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Nordic Management and Sustainable Business

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Abstract

The Nordics have been since a longer time a role model for a social and reliable management style. However, this statement was in the last just proven by doing few case studies with top executives. This study wants to describe the corporate culture and management style in the biggest companies of the Nordics and from that wants to answer if this management approach fosters a sustainable business culture. For defining the management and cultural approach applied in Nordic companies, the method of text mining in relation with machine learning will be used. Among European companies, the Nordic companies show a higher focus on sustainability. The cultural dimensions which describe the uniqueness of the Nordic business culture are to a high degree predictors of a more sustainable business.

Keywords: Management; Nordic; Sustainability; Culture; Corporate; Leadership

Introduction

The Nordic countries are from a historical perspective closely related to each other. Not just from their relation due to trading but also from a cultural perspective. Nearly all countries of the region including Norway, Finland, Denmark and Sweden belonged at one point in time together [1]. Management principles and cultural similarities among companies in the Nordic countries have been proved over the last decades by many scholars [2-6]. The corporate culture is mainly influenced by the national culture and companies exist surrounded by this. Due to this fact, the corporate culture can be better understood by looking at the national culture [7]. Studies have shown that the Nordic countries have, when it comes to leadership styles, similarities that have an impact on their market orientation [7].

The goal of researching the impact of culture might be to draw conclusions in which way the cultural factors influence the sustainability of corporate management. In fact, research faces in this way some difficulties that arise from the nature of culture. The hidden nature of cultural behavior causes some difficulties in measurement and defining these Smith [1]. In order to cope with this difficulties, researchers from outside the region have developed measurements that measure culture on a general scale in order to compare differences among cultures and management styles [2,8]. These results can be used in order to define similarities in a region and or differences to other regions. Not just on country level but also on corporate level might the culture and their difference play a role in the way on how companies react on the development of the world's economy. The fact that current research showed the stakeholder orientation from Nordic companies lead to the consequences that they are more concerned about factors beside the shareholder value [9], according to Freeman who's main research was contributing to the development of the stakeholder approach which is mainly taught by Nordic scholars and has therefore a big influence on the development of Nordic management styles [10,11]. However, beside this logical assumption, current research took this fact more as granted and did not researched on this relation between the long-term stability and the cultural and leadership approach in the Nordic countries.

Due to this fact, the following paper aims to analyze the relation between the Nordic corporate culture and the long term sustainable development of companies. In this connection the study aims to look on the sustainability of management actions and how the corporate culture might influence this. The study collects data from the blue chip companies of the Nordic countries listed in the large cap indices of Denmark, Sweden, Norway and Finland. In order to present differences to other European companies and in order to show the impact of a specific corporate culture a peer group from companies of other European countries was selected. These are listed in the Euro Stoxx 50 index. From this the study uses text mining in order to process an extensive amount of text describing the cultural and management practices in the target companies. Software for text mining and principles or language processing allows to process and quantifies the information and throughout this link it to the economic data which will be collected for each of the countries and companies.

Furthermore, methods from machine learning will be used in order to describe patterns in the linked data and with that present a significant relation between the sustainability of companies in the Nordics and their specific management approach. The models being used for this will be described in more detail under the method selection topic.

The Nordic management approach

The four countries Denmark, Sweden, Norway and Finland can be summarized under the name Nordic region. These country group shares according to current research an equal approach to management that differentiates them from other countries [12,13]. Corporate culture is according to Weber a system of believes [1,14], values and assumptions that are shared among the managers of an organization and that are influencing the way how the organization is managed [15]. Gjølberg showed that in Scandinavia cultural norms and institutional structures that encourage the relationship between stakeholders and the companies are dominant [16]. The structures in companies from the Nordics follow mainly a participative culture [17]. The organizations follow an approach of a high degree of employee engagement and flat hierarchies [13,18]. According to Midttun et al. companies from the

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Nordics follow a culture of combining economic interests within a broader societal interest [19]. Furthermore, Scandinavian companies show an involvement of the employees in the management by having participations from the employee side in the board [20]. The whole corporate governance in the Nordics is stakeholder orientated and the corporate ownership is concentrated [9,21]. A high percentage of owners are the state by foundations and families [9,22]. Research showed furthermore that owners in this case behave not as individuals who are just hunting for the short term profit rather than having a long-term interest in the company [11]. This can be backed up by findings that state that Nordic management seems to be more stability orientated. [23,24]. Mintzberg et al. showed that in the Nordics is a high conformity what theory of stakeholder management says and what is done in the practical world [25]. Researchers like Kakabadse et al. claimed that the stakeholder approach nearly dominated the teaching at universities in Scandinavia as well as that the approach has an important status in Scandinavian management since the 1960s [26].

