Evaluating Export Marketing Decisions using Cluster Analysis and Correspondence Analysis

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Abstract

The study investigates the relationship between elements of an export marketing strategy and management style in marketing decision-making based on data of existing companies from Denmark, New Zealand, and USA. The decision-making styles were evaluated along seven dimensions (5-point Likert scaled questions). A cluster analysis of factorescore (PROC PRINCOMP and PROC FASTCLUS) grouped the sample of firms into four different management styles per country. Discriminant analysis (PROC STEPDISC and PROC DISCRIM) was applied to test the robustness of the clustering. Considerable cluster analysis (PROC CLUSTER) degree of ethno-, poly-, ratio-, and geoeorientism in marketing strategy and management style in marketing decision-making based on data of the four groups. At the same time remarkable similarities across countries could be observed when performing cluster analysis (PROC CLUSTER) on the 12 styles times 7 dimensions matrix. Elements of an export market strategy were established based on the firm's degree of ethno-, poly-, regio-, and geocentrism in marketing the company's most important product abroad. A correspondence analysis (PROC CORRESP and PROC GLOT) was performed to investigate the relationships between the different management style groups and export market attitudes.

Introduction

What determines a company's export marketing strategy has been widely studied in the export behavior literature, for comprehensive reviews, see Dwyer (1978), and Asby and Slater (1989). Although it can be hard to give a general characterization of the overwhelming amount of empirical research done within this field, it seems that most studies have been dealing with structural determinants, for example the importance of firm size, different kinds of economies (scale and scope), product and technology orientations, industry characteristics, etc.

The purpose of this study is to investigate the relationship between elements of an export marketing strategy and management style in marketing decision-making. The underlying premise is that decision-making variables mostly have been neglected in empirical export research. It seems evident that an export marketing strategy also, in particular, has to be determined by how marketing managers actually make decisions (criteria, decision rules, problem solving, etc.).

From an analytical point of view, this paper will center around the issues searching for common decision-making criteria for classifying companies in management style profiles as an important predictor for determining the export behavior of the firm. The four attitudes are assumed to reflect the goals and philosophies of the exporting companies with respect to export marketing strategies.

Management Style and Export Marketing Decisions

We define management style as a recurring set of characteristics that are associated with the decisional process of the firm (including decision processes of marketing managers). This definition is based on the observations of others that "acts of decision are characteristic of organizational behavior as contrasted to individual behavior" (Barnard 47 p. 186).

We propose that a profile of management style relevant for marketing decision makers can be constructed using a seven-dimensional framework.

These involve:

1. Behavioral versus technological orientation
2. Planning versus improvisation
3. Innovation versus imitation
4. Risk acceptance versus risk averse
5. Complexity versus simplicity
6. Induction and informal empiricism versus rationalism and statistical empiricism
7. Individual versus group decision-making

The seven dimensions of attitudes and styles seem to govern a "recurring set of characteristics" of the export marketing decision maker, who is involved in this study. The seven dimensions can be stemmed up as indicative and related to how companies make international marketing decisions. The questions which were used for measurement are shown in Table 1.

Table 1: Scales Used to Report Management Style

<table>
<thead>
<tr>
<th>Scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>My country's decision-making is primarily concerned with market demand rather than technical or product-oriented factors (abridged: MARKET-ORIENTED).</td>
</tr>
<tr>
<td>2.</td>
<td>When my company makes decisions on future activities, thorough planning is not done in advance (NO PLANNING IN ADVANCE).</td>
</tr>
<tr>
<td>3.</td>
<td>The company's decisions are characterized by using objective, quantifiable criteria rather than abstract and unverifiable codes (OBJECTIVE CRITERIA).</td>
</tr>
<tr>
<td>4.</td>
<td>My company's decision-making is characterized by avoiding risks, not accepting risks (VOID RISK).</td>
</tr>
<tr>
<td>5.</td>
<td>When the company decides on a given action, many variables which may have an impact on the decision have been investigated (MANY VARIABLES INCORPORATED).</td>
</tr>
<tr>
<td>6.</td>
<td>Decision-making in my company relies primarily on experience and judgement and not as much on seeking additional information (JUDGEMENT VS. ADDITIONAL INFORMATION).</td>
</tr>
<tr>
<td>7.</td>
<td>Decisions are, in general, made by one or two persons rather than by a committee or other buying groups (SINGLE PERSON DECISION).</td>
</tr>
</tbody>
</table>

