from study to study. David (1989, 2007) and Pearce and David (1987), for example, identify 9 key components found in analysed mission statements and Fred (1996) counts 10 of them. Two other studies note that 10 to 25 different components are being usually used in a mission statement (Bart, 1997; Bart & Baetz, 1998). Jauch and Glueck (1988) note that mission statements are usually of different length and may be ranging from 7 to 1000 words. However, recent study of Breznik & Dermol (2012) revealed five main keywords components in Slovenian economy:

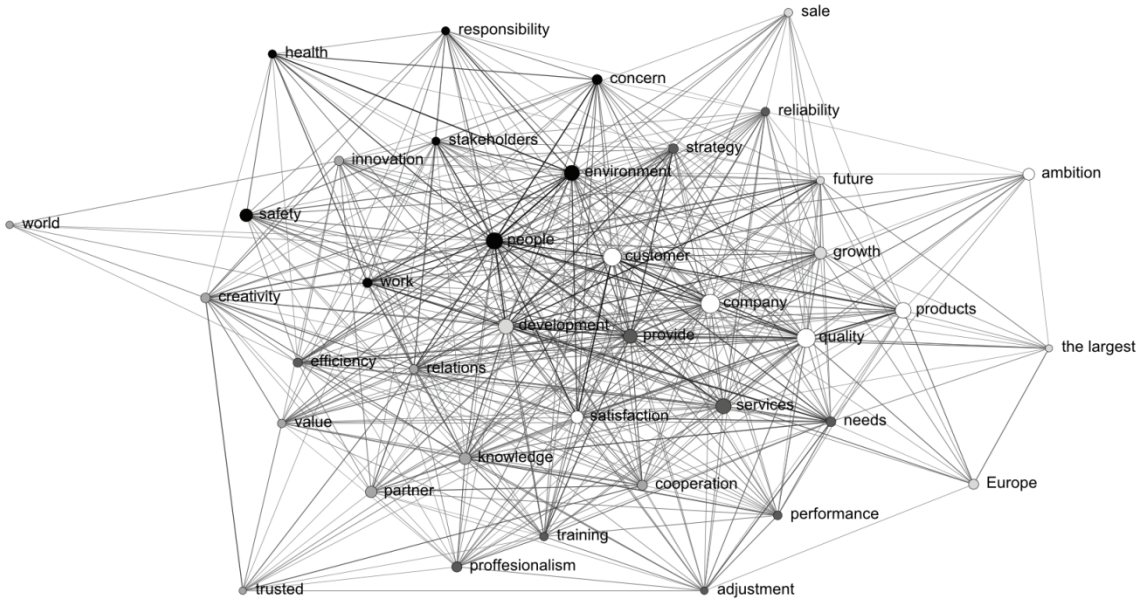
- *Quality of life* (environment, health, people, concern, work, safety, responsibility, stakeholders)
- *Company performance* (training, adjustment, needs, provide, services, professionalism, performance, strategy, efficiency, reliability),
- *Cooperation and innovation* (creativity, innovation, trusted, relations, knowledge, value, partner, world, cooperation),
- *Growth orientation* (Europe, future, development, growth, the largest, sales),
- *Customer orientation* (customer, satisfaction, quality, products, company, ambition).

Breznik & Dermol (2012) additionally provided a network of keywords, which is presented in Picture 1. Nodes representing the keywords are coloured according to the above mentioned five components. 5 grey colours were used from black (the first component, called the quality of life orientation) to white (customer component). Size of nodes is proportional to the frequency of the keyword in the analysed mission statements presented by the node. In order to avoid the excessive impact of keywords frequencies the weights of links were normalised using the cosine dissimilarity. The cosine dissimilarity between keywords *i* and *j* has a value between 0 and 1, and is calculated as

$$\cos(i,j) = \frac{\sum_{k \neq i,j} c_{ik} c_{jk}}{\sqrt{\sum_{k \neq i,j} c_{ik}^2 \sum_{k \neq i,j} c_{jk}^2}}.$$

