Üçüncü Sektör Sosyal Ekonomi Dergisi
Third Sector Social Economic Review
54(3) 2019 1399-1413
doi: 10.15659/3.sektor-sosyal-ekonomi.19.09.1170

Research Article

An Early Warning Model for Turbulence Management by Using Analytic Hierarchy Process

Analitik Hiyerarşi Sürecini Kullanarak Türbülans Yönetimi İçin Erken Bir Uyarı Modeli

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Makale Gönderme Tarihi	**Revizyon Tarihi**	**Kabul Tarihi**
01.07.2019	06.09.2019	09.09.2019

Abstract

The business environment is one of the main factors that affect its activities thereby the existence of the business is influenced, however; it has a dynamic structure which includes different conditions and situations. Turbulence conditions and situations, one of the features of the business environment, has an impact on the functions and actions of the business. It is a vital obligation for business activities to be continued and not to be interrupted in the conditions of the business turbulence. This should be provided by the business. Therefore, it is important to predict possible conditions or situations of turbulence in terms of maintaining the lifetime of the business. The aim of this study is to develop an early earning model for predicting turbulence conditions that a business can encounter in a macro and sectoral environment. In this study turbulence evaluation criteria and turbulence factors - related to the external environment of business are identified. The external environment factors of business are utilized according to criteria which determine turbulence conditions and situations. In the final phase of the study, turbulence degree of the business environment is determined. In this project Analytic Hierarchy Process that is a multiple criteria decision making technique was used. In the results of this study, it is seen that the turbulence degree of the business environment is % 72, 24 and this degree can be considered as a high level according to the method which was used in this study. When the outcomes of the study are evaluated, it can be observed that the turbulence degree of a business environment can be identified with the model recommended in this study. It can be said that knowing the turbulence degree of the business environment, in which it operates, provides an opportunity to manage the turbulence.

Keywords: *Turbulence Management, Early Warning Model, Analytic Hierarchy Process*

1. Introduction

It is known that the management and organization have been researched in various theories and approaches since Taylor (2005) published his book called " Principles Scientific Management"

Önerilen Atıf /Suggested Citation
Kömürcü, K., Gökdeniz, İ. 2019, An Early Warning Model for Turbulence Management by Using Analytic Hierarchy Process, *Üçüncü Sektör Sosyal Ekonomi Dergisi*, 54(3), 1399-1413

after he had done his researches in the early years of the twentieth century. Considering Strategic Management (Koçel, 2005), which is one of these approaches, it is observed that the environment is a major parameter in terms of maintaining the existence of the business. Business environment, as an element beyond the control of the business, is determinative in terms of conducting the functions and activities of the business. Based on this, it is seen that the business environment takes the first place to analyze in the strategic management approach (Ülgen and Mirze, 2004).

Thus, the aimed plan of business' objectives can be done as analyzing the internal and external environmental variables in which the company operates. Relevant to this, activities can be done. Nevertheless, the business environment is not only a strategically important parameter but also has the same importance in terms of the operational and routine activities of the business to maintain the existence of it. Because business can be affected by all the characteristics of the environment (White, 2004). Another faced characteristic of the business environment is turbulence (Barrows and Neely, 2012; Ciao, 2012).

Turbulence, a phenomenon in nature, refers to a feature of physical systems observed in a fluid such as air or water. Turbulence is characterized by velocity and irregularities of changes in pressure. In other words, turbulence is the opposite of smooth laminar flow (Brodnick and Gryskiewicz, 2018). Although the term turbulence is used to describe different physical conditions, it is often used to represent a meteorological situation (Barrows and Neely, 2012). The field of management science uses turbulence to describe the unusual situation encountered in the business environment with an analogical approach. The main reason for this is that the non-routine environmental situation that is faced during the management activity process can be explained more easily and comprehensively with an analogical approach. In the management literature, turbulence has been described in different ways. According to Pfeffer and Salancik's (2003) explanation, the turbulence is a phenomenon which is the form of unexpected consequences resulting from changes that may arise from any source and their consequences without notice. Based on Barrows and Neely's (2012) description the concept of turbulence is a difficulty in predicting volatility or discontinuity. On the other hand Glassman, Zell, and Duron's expression (2015) for turbulence is that turbulence is an extension of environmental uncertainty on the basis of environmental complexity and dynamism factors. Melton's decription (2017) for turbulence is that turbulence is dynamism in the organizational environment. In other words while Melton's decription (2017) for turbulence is that turbulence is a situation which involves unexpected, rapid changes in environmental dimensions. Turbulence is a major challenge faced by today's business and organizations, and turbulence is often expressed with uncertainty. This is because discontinuous and difficulties of unpredictable changes cause uncertainty. Rosca and Moldoveanu (2009) have tried to explain turbulence with variables of changeability and predictability. Rosca and Moldoveanu (2009) stated that turbulence is a function of changeability and predictability according to these variables. When the explanations of the concept of turbulence are examined in terms of management science, it is believed that the first thoughts about turbulence emerge from the interdependence between the organization and the environment (McCann and Selsky, 1984; Melton, 2017). The interdependence between the organization and the environment is the result of the open system nature of the organization. Dependency is the process that organizations do with the components of the environment to obtain the resources they need and to maintain their existence (Pfeffer and Salancik, 2003).