According to the Globe study, the following dimensions can be used to classify the management style in Sweden. Inspirational integrity, visionary, team integration, performance orientation, collaboration. The level of top and middle management is on the same high [27]. This is due to a low level of hierarchy in Scandinavia and in particular Sweden. This participative style in leadership comes in connection with egalitarism and status conscious [28]. There are according to current research certain factors that inhibit leadership in Sweden [27]. These are according to Jagdeep et al. Autocratic, face saver, self-centered, malevolent. As a challenge for the Swedish leader can be seen to balance these factors for good leadership with some of the in depth values of the culture as for example equality [27].

Working in Denmark is characterized by a relatively liberal labor market which means that it is based on self-regulatory mechanisms [29]. In order to provide stability beside this flexible set up, there is a high level of social security provided [30]. This set up of the labor market can also be found in a way in the management style in Danish companies. The focus lies on worker involvement, autonomy and corporation. This had in the latest decade's influence on a positive development of productivity, higher quality and innovativeness [31-33]. Practice in Denmark has shown that practices which create management involvement a positive internal working climate and less repetitive jobs have a positive on the financial performance in Danish companies. In the same, Danish work life can be described as trust in employees and corporation. This had according to current research a positive influence on creating less absenteeism and less strikes [31-33]. In general Danish employees feel adequately informed regarding management decisions. This is due to good information policy in companies as well as a high level of flat hierarchies [34].

One main reason for the economic development of Norway is the increasing democracy both in the public as well as in the management style [35]. Norway did not take part in the Globe project. However, there is research that adapted the questionnaire from this project to Norway [36]. The results have shown that Norway similar to Denmark scores low in power distance and very high in human orientation and collectiveness. In these high score categories, it outperforms all other Nordic countries by far [36]. When it comes to uncertainty avoidance, Norway scores much lower as Sweden which is the highest scoring country in this measure of the Nordic cluster.

In Finland the situation looks a bit like in Sweden. The importance of non-hierarchical dialogue and participative leadership are established values in the Finish management practice [37-39]. Advances in productivity of Finish companies can be related to team tasks, the structure and processes of organizations as well as the creation of social workspaces [40]. The individualistic behavior as well as the high equality between men and women is in Finland same as in Sweden an important element of the culture in companies and society [27]. Another factor that influences the working life as well as the management style is that according to Jagdeep et al. the power distance in Finland can be described as low. This creates equality among the employees. An interesting point that can be found in Finland and differentiate the country in some way from other Nordic societies is that there is a low performance orientation according to the Globe study [41]. Beside this which can have an effect on the performance and reward system in companies, the future orientation is higher as the average country in the Globe study [27].

Sustainability is not just environmental friendliness

In the past year's research has shown that the industrialization had negative effects on the environment [42]. However, the economic output is to a high proportion dependent on the natural system [43]. This leads to more sustainability and environmental friendliness in business. Furthermore, the economic environment is unstable so that business needs to adapt fast to this condition in order to reduce risk of failure [44].

In the 21st century the environment is an important factor that should be preserved for upcoming generations. In order to measure the impact that company have on the environment multiple methods and measures have been developed [45]. One prominent measure of companies' environmental impact is the ESG ratings. The available ESG scores cover a multiple factor that describe company's social responsibility and combine them in one score. These social factors relate to treatment of employees, labor conditions, human rights, supply chains, and treating stakeholders in society fairly. The last factor, governance, covers abuses in executive pay, diversity on boards, equal employment opportunities, business transparency and disclosure, and corruption inter alia [46]. However the principles of score calculation are not transparent. Butz and Pictet argue that ESG scores have become commodities [47], which has led to firms proactively adopting ESG strategies that live up to these rating criteria. Thereby, adopting ESG strategies on a firm level can increase the potential investor base and potentially lead to a higher share price [48]. Beside the impact on the environment a company can also be defined as sustainable from a business perspective. Porter defined a company as sustainable when it creates long term sustainable value for its stakeholders [49].

