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MAKALE

THE MEDIATING EFFECT OF ORGANIZATIONAL COMMITMENT ON RELATIONSHIP BETWEEN FLEXIBLE WORKING AND JOB SATISFACTION: A RESEARCH IN LOGISTICS SECTOR

Fatma TÜRKMEN [1], Nurten POLAT DEDE [2]

Abstract

The competitive environment caused by globalization lead to logistics companies to increase their service quality and implement best practices in order to meet customer demands and to reduce their supply times. The intensity of working hours and difficult working conditions makes the attracting and retaining of talented employees difficult for logistics firms. Therefore, the effect of flexible working arrangements on increasing job satisfaction and employee loyalty in the logistics sector becomes important. In this study, the effect of flexible working on employee's job satisfaction and the mediating role of organizational commitment in this effect were investigated. In the research, 82 employees' data used from 10 leading companies in their sectors implementing flexible working arrangements and the data were analyzed using SPSS 25.0 program. Flexible Working Scale developed by Albion (2004), Organizational Commitment Scale developed by Allen and Meyer (1990), Minnesota Job Satisfaction Scale developed by Weiss et al. (1967) were used to measure the attitudes of the employees. Research results show that there is a positive and meaningful relationship between flexible working and job satisfaction, between job satisfaction and organizational commitment. Furthermore, the results have shown that organizational commitment has a mediating role between flexible working and job satisfaction. In other words, as organizational commitment mediates in the relationship between flexible working and job satisfaction, as organizational commitment increases, job satisfaction also increases.

Keywords: Flexible Working, HRM in Logistics Sector, Job Satisfaction, Organizational Commitment
JEL Classification: J24, J28, J41,M51, M54

ÖRGÜTSEL BAĞLILIĞIN ESNEK ÇALIŞMA VE İŞ DOYUMU İLİŞKİSİNDEKİ ARACILIK ETKİSİ: LOJİSTİK SEKTÖRÜNDE BİR ARAŞTIRMA

Fatma TÜRKMEN, Nurten POLAT DEDE

Öz

Globalleşme ile artan rekabet ortamı lojistik firmalarının hizmet kalitelerini arttırmalarını ve tedarik sürelerinin azalması yönündeki müşteri taleplerini karşılayacak düzenlemeleri hayata geçirmelerine neden olmaktadır. Çalışma sürelerinin yoğunluğu, iş koşullarının zorluğu, yüksek turnover oranları, yetkin çalışanların bulunması ve tutundurulmasını güçleştirmektedir. Bu nedenle esnek çalışma düzenlemelerinin lojistik sektöründe iş doyumu ve çalışan bağlılığının arttırılmasındaki etkisi önem kazanmaktadır.

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Bu araştırmada esnek çalışmanın, çalışanın iş doyumuna etkisi ve bu etkide, örgütsel bağlılığın aracılık rolü araştırılmıştır. Araştırmada, esnek çalışma düzenlemelerini uygulayan sektörlerinde lider 10 şirketin 82 çalışanından bilgi formu ile değerlendirmeleri alınmış ve alınan bilgiler SPSS 25.0 programı kullanılarak analiz edilmiştir. Araştırmada çalışanların tutumlarını ölçmek için, Albion (2004) tarafından geliştirilen Esnek Çalışma Ölçeği, Allen ve Meyer (1990) tarafından geliştirilen 'Örgütsel Bağlılık Ölçeği', Weiss ve arkadaşları (1967) tarafından geliştirilen 'Minnesota İş Doyum Ölçeği' kullanılmıştır. Araştırma sonucuna dayanarak, esnek çalışma ile iş doyumu ve örgütsel bağlılık arasında, iş doyumu ile örgütsel bağlılık arasında pozitif bir ilişki tespit edilmiştir. Ayrıca, esnek çalışmanın, iş doyumu üzerindeki etkisinde, örgütsel bağlılığın aracılık rolü tespit edilmiştir. Başka bir deyişle, örgütsel bağlılık, esnek çalışma ve iş doyumu ilişkisinde aracıdır, örgütsel bağlılık arttıkça iş doyumu da artar.

Anahtar Sözcükler: Esnek Çalışma, Lojistik Sektöründe İKY, İş Doyumu, Örgütsel Bağlılık

Jel Sınıflaması: J24, J28, J41,M51, M54

1. Introduction

While flexible working arrangements continue to spread rapidly in developed countries, they have started to be introduced in many areas in developing countries. It is recognized that working hours and regulations in the workplace have a positive impact on business performance in terms of innovation, finance and even competition. Especially for the new generation, high technology-oriented, enterprises establishing flexible working arrangements will be the priority in preference.

Increasing trade volume with globalization has enlarged importance of logistics business for companies in the last few decades and has led to the rapid growth of companies operating in this field. Logistic activities are becoming more critical both in terms of competition and cost. Turkey, with intercontinental location has an important potential in this area. In addition to product and service quality, thanks to technological infrastructure, fast transfer, storing and customer satisfaction issues have become more important for companies. The necessity of long and intensive work hours for these activities is one of the most important features of this sector. Finding and retaining qualified employees to work in these conditions is one of the challenges of the sector. Therefore in this area with further growth potential, it is inevitable to adapt flexible working models in order to employ technology-oriented talented young people of our age.

In this study; the effects of flexible working on organizational commitment and job satisfaction and the role of organizational commitment in the relationship between flexible working and job satisfaction were examined.