Turbulent characteristics are generally destructive environments that pose threats to organizations for surviving and growing. Turbulence is considered as a constant for the organization (Smart and Vertinsky, 1984). The turbulence characteristics of the business environment can affect the business in point of strategic and operational activities. Hence, it has been stated that the intensity of opportunities and threats stemmed from external environment

are shaped by turbulence (Rosca and Moldoveanu, 2009). Encountering the effects of unexpected and non-routine conditions in organizations damage members, processes, and outputs of the organization. In studies about the effects of turbulence, uncertainty has been found as a result of turbulence and it has negative consequences on individuals and organizations (Cameron, Kim and Whetten, 1987). The turbulence conditions of the business environment cause the operations and

activities of the business to be occurred and implemented out of the normal conditions. Therefore, the management of a business in a turbulent environment is not likely to be done with its current period and structure of conditions and operation. Although it is an excellent organization in the most general sense, it is seen that the issue of management is different in turbulence environment. It can be said that, in the turbulence environment, it is not possible to achieve perfection and to solve the problem with traditional approaches (Metaxas and Koulouriotis, 2014).

Turbulence, as stated in the characteristics of the turbulence given above, may influence operational functions and business activities negatively. Because of the nature of turbulence, in terms of business activities, creates an environment with uncertainty and complexity. Ensuring continuity of activities in turbulence environment in which there is intense and irregular variability in terms of business is essential for maintaining the existence of the business. This may be possible if the operator knows the current or possible turbulence situations and conditions of the environment in which it is located. In other words, turbulence management of the business is possible if it predicts the degree of potential turbulence situations and conditions. Thus, the business can minimize its negative effects of turbulence situations and conditions with turbulence management. For this reason, one of the elements that can be an indicator for turbulence management of the business in the turbulence environment is to know the level of the turbulence. The determination of the severity of the turbulence before encountering the effects of its environment will facilitate the management of the business in the turbulence environment. In the relevant literature review, no studies have been found to allow predicting the turbulence or degree of turbulence which is likely to be encountered in the business environment. In this study, it is tried to develop a model which eliminates this deficiency and allows determining the status and degree of turbulence.

Other parts in this study are: In the second part the method of the study and in the third part application of early warning model for turbulence management given. In the fourth part of the article, the results of the study are discussed and the following studies are mentioned.

2. Method

The study on early warning model for turbulence management has been conducted in a company which operates in Istanbul. The business within the scope of the research is able to produce subcontracts according to their own brand or customer demands. When the business is analyzed in terms of production and commercial activity, it imports 36

Geçerli belgede kaynak yok.% of the inputs. In contrast, it exports 28% of the production.

In this study, which is about the development and application of the early warning model for turbulence, multi-criteria decision making literature studies are used (Yüksel ve Dağdeviren, 2006; Yüksel, 2012; Yüksel and Geban, 2015; Gökdeniz, Kartal and Kömürcü, 2017). The main reason for this is that although the studies aimed to solve the problems related to different fields, the solution methodology used in the studies is objective and functional in the solution of multi-criteria problems. In this study, the early warning model recommended for turbulence management of a business consists of the following stages:

- Analysis of the external business environment.
- Determination of factors of business environment.
- Determination of the criteria for evaluating the situations and conditions of turbulence.
- Creation of AHP model.
- Calculation of the local weights of turbulence criteria, operational environmental dimensions and factors.
- Calculation of general weights of environmental factors.
- Calculation of the turbulence degree of the business environment.
    - Turbulence is very severe (1.00TD≥0.90)

- Turbulence is severe (0.80≤TD≤0.89)
- Turbulence is very high(0.70≤TD≤0.79)
- Turbulence is high (0.60≤TD≤0.69)
- Turbulence is strong (0.50≤TD≤0.59)
- Turbulence is medium (0.40≤TD≤0.49)
- Turbulence is weak (0.30≤TD≤0.39)
- Turbulence is very weak (0.20≤TD≤0.29)
- Turbulence is mild (0.10≤TD≤0.19)
- Turbulence is very mild (0.00≤TD≤0.09)

AHP that is one of the multi-criteria decision-making techniques was used in the study. AHP technique is a mathematical technique enhanced by Saaty (1980; 1986). AHP allows solving problems with an analytical approach. The primary advantage of the AHP technique is to solve problems with a holistic approach (Yüksel and Geban, 2015). In the AHP technique, the problem is modeled by eluting its component and sub-components. Components are categorized into groups according to its common characteristics. The weights of the components in each group are calculated. For the calculation of these weights, we make pairwise comparisons according to the evaluations of the decision makers. Pairwise comparisons were performed with regard to the scale developed by Saaty (1980). The values of the scale are in the range of 1-9. In this study, the pairwise comparisons are made by using (Table 1) the scale (Yüksel, Dağdeviren, and Kabak, 2018) which was developed by Saaty (1980).