The Nordic companies score especially high in responsibility measures [15,19,50,51]. This might be due to the fact that shareholder value is teached extensively in business schools as well as used in business [11,52]. In current research, Harrison et al. provided in his work a demonstration that managing stakeholders leads to stakeholder trust and with this to additional value creation.

Method and Sample Selection

In this section we describe the method that was used in order to analyze big data of cultural statement document corpus. The corpus contained 3000 documents with single statements about the corporate culture, the management and leadership style in Scandinavian and European companies. The text extraction in order to apply text mining and machine learning was done from txt files. For doing both the extraction, mining the software rapid miner was used. The machine learning algorithms were optimized by using the R extension of rapid miner.

Sample: A company selection

The sample size selection for this paper was made by choosing companies from the blue chip indices from the Nordic companies and the European Union. See for detailed information the following table. The selection was made in align with the fact that the companies in the analysis represent the main economic activity in the selected regions. With that it will be possible to draw conclusions about the corporate culture in the target countries and companies (Table 1).

The data were collected from websites which give employees a platform to comment on the management and leadership style as well as the corporate culture of their current or former employees (e.g., glassdoor.com, indeed.com). This post gives in their total a realistic view on the culture in the various firms. Although the way of data collection makes this study less dependent on the companies and also has a lower level influence through participants [52,53].

The sample consists of in total 3.000 attributes where each describes the culture of a specific company. For each company ca. 2030 of such descriptions were collected.

Text mining for data collection

Text mining is a method to process and analyse unstructured textual data. It uses techniques from data mining and machine learning in order to extract knowledge from multiple documents. Clustering trend analysis or association rules are common fields in which text mining is applied [54]. The method of text mining finds in multiple research areas of social science and application [55-57]. In this paper the software Rapidminer® was used in order to process the text with the goal to get the text data in a structured for which can be analyzed by a statistics program. This was necessary in order to use machine learning and also for later linking the findings to the economic data. Furthermore, this method allows drawing also a picture of the cultural set up in each of the companies which makes it different to the current studies on culture and for the purpose of this study necessary.

The text mining process is presented in Figure 1 and contains different steps that lead to a list of words that mainly describe the underlying text and with that includes the core information of the text. The first step is that the words get tokenized. That means that the text will be split into the single words. After that the words were filtered by length. In this case words with less than 4 and with more than 25 characters where excluded. The words got also filtered by English stop words so that words like "and" and "then" etc. were excluded from the sample since they do not contain specific content information. The next step that was performed was stemming. The used operator (written in the snowball language) stems the words in the documents based on their English word stem. This is necessary in order to not have multiple words with just different forms in the output of the text mining process. After all the words were transformed to a homogeneous case (here lower case), the result was then written into an excel document for further analysis.

Country	Index	Num. Companies
Norway	OBX 26	26
Denmark	OBX 26 OMX Copenhagen 20	20
Sweden	OMX Stockholm 30	30
Finland	OMX Stockholm 30 OMX Helsinki 25	25
EU	EUROSTOXX 50	49[2]

Table 1: Covered indices.

The outcome is a list of words that each of the documents contain and the number of it. Each document is linked to the company it belongs to and it can therefore easy be linked to data from the country or the company.

Machine learning to predict defined patterns

As a part of the method, machine learning algorithms were applied on the text corpus in order to classify the text. The text classification uses a supervised machine learning approach and can be seen as a process were the machine as signs predefined labels to new documents. This is done by using a probabilistic measure of likelihood using a training set of documents that where labelled before [58].

First sample data sets were defined. This was done for each of the cultural dimensions. The sample data were statements that described for example a more future oriented culture or a less future oriented culture. After that, a linear support vector machine (SVM) was used as a classifier [59]. The SVM groups the data points into classes by designing a hyper plane between these.

There can be multiple hyper planes be designed but the algorithm choses the one which leaves the maximum margin between both classes. The hyper plane delivers for each class different value: With minimizing the distance, the algorithm minimizes the reparability of the classes. This is done by using a nonlinear optimization task using the KKT method and Lagrangian multipliers λ [60,61].