In this study we assumed that several elements of an export marketing strategy can be described by using EPRG-profiles, see Wind, Douglas and Perlmutter (1973) and Chakravarthy and Perlmutter (1985). This framework is quite well known amongst international marketing researchers - identifies four types of attitudes or orientations that are associated with successive stages in the evolution of foreign operations - ethnocentrism (E), polycentrism (P), regiocentrism (R), and geocentrism (G) - although these mostly have been applied to the description of MNCs. The four attitudes are assumed to reflect the goals and philosophies of the exporting companies with respect to market information seeking, planning and risk behavior attitudes, market versus product orientation and to lead to different export market strategies.

Method

A mailed questionnaire was formulated on the basis of a literature review of past export behavior studies and of the author's experiences with international-oriented companies. The questionnaire was addressed individually to export managers. The sample of firms was randomly selected from national lists where each firm met the following criteria: (a) was a manufacturing company, and (b) had current export activities.

Usable net-response was received from...

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of companies (response rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>456 companies (39% response rate)</td>
</tr>
<tr>
<td>New Zealand</td>
<td>250 companies (61% response rate)</td>
</tr>
<tr>
<td>USA</td>
<td>110 companies (20% response rate)</td>
</tr>
</tbody>
</table>

Some effort was undertaken with regard to evaluating the considerable differences in response rates across countries (Albaum and Strandskov 93). Firms also differed with respect to size: While the companies which made up the US sample were Fortune 500's (average value exceeding one billion dollars), the samples from New Zealand and Denmark mainly contained medium-sized companies.

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Analysis and Results

1. Principal Components Analysis and Cluster Analysis

The data were analyzed in the following way (exemplified by the Danish sample):

First, based on 408 usable answers (out of 456) the management style variables were factor analyzed using principal components, thus producing a 7 factor score x 408 respondents matrix (while variables usually are correlated, factor scores are uncorrelated).

Based on the principal component analysis, the factor scores x respondents matrix was cluster analyzed using MacQueen’s k-means algorithm (in accordance with Anderson’s nearest centroid sorting method). Because there is no well-accepted means of determining the statistical significance of a cluster solution, cluster solutions from 2 to 10 clusters were examined (Table 2).

An inspection of Figure 1 - according to the authors - recommend using 4 clusters (Danish data):

- Galimski and Herabaz’ Pseudo F-statistic is at its peak (global peak between 2 and 10 clusters).
- CCC - The Cubic Clustering Criterion is also at a peak (however, when using two clusters CCC is slightly higher).

So, a four cluster solution was chosen for subsequent analysis.

In Figure 2 and Figure 3 the cluster analysis is repeated using data samples from New Zealand and USA.

A closer inspection of the New Zealand sample seems to favor 4 clusters - as was the case regarding the Danish sample. The US-sample might be described using between 3 and 6 clusters.

For matters of comparison it was decided to use also 4 clusters when analyzing the US-sample.

The proportionnal sizes of the clusters (styles) with respect to total sample sizes were:

<table>
<thead>
<tr>
<th>Country</th>
<th>Cl 1</th>
<th>Cl 2</th>
<th>Cl 3</th>
<th>Cl 4</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>25%</td>
<td>20%</td>
<td>24%</td>
<td>21%</td>
<td>100%</td>
</tr>
<tr>
<td>New Z.</td>
<td>20%</td>
<td>21%</td>
<td>23%</td>
<td>26%</td>
<td>100%</td>
</tr>
<tr>
<td>USA</td>
<td>30%</td>
<td>19%</td>
<td>31%</td>
<td>20%</td>
<td>100%</td>
</tr>
</tbody>
</table>

All clusters, were of roughly equal sizes. Since none of the three data-sets seemed to be outlier-ridden, it was not found necessary to perform an outlier detection procedure like the one described by Menzer & Schmidt (1990 P. 1301) and in SAS manuals (e.g. SAS-STAT/PC Ver. 6, 1987 pp. 511-17).

2. Discriminant Analysis

A stepwise discriminant analysis (SAS PROC STEPDISC) was run on the data to determine the discriminatory power of the variables and to evaluate the resulting classification matrix (SAS PROC DISCRIM).

Table 3 shows the results of the stepwise discriminant analysis and displays the classification matrix (Danish sample only).