Table 1. Importance Levels at Pairwise Comparison

a_{ij}	**Definition**	**Explanation**
1	Equal importance	Two events contribute equally to the goal
3	Weak importance	Activity is relatively preferred compared to other
5	Strong importance	Activity is strongly preferred compared to other
7	Very strong or proven importance	When it is compared to the other, the event is very strongly preferred
9	Absolute importance	There is a very high degree of reliability in the argument of the activity that is preferred to another.
2,4,6,8	Intermediate values	These values were used when needed

After the pairwise comparisons, local and general weights are calculated; however, the consistency of the pairwise comparisons can also be determined by the AHP. In the case of inconsistencies in the pairwise comparisons, the decision-maker repeats the pair comparisons. In terms of this feature, the AHP technique is superior to other comparison techniques (Saaty, 1980:1986). Inconsistencies are not allowed in the pairwise comparisons in AHP. This allows the data which is used to solve the problem in the study to be reliable. In this study, the mathematical structure and properties of the AHP technique are not given. The main reason for this is that the mathematical explanations of the AHP technique are explained extensively in the related literature. It is seen in the literature that the AHP is a technique which is widely utilize in studies related to various fields (Saaty, 1986; Zahedi, 1986; Zhong-Wu, Guang-Ming, Hua, Bin, and Sheng, 2007; Podgorski, 2015; Ivanco, Hou and Michaeli, 2017; Wang, Zhang, Guo and Lu, 2017; Acharya, Sharma and Gupta, 2018).

Results of an application of the early warning model for turbulence management

In the implementation of the study the external environment analysis, which was about the business, was performed. The factors affecting the business activities of the company were determined as a result of the sector and the general environment analysis. Distinguished external environmental factors are grouped according to their common characteristics. Factors and classifications are as follows:

Political and economic factors (PE)

- National political stability (PE1)
- Economic growth (PE2)
- Fiscal policy (PE3)
- Monetary policy (PE4)
- Exchange rates (PE5)
- Interest rates (PE6)

Sectoral factors (SF)

- Intensity of competition (SF1)
- Market entry (SF2)
- Exit from the sector (SF3)
- Supply (SF4)
- Demand pattern (SF5)

Financial factors (FF)

- Recovery of debts (FF1)
- Financing charges (FF2)
- Return on investment (FF3)
- Cash flow (FF4)
- Profitability (FF5)

International conjuncture (IC)

- Conflict in the Middle East (IC1)
- Conflict in Syria (IC2)
- USA-Iranian relations (IC3)
- USA-Russia relations (IC4)
- USA-China relations (IC5)
- Russia-Europe relations (IC6)

In the study, criteria for assessing the situations and conditions of turbulence are determined. Although different characteristics of turbulence condition have been defined in the literature review (Lynch, 2012; Rosca and Moldoveanu, 2009; Barrows and Neely, 2012; Glassman, Zell, and Duron, 2015; Melton, 2017; Brodnick and Gryskiewicz, 2018), the changeability and predictability criteria that Lynch (2012) and Rosca and Moldoveanu (2009) have taken as basis in determining turbulence are determined as criteria. The main reason for this is that the business under the scope of this study is analyzed on the basis of two turbulence characteristics of the operating environment in which it operates.

After the determination of turbulence evaluation criteria, environmental dimensions and factors, the AHP model was formed. AHP model comprise of four levels. The first level is the determination of the degree of turbulence as a function of purpose. The second level of the AHP model includes turbulence evaluation criteria. Environmental aspects take part at the third level. At the fourth level, factors under each environmental dimension were collected. The model constructed according to this is given in Figure 1.