The vector that describes distance between the hyper plane and the data point's is also named support vector. The hyper plane is the used for classifying the data. This process was repeated for each of the cultural dimensions. The resulting data was then saves as .xlsx file. This process can be described in the following rapidminer processes (Figure 2).

After training the model with a split of the sample, the model was applied to classify the rest of the data set. This process is described in the following (Figure 3).

This was done several times in order to classify the corpus with different labels for each of the cultural dimensions defined by the Globe project as well as for sustainability.

The data that results from the text mining and machine learning operations will be analyzed with descriptive statistics and regression modelling. Based on a selection made by the descriptive statistics, the main cultural dimensions will be analyzed by simple regression models and together in a multiple regression model which can be described by the following formula. In the descriptive statistics the scores for the Nordic countries and the other EU countries will be described and compared with each other.

Nordic management on top of Europe

The management of the Nordic countries was in the past extensively studied on country level. This study examines the leadership culture on company level in order to bring it into relation with the companies' actions related to sustainability.

The difference in leadership between the Nordics and rest of Europe

The first step in order to define the leadership styles in each of the companies that are contained in the sample size was to extract the word list by using the above described algorithms in rapid miner. The resulting word count list can be requested from the author but will not be displayed in this paper due to limited space for the rich data. In the

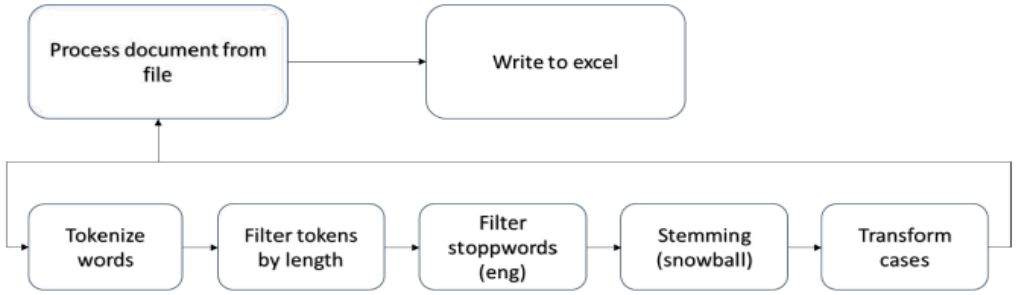

Figure 1: Text mining process.

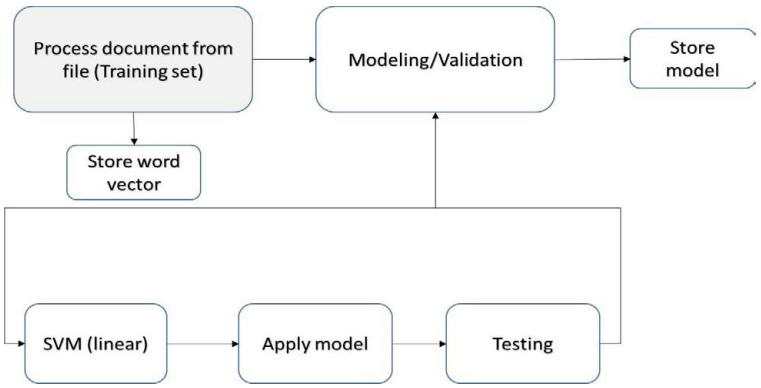

Figure 2: Building and testing SVM model.

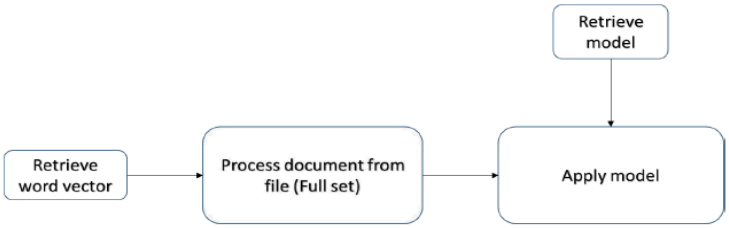

Figure 3: Applying VSM model on data set.

first step of the analysis an exploratory factor analysis was performed. The number of factors was distinguished by theory and the definitions of the GLOBE study were chosen since they were more detailed and it allowed making the model more precise.

The following graphs show how the Nordic countries differ in terms of management approach based on the Globe study dimensions (Figure 4).