Consequently the matrix of all cosine dissimilarities among words in the frequency list is called the cosine-normalised matrix. This normalisation technique is in this case preferable over the Pearson correlation matrix (Schneider & Borlund, 2007) since the word-frequency distributions are usually not normally distributed. Direct consequence of the normalisation is that all weights of the links are on closed interval between 0 and 1. Position of the nodes in Picture 1 was determined using a spring embedder called the Kamada-Kawai algorithm which places the nodes in a kind of an entropy state. Nodes with the highest degree measure are near the centre of the figure. Only some minor replacements of nodes were made in order to make the figure more readable.

Picture 1: Network of mission statement keywords among Slovenian companies



The first impression is that the network in Picture 1 is very dense. Nevertheless some important keywords can be determined. For example: people, customer, environment, company, development, quality, services and some others. In addition to already known results there are two main aims of the paper. The first is to identify and/or to confirm the most important words obtained by visualization methods and frequency calculation with the use of various network centrality measures. The second aim is to provide a presentation of the keywords network more legible than the network figure in Picture 1.

2. RESEARCH METHODOLOGY

We conducted our research on population of Slovenian companies listed in PIRS which is one of the major sources of business data in Slovenia. Companies were initially classified according to the number of the employees into four clusters. Thresholds were set to 50, 120 and 250 employees. Inside each cluster a simple random sampling was used to select 100 companies and therefore keep the size of the analyzed entities within bearable limits. For each company in the sample mission statement was searched on its web pages. All the mission statements were written in the native Slovenian language.

The next step in our research was to identify the mission statement's *keywords*, i.e. words that are represented in Slovenian companies' mission statements and which are listed by Musek (2008) as the most common words in mission statements overall. There was a lot of work needed to delete the redundant words (called also the stop words), account numerous synonyms, and to provide a *frequency list*. In the final keywords' list the threshold was set to 50 (we removed the words with lower frequencies).

The network of keywords was obtained in the following way. Firstly, we select the keywords for actors in the network. Relation was defined as 'being together in the same mission statement'. Hence two keywords are related (or linked) if they emerge together in at least one common mission statement. Described network is obviously undirected and weighted. Weights on links count how many times the pair of adjacent words appeared together in the

same mission statement. In order to make the weights on links more objective in the subsequent stages weights were normalized using the cosine dissimilarity already described in previous section.

In social network analysis many standard measures of network (actor) centrality are known and used in the practise. *Nodal degree* is the number of lines that are incident with the analyzed node. *Betweenness centrality* is equal to the number of shortest paths from all vertices to all others that pass through that node. For more information on the standard network centrality measures a reader should consider Wasserman and Faust (1994). In addition to the standard centrality measures we calculated the *PageRank centrality* (Brin & Page, 1998) of all nodes. The PageRank algorithm was originally used for ranking web pages and is currently used by Google.

The PathFinder algorithm (Schvaneveldt et al., 1988) was used as a method to make the original figure more legible. For the conduct of descriptive analysis and for preparation of the keywords network the SPSS software and statistical program R (CRAN, 2012) were used. Network analysis was carried out by Pajek (Batagelj & Mrvar, 2011). Pajek (Slovenian word for Spider) is a computer program for analysing and visualising large networks (Wasserman & Faust, 1994).

3. RESULTS

Network relation was defined as the number of cases two words occur together in the same mission statement. The obtaining network was undirected and weighted by the number of the above mentioned occurrences. To normalize the weights on the links we used the cosine dissimilarity. In Table 1 top ten of the most frequent words are presented in the descending order. Additionally three measures of network centrality are computed: PageRank centrality, Degree and Betweenness centrality. Table 1 displays top ten words of all measures in the descending order.