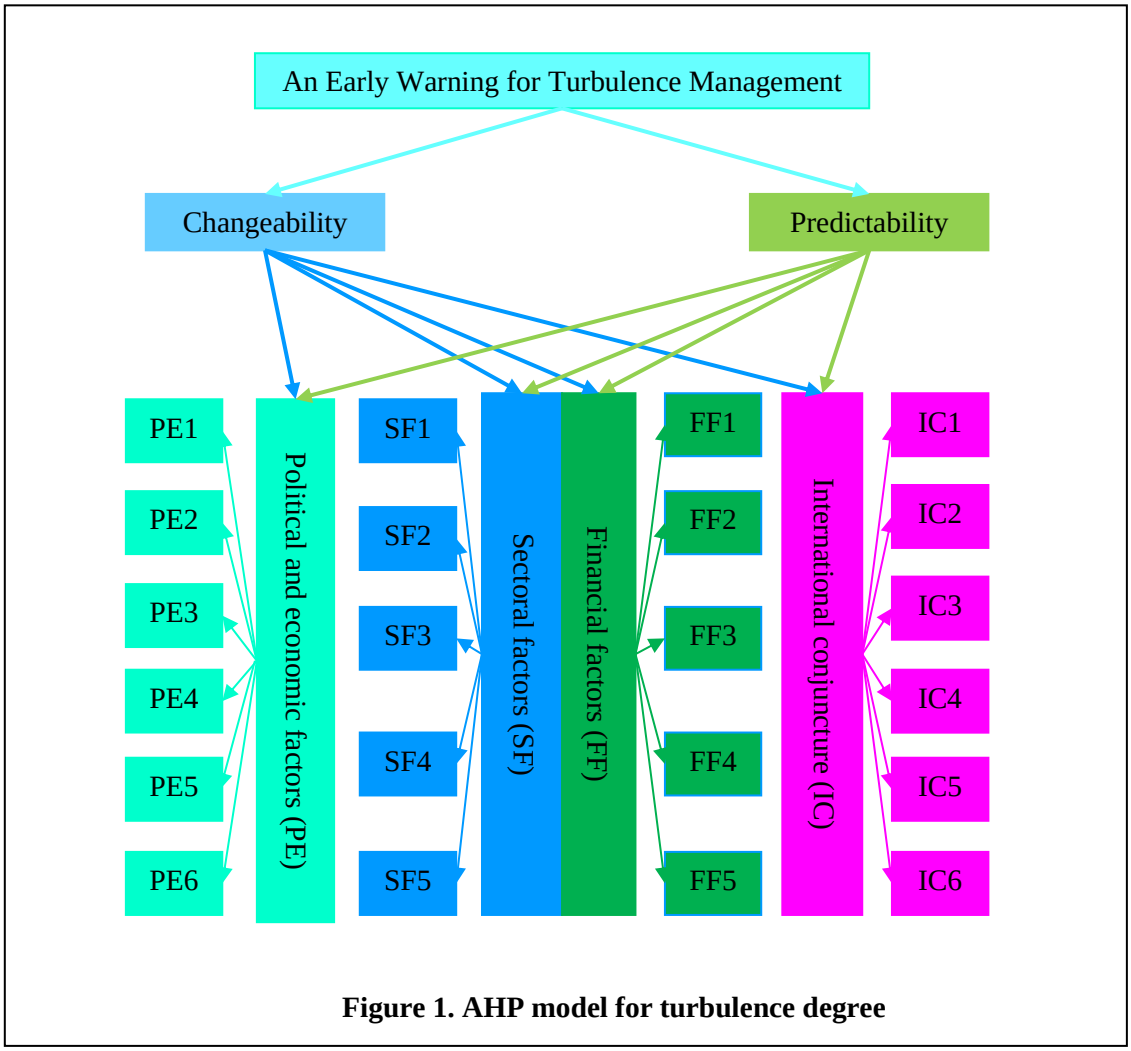

Figure 1. AHP model for turbulence degree

Weighing factors related to the business environment were done according to levels of the AHP model. For this purpose, pairwise comparisons of turbulence criteria, dimensions and factors were done with regard to the opinion of the expert team in the research. Pairwise comparisons were made with the scale developed by Saaty (1980) (Table 1). Pairwise comparisons according to AHP model levels were given (Table 2-5). Pairwise comparisons weights were calculated by using the Expert Choice (2000) program. In order to determine the consistency of the opinions of the expert group, inconsistency rates of the pairwise comparison matrices were calculated. Firstly, pairwise comparisons of turbulence evaluation criteria were made and weights were calculated. As shown in Table 2, the changeability criterion for this study were found to be higher than the predictability.

Table 2. Pairwise comparison matrix for criteria of turbulence

Criteria	CH	PD	Local weights
Changeability (CH)	1	2	0.667
Predictability (PD)		1	0.333

Table 3 shows the pairwise comparisons and weights for the dimensions given at the third level of the AHP model. As shown in Table 3, the dimensions were calculated separately for the two criteria in the second level of the model. Local weights were determined as a result of pairwise comparisons of environmental dimensions according to changeability. According to changeability, the weight of the international conjuncture was highest and followed by political and economic factors. Considering their importance, financial factors were third and sectoral factors ranked fourth. In terms of predictability, it was found that the size of the international conjuncture has a priority weight, however; it was found that the financial factors are in the second, sectoral factors are in the third and political and economic factors are in the fourth place. In the study, the consistency ratio of the pairwise comparison matrix is 0.06 according to changeability and the consistency ratio of the pairwise comparison matrix is 0.04 according to predictability. These two values indicate that the pairwise comparisons are consistent.

Table: 3. According to the criteria pairwise comparison matrix for dimensions of environment

Criteria	Dimensions of environment	PE	SF	FF	IC	Local weights
Changeability (CH)	Political and economic factors (PE)	1	3	2	1/3	0.254
	Sectoral factors (SF)		1	1	1/4	0.113
	Financial factors (FF)			1	1/2	0.152
	International conjuncture (IC)				1	0.481
Predictability (PD)	Political and economic factors (PE)	1	1/2	1/3	1/2	0.126
	Sectoral factors (SF)		1	1	1/2	0.226
	Financial factors (FF)			1	1/2	0.257
	International conjuncture (IC)				1	0.391

Table 4 shows pairwise comparisons, weight and consistency ratios of factors according to changeability, which is one of the criteria of turbulence. According to the values given in the last column of Table 4, the pairwise comparisons of the factors are found to be consistent. When the factors are evaluated as a whole, it is seen that according to changeability, the factors have different values to the importance of the environment.

Table 4. According to the changeability pairwise comparison matrix for factors

Factors							Local Weights	Consistency Ratio
PE	**PE1**	**PE2**	**PE3**	**PE4**	**PE5**	**PE6**		0.03
National political stability (PE1)	1	1	2	2	2	2	0.241	
Economic growth (PE2)		1	3	2	2	2	0.263	
Fiscal policy (PE3)			1	1	1	2	0.134	
Monetary policy (PE4)				1	2	1	0.137	
Exchange rates (PE5)					1	1/2	0.099	
Interest rates (PE6)						1	0.126	
SF	**SF1**	**SF2**	**SF3**	**SF4**	**SF5**			0.07
Intensity of competition (SF1)	1	3	2	3	1/2		0.286	