It is from the graphs clear to see that companies in the Nordics score lover then in the rest of Europe when it comes to the dimension's collectivism, uncertainty avoidance, power distance and masculinity. In Human and future orientation have the Nordic companies higher scores then I the rest of Europe. These findings out of the text mining process is in align with the findings of previous research related to the Nordic culture.

Impact of Nordic corporate culture on stability

The first look on the difference of sustainability of the Nordic countries compared to the other Europeans shows that there is not a huge difference in how they talk about sustainability. However, all the Nordic companies score slightly higher as the average European company (Figure 5).

The data analysis shows that the average European company scores lower as companies from the Nordic countries. This is in aligning with the findings from current research regarding the social and environmental friendly orientation of Nordic companies. However, these descriptions show just the current situation and do not focus on the question whether there is a relation between the Nordic leadership and the higher sustainable orientation of the Nordic countries. In order to discover this multiple regression models were performed. To oversee the relations between the sustainable orientation and the corporate culture see the following scatter plots (Figure 6).

The strongest relationship is between sustainability and the cultural dimension's future orientation, masculinity and human orientation. This can be also seen in the correlation matrix in the appendix of this paper. Therefore, the further analysis will have a more in depth look on these. The sustainability measure is for all following in depth analysis the same and can be described by the following descriptive statistics (Table 2).

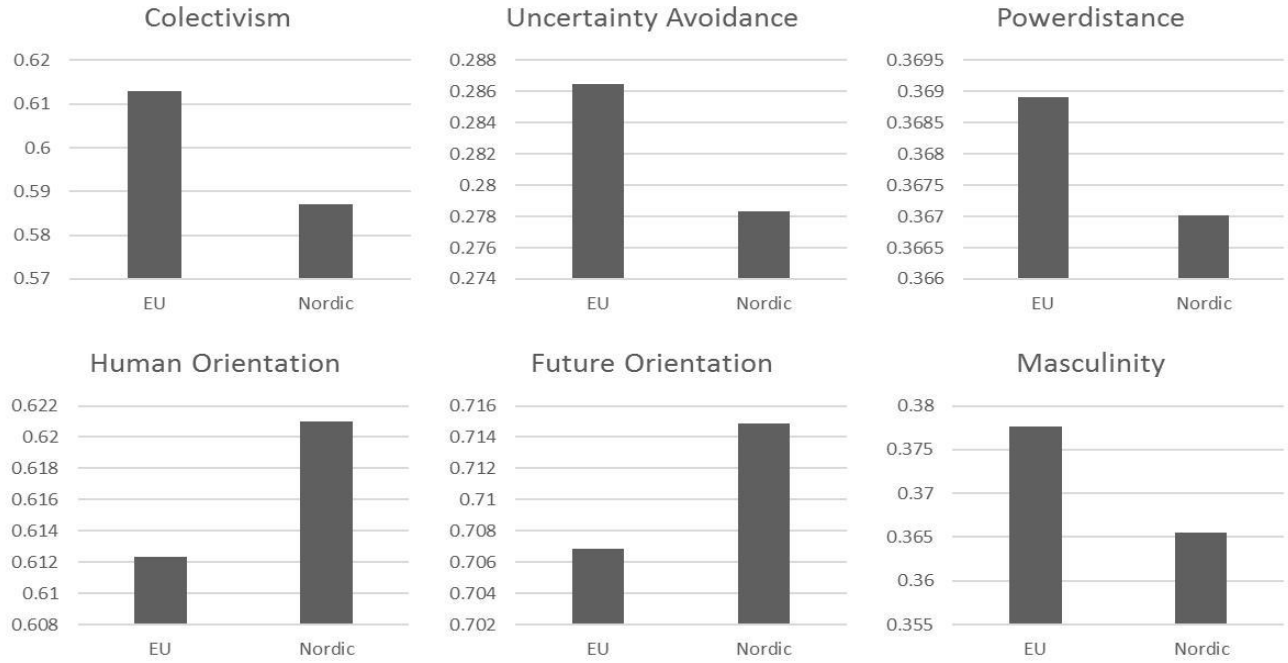

Figure 4: Graphs cultural dimensions.