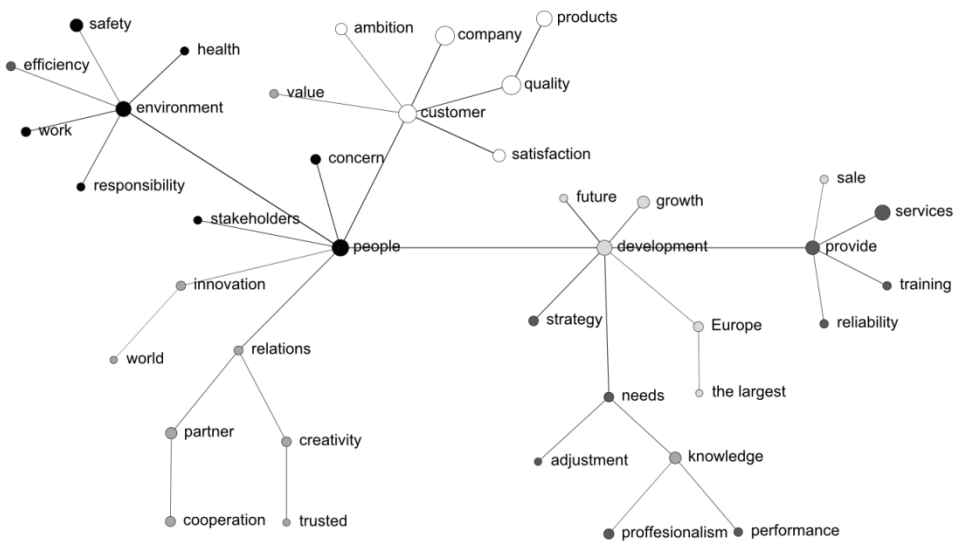
The presence of five words in all four columns (frequency column and all three centrality measures columns) is detected. These words are (in alphabetical order): *company*, *development*, *environment*, *people* and *quality*. Keywords *environment* and *people* are from the *quality of life* factor, *company* and *quality* are classified as *customer orientated* factor and, on the other hand, *development* is in the *growth orientated* factor. Results indicate that frequency and all three network centrality measures are scaling the same.

Table 1: Top ten ranks of keywords according to the frequency and network centrality measures

Rank	Frequency	PageRank centrality	Degree centrality	Betweenness centrality
1	company	quality	development / provide	development
2	quality	people		provide
3	customer	environment	people	people
4	people	knowledge	customer / company	customer
5	products	development		company
6	environment	company	quality / services	quality
7	services	partner		services
8	development	provider	relations / environment	growth
9	provide	products		environment
10	safety	cooperation	growth	future

Although visualisation is not an analytical technique it could serve as an intriguing method to communicate the results of other analytic methods. Nevertheless, some deficiencies of using the cosine dissimilarity are visible in Picture 1. The most important flaw is that all values are within a relatively small interval and therefore the difference between link weights is insufficient to make the figure more legible. For this reason we used the PathFinder algorithm as a very efficient tool for removing less important links and nodes from the network. Therefore, only the *skeleton* of the network remains after using the PathFinder algorithm. It also preserves connectivity which is based on the concept of pair wise similarity. When applying the PathFinder algorithm two parameters (r and q) should be considered. The r parameter is used for calculating the distance of a path based on the Minkowski metric. On the other hand, the q parameter specifies that triangle inequalities must be satisfied for paths with less than q links. The number of links in a network obtained using the PathFinder algorithm is inversely proportional to the value of both parameters. The network obtained with $r = \infty$ and $q = n - 1$ (n is the number of nodes in basic network) has the least number of links. These two values were used in our case to present the result in Picture 2.

Picture 2: Network of mission statement keywords in Slovenian companies after applying the PathFinder algorithm



The final network of keywords clearly shows 5 underlying dimensions of mission statements in the context of Slovenian companies. The results of PathFinder algorithm are consistent with the results of network centrality measures.