Market entry (SF2)		1	1	1/2	1/3		0.092	
Exit from the sector (SF3)			1	1/3	1/4		0.090	
Supply (SF4)				1	1		0.204	
Demand pattern (SF5)					1		0.328	
FF	**FF1**	**FF2**	**FF3**	**FF4**	**FF5**			0.01
Recovery of debts (FF1)	1	2	2	1	1/2		0.212	
Financing charges (FF2)		1	1	1/2	1/2		0.121	
Return on investment (FF3)			1	1/3	1/3		0.102	
Cash flow (FF4				1	1		0.262	
Profitability (FF5)					1		0.304	
IC1	**IC1**	**IC2**	**IC3**	**IC4**	**IC5**	**IC6**		0.04
Conflict in the Middle East (IC1)	1	1/3	2	3	2	3	0.210	
Conflict in Syria (IC2)		1	4	3	3	3	0.377	
USA-Iranian relations (IC3)			1	2	1/2	2	0.109	
USA-Russia relations (IC4)				1	1/3	1	0.072	
USA-China relations (IC5)					1	2	0.156	
Russia-Europe relations (IC6)						1	0.076	

The pairwise comparisons, weights and consistency ratios of the factors in the model according to predictability were given in Table 5**.** Pairwise comparisons on the basis of predictability are also consistent.

Table 5. According to the predictability pairwise comparison matrix for factors

Factors							**Local Weights**	**Consistency Ratio**
PE	**PE1**	**PE2**	**PE3**	**PE4**	**PE5**	**PE6**		0.05
National political stability (PE1)	1	1	2	2	2	2	0.254	
Economic growth (PE2)		1	1/2	1	2	1/2	0.139	
Fiscal policy (PE3)			1	3	2	½	0.187	
Monetary policy (PE4)				1	1	½	0.100	
Exchange rates (PE5)					1	1/3	0.088	
Interest rates (PE6)						1	0.233	
SF	**SF1**	**SF2**	**SF3**	**SF4**	**SF5**			0.02
Intensity of competition (SF1)	1	4	3	1	1/2		0.246	
Market entry (SF2)		1	1	1/3	1/3		0.083	
Exit from the sector (SF3)			1	1/3	1/4		0.082	
Supply (SF4)				1	1		0.262	
Demand pattern (SF5)					1		0.327	
FF	**FF1**	**FF2**	**FF3**	**FF4**	**FF5**			0.05
Recovery of debts (FF1)	1	1	2	1	1/2		0.179	

Financing charges (FF2)		1	2	1/3	1/3		0.128	
Return on investment (FF3)			1	1/3	1/4		0.079	
Cash flow (FF4				1	2		0.326	
Profitability (FF5)					1		0.289	
IC1	**IC1**	**IC2**	**IC3**	**IC4**	**IC5**	**IC6**		
Conflict in the Middle East (IC1)	1	1/2	2	3	2	3	0.238	0.03
Conflict in Syria (IC2)		1	3	3	2	2	0.301	
USA-Iranian relations (IC3)			1	2	1/2	1	0.105	
USA-Russia relations (IC4)				1	1/3	1/2	0.066	
USA-China relations (IC5)					1	3	0.188	
Russia-Europe relations (IC6)						1	0.102	

In the study, global weights for 22 environmental factors in the model were calculated after the local weights' calculations according to the comparisons concerning the factors in the AHP model. Global weights indicate the weight of each factor, in other words, they show the importance of each factor. The calculated global weights were given in the second column of Table 7.

In the last stage of the study, the degree of turbulence environment in which the business operates was determined. Firstly, the turbulence status of each factor in the model was evaluated in this part. The evaluation was conducted with a scale (Table 6) developed by Yüksel and Dağdeviren (2006) and used in multi-criteria decision-making problems (Yüksel, 2012; Yüksel

and Geban, 2015). The evaluation of the turbulence factors was done according to the opinions of the decision makers of the company and the expert group of the researchers. The scale which is used to determine the turbulence state consists of six levels. The expert group of the study evaluates the turbulence status of each factor with scale. Within the scope of this study, when the current turbulence factor in the business environment is very high, it is graded as 1.0. On the other hand, if there is no current turbulence of the factor, it is graded as 0.0. As seen in Table 6, there are four possible conditions between these two values.

Table 6. Factor Current Status Assessment Scale (Yüksel and Dağdeviren, 2006)

Current Status of Factor	**Value**
Very High (VH)	1.0
High (HG)	0.8
Medium (MD)	0.6
Low (LW)	0.4
Very Low (VL)	0.2
Non-existent (NE)	0.0

As a result of the evaluations conducted by the expert group, the turbulence evaluation results of the environment in which the company operates were given in Table 7. In the first column of Table 7, the factors related to the business environment were given. In the second column, the general weights of the factors were shown. General weights were calculated by Expert Choice (2000) program. In the third column, the current turbulence status of the factors related to the business environment and in the fourth column numerical values corresponding to the current

situation were given. In the last column of the table, the turbulence level of each factor was given. The turbulence level was obtained by multiplying the factor general weights with the scale value.