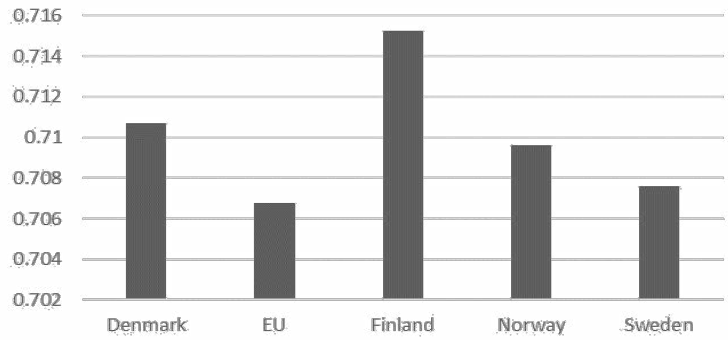

Figure 5: Sustainability score.

Sustainability	
Mean	0.7094
Standard Error	0.0013
Median	0.7095
Standard Deviation	0.0149
Sample Variance	0.0002
Kurtosis	0.8843
Skewness	0.0090
Range	0.0887
Minimum	0.6677
Maximum	0.7564
Sum	97.1873
Count	137

Table 2: Summary descriptive statistics Sustainability.

It can be said that the median and the mean are nearly the same which indicate a normal distribution. The regression model with the highest prediction power is between Sustainability and Masculinity (Table 3).

Also for this dimension is the mean close to the median. However, over all, this dimension is wider spread then the dimension describing sustainability which indicates for a higher variety among the data set. The regression statistics in the following table highlight that the model has a maximum prediction power of ca. 25%. This is for just one cultural dimension high. The R square as well the adjusted R square is much lower but this can be in this case neglected since it accounts for a small sample size. However, since the number of companies is given, this can't be adjusted (Table 4).

Also the ANOVA table supports the hypothesis that a higher masculinity has a negative impact on the sustainability of a company. And with that accounts this for a higher sustainable management in Nordic companies which have in average a lower masculinity then the average European company (Table 5).

The significance of the model is below 0.005 so it can be used as a predictor for the outcome of the model. The second cultural dimension which has a high impact on the sustainability based on the regression model is the future orientation. This is also logic and was proven my current research that a more towards the future oriented company searches also for more innovative and sustainable solutions.