It is easy to see that the chosen combination of cluster analysis and discriminant analysis was extremely successful with regard to clustering respondents (managers) into groups. However, this is of little surprise since we are using a model which optimize heterogeneity (clustering) in a given data set, and we are performing a test (discriminating) that evaluates if the heterogeneity which has just been detected, is precisly - by using the very same data set.

1 Pseudo F = \[ \frac{R^2(n-1)}{(1-R^2)(n-\alpha)} \] , \( R^2 \) is the observed overall R-square, \( \alpha \) is the number of clusters and \( n \) is the sample size.

2 The CCC is a stopping procedure which has been developed by the SAS Institute. It measures the deviation of the clusters from the distribution of points expected if the points were actually from a uniform distribution. R-Square (Expected) is the appropriate expected value of the overall R-square under the uniform hypothesis assuming that variables are uncorrelated. Since factor scores are clustered this assumption in not violated. In Figure 1 R-Square - Expected as well as Observed - have been multiplied by 10 for matters of convenience.
The classification matrix from the analysis reveals that the model is very successful in correctly classifying observations into their appropriate population (96% of the cases are correctly classified).

Based on the mean values of each Likert Scale (Table 3 and Figure 4) for management style dimensions, the largest differences between group means are found for planning activities, degree of market orientation, the use of judgement over gathering additional information, the propensity to accept risk, and using objective criteria in decision-making.

Compared with the other groups, the companies with management Style 1 are primarily technical or product-oriented, planning and information seeking activities are limited, unstructured decision criteria are used, and relatively only a few variables are investigated. Risk behavior and individual versus group decision-making do not differentiate management Style 1 from the rest.

The most clear features that distinguish management Style 2 companies are: They are strongly market driven, they do little planning for decisions in advance, and they use subjective judgement rules. Furthermore, they are risk neutral. Interesting, management Style 2 firms also tend to rely on objective and verifiable data. A highly risk aversion behavior is the single most characteristic of management Style 4 companies. The decision-making process seems to be characterized with more planning, looking at many variables and the use of objective criteria. Management Style 4 companies are the most planning-oriented and rely on objective information, take group decisions, are risk avoiders, i.e. applying an analytical-oriented decision-making approach.

Perhaps one might sum up in the following way (Danish sample only):

**Style 1**: "The practical technician"
**Style 2**: "The market driven manager"
**Style 3**: "The analytical gambler"
**Style 4**: "The careful planner"

Figures 5 and 6 display profiles of the management styles regarding New Zealand and USA (to be analyzed in detail elsewhere).

Next, the authors wanted to evaluate the (dis)similarities in styles across countries. Thus the 7 variables x 12 matrix of styles was cluster analyzed (four styles per country, three countries).

The following twelve algorithms (all available SAS-options) were performed:
- Average Linkage, Centroid Hierarchical, Complete Linkage, Density Linkage,
- Equal Distance Maximum Likelihood, Flexible Beta, McQuitty's Similarity, Median Pairwise,
- Single Linkage (without control for chaining) Two Stage, and Ward.

Figure 7 displays a dendrogram of the results (PROC CLUSTER using the average linkage option). The results were quite stable across methods!

Interestingly, it seems that Danish and American management styles resemble each other more than do they resemble the styles from New Zealand, since all eight Danish and American styles cluster before they are clustering with the styles from New Zealand.

This finding might seem reasonable if one is inspecting Figures 4-6: From an optical point of view the profile structure of Figures 4 and 6 look somewhat more alike than that of Figures 4 and 5, and Figures 5 and 6, respectively.

Figure 8 shows the two management styles with the highest degree of similarity across countries: Denmark Style 4 and US Style 1. Both styles seem to describe managers who pay an extraordinary attention to planning.

Management Style 1 amongst managers from New Zealand seems to be rather special. This style seems to reflect some kind of "wild management" (almost average values - around 3 - on all variables).

It should be stressed that similarities across styles within a country are weak. This, of course, due to the method which was chosen: the cluster analysis within each country was based on differences in answers regarding the seven decision styles variables. So, it should be of no surprise that there are differences within a country.

One finding, however, is worth mentioning: The standard deviations concerning the 12 style means regarding the 7 variables were...