Table 7. Calculation of turbulence level

Factors	Global weights	Evaluation of Turbulence Situation	Scale Value	Turbulence Level
National political stability (PE1)	0.063	NE	0.0	0.0000
Economic growth (PE2)	0.061	HG	0.8	0.0488
Fiscal policy (PE3)	0.037	HG	0.8	0.0296
Monetary policy (PE4)	0.033	HG	0.8	0.0264
Exchange rates (PE5)	0.025	VH	1.0	0.0250
Interest rates (PE6)	0.038	VH	1.0	0.0380
Intensity of competition (SF1)	0.039	VL	0.2	0.0078
Market entry (SF2)	0.013	NE	0.0	0.0000
Exit from the sector (SF3)	0.013	VH	1.0	0.0130
Supply (SF4)	0.034	HG	0.8	0.0272
Demand pattern (SF5)	0.048	HG	0.8	0.0384
Recovery of debts (FF1)	0.037	VH	1.0	0.0370
Financing charges (FF2)	0.023	VH	1.0	0.0230
Return on investment (FF3)	0.017	MD	0.6	0.0102
Cash flow (FF4	0.055	VH	1.0	0.0550
Profitability (FF5)	0.056	LW	0.4	0.0224
Conflict in the Middle East (IC1)	0.089	HG	0.8	0.0712
Conflict in Syria (IC2)	0.143	VH	1.0	0.1430
USA-Iranian relations (IC3)	0.044	MD	0.6	0.0264
USA-Russia relations (IC4)	0.029	LW	0.4	0.0116
USA-China relations (IC5)	0.068	HG	0.8	0.0544
Russia-Europe relations (IC6)	0.035	LW	0.4	0.0140
		Total degree of turbulence		**0.7224**

In the last row of Table 7, the total turbulence level of the factors related to the operating environment (0.7224) was given. According to the turbulence evaluation levels given in the method part, the value of 0.7224 indicates that the business encounters a very high turbulence.

Performance sensitivity analysis of the model for determining the degree of turbulence recommended in the study was conducted with Expert Choice (2000) program. Figure 2 shows the distribution of the sensitivity analysis of the factors in this study. In Figure 2, it is seen that the distribution of factors has changed according to the criteria of changeability and predictability. This finding indicates that the changeability and predictability criteria, which are determined as turbulence evaluation criteria, are important criteria in determining the degree of turbulence.

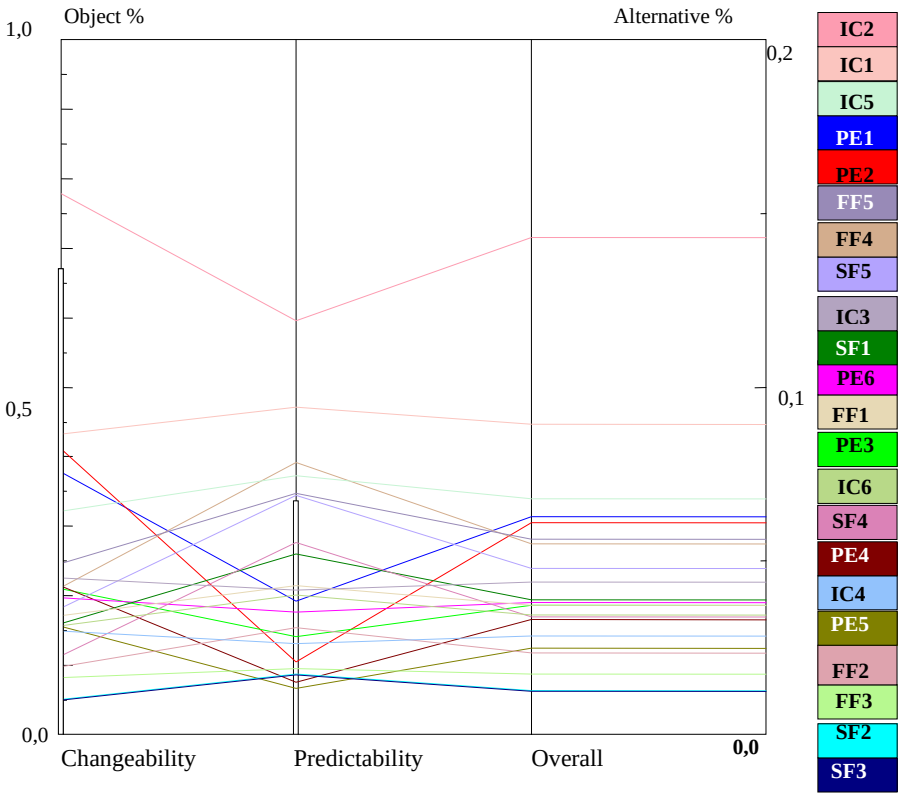

Figure 2. Performance sensitivity for nodes below: Goal: Early Warning for Turbulence

Conclusion

In this study, the turbulence event, which is one of the possible situations that a business may face in the macro and sectoral environment, was analyzed. In the study, turbulence degree was determined by taking the environment in which the business operates as a basis. The model for determining the degree of turbulence includes the external environment of the business. The analytical model for determining the degree of turbulence was structured on the basis of changeability and predictability criteria. The advised AHP model consists of four environmental dimensions representing the external environment of the business. The determined business environment dimensions cover 22 factors. AHP technique that is one of the multi-criteria decision-making techniques, was used in the recommended model. The analytical structure of the model created in this study has a flexible characteristic. It is possible to differentiate the number of factors and sizes according to the sector or business characteristics in which the business operates.