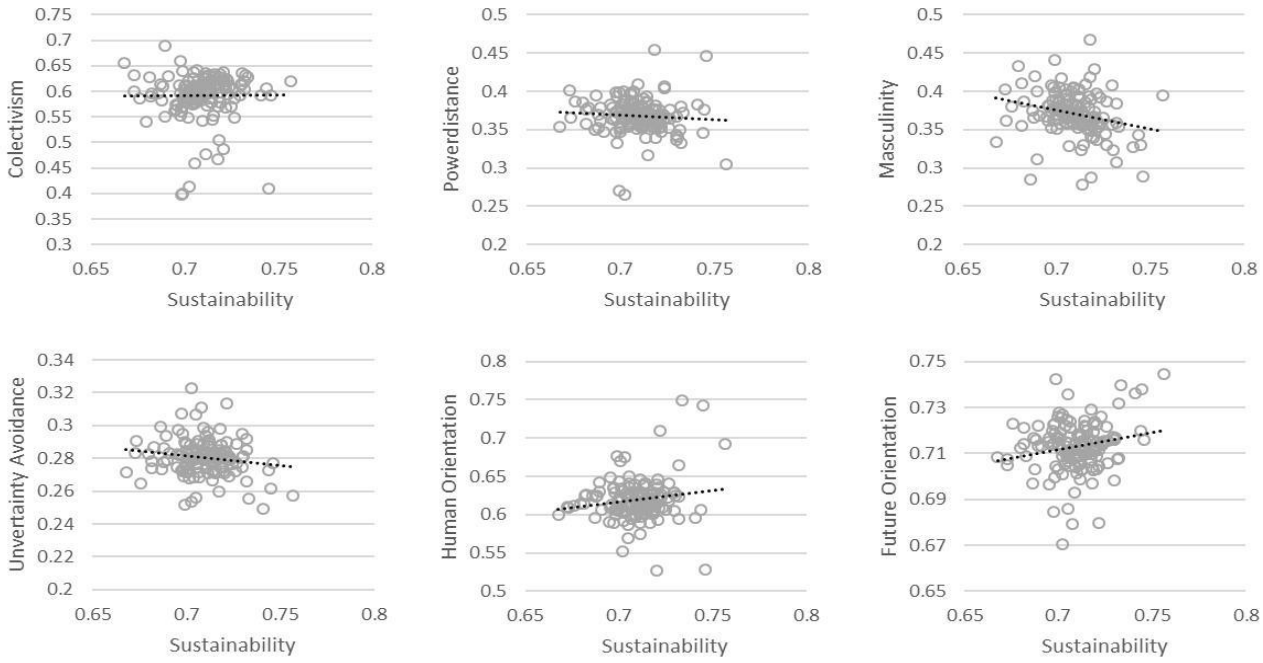

Figure 6: Scatter plots - relation sustainability and cultural dimensions.

Masculinity	
Mean	0.3705
Standard Error	0.0025
Median	0.3702
Standard Deviation	0.0293
Sample Variance	0.0009
Kurtosis	1.7119
Skewness	-0.3237
Range	0.1897
Minimum	0.2781
Maximum	0.4678
Sum	50.7625
Count	137

Table 3: Summary descriptive statistics masculinity.

Regression Statistics	
Multiple R	0.247168228
R Square	0.061092133
Adjusted R Square	0.05413726
Standard Error	0.014458545
Observations	137

Table 4: Regression statistics masculinity-sustainability.

	df	SS	MS	F	Significance F
Regression	1	0.001836307	0.00183631	8.78407589	0.003593041
Residual	135	0.028221687	0.00020905		
Total	136	0.030057994			

Table 5: ANOVA statistics regression model masculinity-sustainability.

The dimension can be described by the following descriptive statistics (Table 6).

The dimension is like the sustainability not wide spread across the companies as well as has a median which is near to the mean. The regression model between future orientation and sustainability can be described by the key figures in the following (Table 7).

Future Orientation	
Mean	0.7129
Standard Error	0.001
Median	0.7137
Mode	n/a
Standard Deviation	0.0113
Sample Variance	0.0001
Kurtosis	2.3612
Skewness	-0.4369
Range	0.0742
Minimum	0.6704
Maximum	0.7445
Sum	97.6695
Count	137

Table 6: Descriptive statistics future orientation.

Regression Statistics	
Multiple R	0.199037629
R Square	0.039615978
Adjusted R Square	0.032502022
Standard Error	0.01462297
Observations	137

Table 7: Regression statistics future orientation-sustainability.

The prediction power of the future orientation is slightly lower as the one of masculinity which is could have been based on current research the other way around. However, both R's are with 25% and 20% close to each other. The ANOVA table for this model can be seen in the following (Table 8).

With ca 0.02 is the significance much higher as for the masculinity but still can be accepted since the model contains just one cultural dimension which is only a piece of the whole corporate culture and management style of a company. The last dimension which has a major impact on how sustainable a company is managed is the human orientation. The more human a company is oriented the more

sustainable is the company managed. This is in align with current research and also logic since how a company interacts with employees as well as other human is also a factor for how sustainable a company (Table 9).

Also hear is the mean close to the median. But the maximum and minimum are wider spread then at the future orientation ore the sustainability (Table 10).

The prediction power of the model is with ca. 15%, 5% points lower as the other two dimensions but still one of the most important once (see scatter plots) (Table 11).

Parallel with the prediction power of the model is also the significance changed. With 0.07 is it the highest out of the main predictors. If these three cultural dimensions are put together in a multiple regression model, then then culture defined by this dimensions can predict 32.6% of the outcome of the sustainability. The regression model can be seen in the appendix of this paper (Tables 12 and 13).

Result and Discussion

The results of this research present the relation between cultural dimensions and the sustainability of the companies. For the four Nordic countries Denmark, Sweden, Norway and Finland as well as the biggest European companies (Euro Stoxx50). However, the picture

df		SS	MS	F	Significance F
Regression	1	0.001190777	0.001190777	5.568769207	0.019715952
Residual	135	0.028867217	0.000213831		
Total	136	0.030057994			

Table 8: ANOVA future orientation-sustainability.

Mean	0.6193
Human Orientation	
Standard Error	0.0024
Median	0.6168
Mode	n/a
Standard Deviation	0.0283
Sample Variance	0.0008
Kurtosis	6.8426
Skewness	1.1802
Range	0.2220
Minimum	0.5273
Maximum	0.7493
Sum	84.8414
Count	137

Table 9: Descriptive statistics human orientation.