4. FINDINGS AND DISCUSSION

As it can be seen from the network presented in Picture 1 and Picture 2, the central and therefore the most common mission statement dimensions in the context of Slovenian companies are (1) *care for quality of life* quality of life, and (2) *growth orientation*. The first dimension emphasises the meaning of health, safety, and responsibility, but also efficiency. Growth orientation is related to growth in the sense of geography diversification (especially within Europe) and in the sense of realisation of strategic intentions leading to needs adjustments and knowledge enhancement for professionalism and performance. Three other dimensions are somehow more marginal. (3) The third dimension - *cooperation and innovation* is related to concern for stakeholders and for relations enhancing creativity,

cooperation, partnership and trust. On the other hand, (4) *customer orientation*, which represents the fourth dimension, focuses on company product and its quality, on value it brings to the customers and on their satisfaction. The fifth dimension is related to *company performance orientation* based on providing appropriate level of services, training and reliability. These findings were supported by network centrality measures, which exposed five keywords: environment, people, company, quality and development.

As already indicated, the recognised mission statement dimensions are the first attempt to better understand attitudes towards the creation of mission statements, vision statements and organisational values among Slovenian companies. Recognised dimensions offer the opportunity to explore possible influences of different mission statement orientations on performance of a company.

REFERENCE LIST

1. Bart, C. K. (1997). Industrial Firms and the Power of Mission. *Industrial Marketing Management*, *26*(4), 371–383.
2. Bart, C. K., & Baetz, M. C. (1998). The Relationship between Mission Statements and Firm Performance: an exploratory study. *Journal of Management Studies*, *36*(6), 823–853.
3. Batagelj, V., & Mrvar, A. (2011). *Pajek home page*. Retrieved from: http://vlado.fmf.uni-lj.si/pub/networks/pajek/
4. Breznik, K., & Dermol, V. (2012). Identifying the Mission Statement's Clusters in Slovenian Economy. *TIIM 2012*, Lublin, Poland.
5. Brin, S., & Page, L. (1998). The anatomy of a large-scale hypertextual web search engine. *Computer Networks and ISDN Systems, 30*, pp. 107–117.
6. Collins, J. C., & Porras, J. I. (1991). Organizational Vision and Visionary Organizations. *California Management Review*, *34*(1), 30–52.
7. Cran, R. (2012). *Home page*. Retrieved from: http://www.r-project.org/
8. David, F. R. (1989). How Companies define their Mission. *Long Range Planning*, *22*(1), 90–97.
9. David, F. R. (2007). *Strategic Management: Concepts and Cases,* Prentice Hall, Englewood Cliffs, NJ.
10. Falsey, T. A. (1989). *Corporate Philosophies and Mission Statements: A Survey and Guide for Corporate Communicators and Management*, Greenwood, Westport, CT.
11. Fred, R. D. (1996). *Strategic Management*, Macmillan Publishing Company, New York, NY.
12. Ireland, R. D., & Hitt, M. A. (1992). Mission Statements: Importance, Challenge, and Recommendations for Development, *Business Horizons*, *35*(3), 34–42.
13. Jauch, L. R., & Glueck, W. (1988). Business Policy and Strategic Management, McGraw-Hill, New York, NY.
14. Musek Lešnik, K. (2008). *Vrednote, poslanstvo in vizija podjetja: organizacijske vrednote, poslanstvo in vizija podjetja kot jedrni elementi strateškega managementa*, UP Fakulteta za management, Koper.
15. Pearce, J. A., & David, F. (1987). Corporate Mission Statements: The Bottom Line, *Academy of Management Executive*, *1*(2), 109–116.
16. Schneider, J., & Borlund, P. (2007). Matrix Comparison, Part 1: Motivation and Important Issues for Measuring the Resemblance between Proximity Measures or Ordination Results, *Journal of the American Society for Information Science and Technology*, *58*(11), 1586–1595.

17. Schvaneveldt, R. W., Dearholt, D. W., & Durso, F. T. (1988). Graph Theoretic Foundations of Pathfinder Networks, *Computers and Mathematics with Applications*, *15*(4), 337–345.
18. Wasserman, S., & Faust, K. (1994). *Social Network Analysis*. Cambridge university press.