When the results of the study are examined, it is seen that the turbulence situation encountered in the business environment can be detected with the proposed model. In addition to this, the degree of turbulence that the business was exposed could also be calculated. When the results of the study were evaluated broadly, it was determined that the degree of turbulence could be calculated with the proposed model systematically and objectively. The other important result of the study is that the degree of turbulence can be determined in a classifiable way. When the results were examined in detail, it was discovered that the importance levels of the turbulence evaluation criteria could be determined with the recommended approach in this study, which way aimed to determine the turbulence status. Another result of this study is that the weights of the dimensions of the business environment could be calculated. In addition, the weights of the environmental factors covered by the dimensions could be determined. These findings of the study are important data and knowledge that enables the turbulence management of a business. Thanks to this

knowledge, business management functions and activities in conditions of extraordinary environment will be able to be performed easily by the business.

In this study, only turbulence status is researched in terms of the external environment, however, turbulence can be considered in terms of the internal environment also. In other words, the business may be exposed to turbulence in the internal environment. Therefore, evaluations about turbulence should be done in the inner environment also. In future studies, it can be recommended to carry out studies which take the internal environment into account. Another issue is that the correlation between factors is not taken into account in the model for determining the degree of turbulence; however, a relationship between factors that forms the business environment can be expected. Studies on these issues have been designed and continued as studies to be carried out after this paper.

Acknowledgement

The source of this study is a thesis which was done by Kıvanç KÖMÜRCÜ, under the supervision of Assoc. Prof. Dr. İsmail GÖKDENİZ at Kırıkkale University Institute of Social Sciences, Department of Business Administration, Ph.D. program.

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Araştırma Makalesi

An Early Warning Model for Turbulence Management by Using Analytic Hierarchy Process

Analitik Hiyerarşi Sürecini Kullanarak Türbülans Yönetimi İçin Erken Bir Uyarı Modeli

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Genişletilmiş Özet

İşletmenin (business) çevresi işletmenin faaliyetlerini ve dolayısıyla varlığını etkileyen başlıca unsurlardan biridir. Ancak işletme çevresi farklı koşul ve durumları içeren dinamik bir yapıya sahiptir. İşletme çevresinin karakteristiklerden biri olan türbülans koşulları ve durumu işletmenin işlev ve faaliyetlerini etkileyebilmektedir. Türbülans karekteristikleri itibariyle genellikle organizasyonların varlığını sürdürmeye ve büyümesine yönelik tehditler oluşturan yıkıcı ortam ve çevrelerdir. Türbülans organizayon için bir sabit (constant) olarak değerlendirilmektedir (Smart and Vertinsky, 1984). İşletme çevresinin türbülans karakteristikleri işletmeyi stratejik ve operasyonel faaliyet açısından etkileyebilir. Nitekim işletmenin dışsal çevresinden kaynaklanan tehditler ve fırsatların yoğunluğunun türbülans tarafından şekillendiği ifade edilmiştir (Rosca and Moldoveanu, 2009). Organizasyonlarda beklenilmeyen ve rutin olmayan koşulların etkileriyle karşılaşmak örgütün üyelerine, süreçlerine ve çıktılarına zarar vermektedir. Türbülansın etkilerine yönelik yapılan çalışmalarda, türbülans neticesinde oluşan belirsizliğin (uncertainty) bireyler ve organizasyonlar üzerinde olumsuz sonuçlar meydana getirdiği görülmüştür (Cameron, Myung and Whitten, 1987). İşletme çevresinin türbülans koşullarında olması işletmenin işlev ve faaliyetlerinin olağan koşulların dışında gerçekleşmesi ve uygulanmasına neden olmaktadır. Dolayısıyla bir işletmenin türbülans ortamında yönetimi olağan dönem ve koşullarının yapısı ve işleyişi ile olası değildir. En genel anlamda mükemmel bir organizasyon (excellent organization) olsa da türbülans ortamında yönetim meselesinin (issue) farklılaştığı görülmektedir. Türbülans ortamında geleneksel yaklaşımlarla sorununun çözümlenmesi ve mükemmeliyete ulaşmanın olanaklı olmadığı söylenebilir (Metaxas and Koulouriotis, 2014). Yukarıda verilen türbülansa ilişkin karakteristiklerde ifade edildiği üzere türbülans işletme işlev ve faaliyetlerini olumsuz yönde etkileyebilmektedir. Çünkü türbülans doğası gereği işletmenin faaliyetleri açısında karmaşıklık ve belirsizlik içeren bir ortam oluşturmaktadır. İşletme açısından yoğun ve düzensiz bir değişkenliğin yaşandığı türbülans ortamında faaliyetlerinin devamlılığının sağlanması işletme varlığını sürdürmek açısından zorunludur. Bunun gerçekleştirebilmesi işletmen içerisinde bulunduğu çevreye ilişkin mevcut ya da muhtemel türbülans durumunu ve koşullarını öncelikle bilmesi ile mümkün olabilir. Diğer bir ifadeyle işletmenin türbülans yönetimi işletmenin olası türbülans durum ve koşullarının derecesini öngörmesi ile olasıdır. Böylece işletme türbülans durumu ve koşullarının işletme üzerindeki olumsuz etkilerini türbülans yönetimi ile minimize edebilir. Bu nedenle türbülans ortamında işletmenin türbülans yönetimine gösterge olabilecek unsurlardan biri türbülansın ne düzeyde olduğunun bilinmesidir. İşletmenin türbülans çevresinin olağandışı etkileri ile karşılaşmadan ya da karşılaşmış ise türbülans durumunun şiddetini belirlemesi işletmenin türbülans ortamında yönetimini kolaylaştıracaktır. İlgili literatür