Regression Statistics	
Multiple R	0.153911585
R Square	0.023688776
Adjusted R Square	0.016456841
Standard Error	0.014743726
Observations	137

Table 10: Regression statistics human orientation-sustainability.

df		SS	MS	F	Significance F
Regression	1	0.000712037	0.000712037	3.275579221	0.072542563
Residual	135	0.029345957	0.000217377		
Total	136	0.030057994			

Table 11: ANOVA table regression model human orientation-sustainability.

	SUST	PWD	MAS	UAV	HUO	FUO	COL
SUST	1						
PWD	-0.08089	1					
MAS	-0.24717	0.11903	1				
UAV	-0.15705	0.15732	0.02017	1			
HUO	0.15391	-0.27789	-0.04053	-0.0625	1		
FUO	0.19904	-0.19779	-0.09384	-0.9376	0.1580	1	
COL	0.00607	0.05450	-0.27281	0.3228	-0.0783	-0.2198	1

Table 12: Correlation matrix sustainability and cultural dimensions.

remains incomplete and the question regarding how to in detail influence the cultural dimensions remains unanswered by this analysis. Methodological limitations should also be considered when drawing conclusions from these findings.

In the first step it can be summarized that the findings about the Nordic corporate culture can support the current research. The management style in the Nordic companies is in contrast to the rest of European companies defined by flat hierarchies. The broader social interest of companies in Denmark, Sweden, Norway and Finland can be found respectively in the score of the human orientation. Nordic companies are focused on social values and highly future orientated. This future orientation is in align with the visionary set up that is especially in the Swedish corporate set up the case.

When connecting this score to the sustainability, the analysis showed that the cultural dimension's masculinity, future orientation and human orientation have the highest impact on how high the firm scores in sustainability. Masculinity has a negative impact and the other two dimensions have a positive impact on the sustainability. When comparing the Nordic companies with other European companies they score in these dimensions in exactly the supporting direction. The way how the Nordic companies in average differentiate themselves against the rest of Europe is in align with current research. The companies in the Nordic countries have a culture that can be defined by higher individualism and lower uncertainty avoidance. They account for a low power distance and a higher future and human orientation. Furthermore, they have a less masculine culture which can also be seen by the role of women in those societies.

Managerial Implications

Since certain studies showed already a correlation between sustainability and corporate financial performance [62-64]. Managers are good advised to focus on responsibility activities. This paper showed that by adopting a management style similar to the Nordic countries, the sustainability of business operations can be increased. The Nordic approach is more future orientated, focus on the human capital and increases the flexibility by giving the employees more freedom to act.

Future Research

The method of text analytics and machine learning is rather new in the field of social science research. Therefore, it gives further research the possibility in finding more suitable algorithms for certain data sets. Furthermore, the paper used also for the discovery of firm's responsibility a text mining approach. Also if the results of this are in align with current research it can be enriching to analyze how the assessment of social responsibility with this method scores in combination with other established rating methods (e.g., sustain alythics' ESG rating). There might be a slight difference in the outcomes of certain methods given by the underlying data.

Regression Statistics								
Multiple R	0.3259							
R Square	0.1062							
Adjusted R Sq.	0.0860							
Standard Error	0.0142							
Observations	137							
ANOVA								
					Significance			
	df	*SS*	*MS*	*F*	*F*			
Regression	3	0.0031	0.0010	5.2692	0.0018			
Residual	133	0.0268	0.0002					
Total	136	0.0300						
		Standard				*Upper*	*Lower*	*Upper*
	Coefficients	*Error*	*t Stat*	*P-value*	*Lower 95%*	*95%*	*95.0%*	*95.0%*
				2.07E-				
Intercept	0.5637	0.08187	6.8846	10	0.4017	0.7256	0.4017	0.7256
MAS	-0.1152	0.0417	-2.7610	0.0065	-0.1977	-0.0326	-0.1977	-0.0326
FUO	0.2096	0.1100	1.9053	0.0588	-0.0079	0.4273	-0.0079	0.4273
HUO	0.0628	0.0436	1.4402	0.1521	-0.0234	0.1490	-0.0234	0.1490

Table 13: Multiple regression model.

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