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**Table 3a:** Stepwise Discriminant Analysis (PROC STEPDISC) - Danish Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean of Style</th>
<th>F</th>
<th>Part</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Planning in Adv.</td>
<td>3.2</td>
<td>2.1</td>
<td>3.6</td>
<td>4.3</td>
</tr>
<tr>
<td>Market Oriented</td>
<td>3.3</td>
<td>1.6</td>
<td>2.1</td>
<td>1.6</td>
</tr>
<tr>
<td>Objective Criteria</td>
<td>3.1</td>
<td>2.9</td>
<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Judgement vs. Add. Info.</td>
<td>2.1</td>
<td>1.9</td>
<td>2.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Avoid Risk</td>
<td>2.7</td>
<td>2.9</td>
<td>3.6</td>
<td>2.5</td>
</tr>
<tr>
<td>Many Variables Included</td>
<td>3.4</td>
<td>2.4</td>
<td>2.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Single Person Decision</td>
<td>2.0</td>
<td>1.9</td>
<td>1.9</td>
<td>3.0</td>
</tr>
</tbody>
</table>

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**Table 3b:** Discriminant Analysis Classification Matrix (PROC DISCRIM)

<table>
<thead>
<tr>
<th>Group</th>
<th>- Classifications -</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>St-1</td>
<td>St-2</td>
</tr>
<tr>
<td>Style 1</td>
<td>96</td>
<td>0</td>
</tr>
<tr>
<td>Style 2</td>
<td>1</td>
<td>72</td>
</tr>
<tr>
<td>Style 3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Style 4</td>
<td>1</td>
<td>72</td>
</tr>
<tr>
<td>Total</td>
<td>101</td>
<td>72</td>
</tr>
</tbody>
</table>

---

Figure 4: Danish Management Styles:

- **Marked Oriented**
- **No Planning in Adv.**
- **Objective Criteria**
- **Avoid Risk**
- **Many Variables Included**
- **Judgement vs. Add. Info.**
- **Single Person Decisions**

Figure 5: New Zealand Styles

- **Marked Oriented**
- **No Planning in Adv.**
- **Objective Criteria**
- **Avoid Risk**
- **Many Variables Included**
- **Judgement vs. Add. Info.**
- **Single Person Decisions**

Figure 6: US Styles

- **Marked Oriented**
- **No Planning in Adv.**
- **Objective Criteria**
- **Avoid Risk**
- **Many Variables Included**
- **Judgement vs. Add. Info.**
- **Single Person Decisions**

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1 Subsequent analysis will be clustering the 408 (DK) + 550 (NZ) + 110 (US) = 1068 respondents x 7 variables matrix. So, a given cluster will consist of managers from Denmark (i.e. 40%), New Zealand (i.e. 25%), and USA (i.e. 35%).
While managers do not seem to disagree much across countries and styles on risk avoidance and how to make priorities between judgement (make decisions now) and gather additional information - they really seem to disagree on how many variables to include, how many persons to involve, and on the degree of market orientation.

3. Correspondence Analysis

Finally a set of Correspondence Analysis was performed (SAS PROC CORRESP). Only the analysis of the Danish sample is reported here.

Table 4 shows two contingency tables (Management Style versus Company Size and International Marketing Strategy). In Figure 9 and Figure 10 the row and column coordinates are displayed in two dimensional space (SAS PROC GPlOT).

Figure 8: Comparable Management Styles

“Carefully Planning Managers” in Denmark and USA

Figure 7: Dendrogram - Cluster Analysis of Management Styles

Average Linkage

Bar chart showing the dendrogram with different management styles.

Discussion

The authors argue that it is indeed possible to identify and describe differences in management style within a given country and culture. The study found remarkable similarities between management styles across countries.

References


Contact Address: Grundtvigs Allé 150, DK 6400 Sonderborg.
Table 4: Contingency Tables of Management Style versus Company Size and International Marketing Strategy

<table>
<thead>
<tr>
<th>Number of Employees</th>
<th>Management Style</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>St-1</td>
<td>St-2</td>
</tr>
<tr>
<td>&lt; 50</td>
<td>58</td>
<td>40</td>
</tr>
<tr>
<td>50-100</td>
<td>27</td>
<td>18</td>
</tr>
<tr>
<td>101-500</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>&gt; 500</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>102</td>
<td>81</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EPRG-Type Decisions</th>
<th>Management Style</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnocentric</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>Polycentric</td>
<td>38</td>
<td>30</td>
</tr>
<tr>
<td>Regiocentric</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>Geocentric</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>Total a</td>
<td>102</td>
<td>81</td>
</tr>
</tbody>
</table>

a 29 Managers (408-379) did not answer the EPRG-related question.