incelemesinde bir işletmenin çevresinde karşılaşması olası olan türbülans durumunu ya da derecesini öngörmeye olanak sağlayacak ve böylece erken uyarı işlevi sağlayacak herhangi bir çalışmaya rastlanılmamıştır. Bu çalışmada ilgili yazındaki bu eksikliği gideren ve böylece bir işletmenin türbülans durumunu ve derecesini belirlemeye olanak sağlayacak bir model geliştirilmeye çalışılmıştır.

İşletmenin türbülans koşullarında faaliyetlerinin kesintiye uğramaması ve faaliyetlerin devamlılığını sağlamak işletme için hayati bir zorunluluktur. Bu nedenle işletmenin olası türbülans durum ve koşullarını öngörebilmesi işletmenin yaşamını sürdürmesi açısından önemlidir. Bu çalışmada bir işletmenin makro çevre ve sektörel çevrede karşılaşabileceği türbülans durumunu öngörmeye yönelik bir erken uyarı modeli geliştirilmeye çalışılmıştır. Çalışmada türbülans değerlendirme kriterleri ve işletmenin dış çevresine ilişkin türbülans faktörleri ve belirlenmiştir. İşletme dış çevre faktörleri türbülans koşulları ve durumunu belirleyen kriterlere göre değerlendirilmiştir. Çalışmanın son aşamasında ise işletmenin çevresine ilişkin türbülans derecesi belirlenmiştir. Çalışmada çok ölçütlü karar verme tekniklerinden biri olan Analitik Hiyerarşi Prosesi (analytic hierarchy process) kullanılmıştır. Çalışmanın sonuçlarına göre işletmenin içerisinde bulunduğu çevrenin türbülans düzeyinin % 72.24 olduğu ve bu düzeyin araştırmada kullanılan derecelendirmeye göre çok yüksek sayılabilecek bir seviye olduğu görülmüştür. Çalışmanın sonuçları değerlendirildiğinde çalışmada önerilen model ile bir işletmenin çevresine ilişkin türbülans derecesinin belirlenebildiği görülmüştür. İşletmenin faaliyette gösterdiği çevreye ilişkin türbülans derecesinin bilinmesi türbülans yönetimine olanak sağlayacağı söylenebilir. Çalışmada önerilen türbülans derecesini belirlemeye yönelik modele ilişkin performans duyarlılık analizi Expert Choice (2000) programı ile yapılmıştır. Şekil 2'de bu çalışmanın kapsamındaki faktörlere ilişkin duyarlılık analizine ilişkin dağılım verilmiştir. Şekil 2'de görüldüğü üzere changeability ve predictability kriterlerine göre faktörlerin dağılımının değiştiği görülmektedir. Bu bulgu türbülans değerlendirme kriterleri olarak belirlenmiş olan changeability ve predictability kriterlerinin türbülans derecesini belirlemede anlamlı birer kriter olduğunu göstermektedir.

İşletmenin (business) çevresi işletmenin faaliyetlerini ve dolayısıyla varlığını etkileyen başlıca unsurlardan biridir. Ancak işletme çevresi farklı koşul ve durumları içeren dinamik bir yapıya sahiptir. İşletme çevresinin karakteristiklerden biri olan türbülans koşulları ve durumu işletmenin işlev ve faaliyetlerini etkileyebilmektedir. İşletmenin türbülans koşullarında faaliyetlerinin kesintiye uğramaması ve faaliyetlerin devamlılığını sağlamak işletme için hayati bir zorunluluktur. Bu nedenle işletmenin olası türbülans durum ve koşullarını öngörebilmesi işletmenin yaşamını sürdürmesi açısından önemlidir. Bu çalışmada bir işletmenin makro çevre ve sektörel çevrede karşılaşabileceği türbülans durumunu öngörmeye yönelik bir erken uyarı modeli geliştirilmeye çalışılmıştır. Çalışmada türbülans değerlendirme kriterleri ve işletmenin dış çevresine ilişkin türbülans faktörleri ve belirlenmiştir. İşletme dış çevre faktörleri türbülans koşulları ve durumunu belirleyen kriterlere göre değerlendirilmiştir. Çalışmanın son aşamasında ise işletmenin çevresine ilişkin türbülans derecesi belirlenmiştir. Çalışmada Analitik Hiyerarşi Prosesi tekniği kullanılmıştır. Çalışmanın sonuçlarına göre işletmenin içerisinde bulunduğu çevrenin türbülans düzeyinin % 72.24 olduğu ve bu düzeyin araştırmada kullanılan derecelendirmeye göre çok yüksek sayılabilecek bir seviye olduğu görülmüştür. Çalışmanın sonuçları değerlendirildiğinde çalışmada önerilen model ile bir işletmenin çevresine ilişkin türbülans derecesinin belirlenebildiği görülmüştür. İşletmenin faaliyet gösterdiği çevreye ilişkin türbülans derecesinin bilinmesi türbülans yönetimine olanak sağlayacağı söylenebilir.