In the first part of the study, flexible working and flexible working models, in the second part, the concept of job satisfaction, job satisfaction approaches and the factors affecting job satisfaction are discussed. In the third section, the concept of organizational commitment and organizational commitment approaches are explained as a result of the literature study. In the fourth section, the research section of the study is located. In this section, the validity and reliability of the data were analyzed and the degree and direction of the relationship between the variables were determined, and statistical results were given in detail. The study was completed with the results section where the data were evaluated.

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2. Flexible working

2.1 Flexible Working Concept

Flexibility can be defined as the capacity to adapt to change. In other words, an ability to respond to change (Michon, 1987), can be defined as the ability of a system and its subsystems to respond to needs (Boyer, 1990)

Atkinson in the definition of "dynamic flexibility"; changes in institutional, cultural and other social or economic regulations and practices that make the capacity to respond to change persistent and permanent (Atkinson, 1987).

Flexibility in business literature; refers to flexible arrangements both in organizational structuring and working conditions and in career planning and wage system (Seyyar & Öz, 2007).

Flexibility in working life can be explained as the ability to adjust and adapt to developments and changes in economic, technological and other areas of life (Günay, 2004). In this respect, it is also possible to define flexibility not only as non-standard practices (new working models or changing working hours), but also as a new perspective on labour laws and practices through the fundamental changes required by the era (Ekin, 1999). However, it is considered as a current and important tool which is a remedy to unemployment and as an agreement and solution arising from the reconciliation of workers and employers during the difficult times of working life (Karakoyunlu, 1999).

As in many other innovations, emergency of flexible working models have been caused by changes in production processes and technology.These debates started especially after the economic and technological transformation and became widespread especially in the years of the 1973 Oil Crisis (Yavuz, 1995). The need to adapt to developments has led enterprises to renew themselves in production and employment processes and move to a more flexible management system (Günay, 2004).

With the effect of these policies, globalization gained momentum in the 1980s and the liberalization of capital markets and international trade, the flexibility of labor markets, the reduction of social expenditures, the reduction of taxes and the support of the private sector were taken as basis. In this period, rapid change in technology and automation in production increased.

As a result of technological developments and growing markets and production increase, the necessity of continuous production in enterprises has required a full-time work.

Flexible working models meet the needs of working life arising from economic and technological developments while helping to establish the balance between work and family (Stone, 2004).

Nowadays, the term "non-standard employment" is used more than the term "flexible employment". Non-standard employment represent that this type of work becomes an obligation for the employer rather than an option (Stone, 2004). For trade unions, flexibility means less job security, less wages and worse working conditions (Burchell, Ladipo, & Wilkinson, 2002).

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According to this approach, flexible working arrangements will negatively affect trade union relations and ease of making arrangements in working conditions that are not in favor of employees will be provided. (Gilmore & Williams, 2009).

2.2 Types of Flexible Working

There are various studies on the subject in the literature. One of these studies is used as internal and external flexibility (Atkinson, 1987) and (Rubery, Tarling, & Wilkinson, 1987). Internal and external flexibility is also called functional and numerical flexibility. Wage flexibility and exclusion strategies were then added to this grouping. Meulders and Wilkin also offer a model of flexibility, which is similar but includes different categories

(Meulders & Wilkin, 1987). In this model, wage and numerical flexibility are the same as those of Atkinson's model. Although similar to Atkinson's model, the third model has a wider scope with the newly added technical and organizational part (Meulders & Wilkin, 1987). Working hours flexibility is also included in this model.

Taking these criticisms into consideration, new models have been developed to simplify this complexity associated with flexible working. Standing is one of those who propose a new model. Considering globalization, technological change and economic restructuring, Standing develops a flexibility model that includes five different types of flexibility: production or organizational flexibility, wage system flexibility, labor cost flexibility, business process flexibility (functional flexibility), business structure flexibility. Besides, Benner has divided flexibility into work flexibility and employment flexibility (Benner, 2002). Benner’s flexibility in work expresses his ability to adapt to changes in production, employment and knowledge. Benner's employment flexibility, by contrast, refers to forms of employment (such as part-time, temporary and fixed-term employment, outsourcing, and employment agencies).

2.3.Flexible Working Models

Especially in developed countries, it is seen that different flexible working models are widely applied. Among the most common flexible working models in terms of working place, working time and working style; tele-work, work at home, part-time work, flexi-time, on-call work, sub-contracting, subordinate work, loan work relationship, intensified weekly work, temporary work relationship (periodic work), job sharing, shift work, short work. Among these, part-time work is the most well-known and oldest flexible work model. And also the most common and applied flexible work arrangement is working at home. On the other hand, tele-work offers more opportunities for women, the disabled, the elderly and retired employees and at the same time contributes to the establishment of work-family balance.

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3. Job satisfaction

Job satisfaction is; satisfaction of the individual as a result of harmony with his / her work and workplace and also can be expressed as a positive attitude towards work (Karcıoğlu, Timuroğlu, & Çınar, 2009).

The first studies in this area began with Elton Mayo's Hawthorne research in the 1930s, and in the 1943s Maslow touched upon the relationship between satisfying needs and job satisfaction. Many researchers have tried to explain the job satisfaction.

According to Keith Davis, job satisfaction is the satisfaction or dissatisfaction of employees with their work (Davis, 1988). Hackman and Oldham define job satisfaction as the happiness of individuals from the work they do or satisfaction from the services they receive. Vroom defined job satisfaction as a pleasant or positive emotional state resulting from evaluating one's work or work experience (Ardıç & Baş, 2001). Steers and Black defined job satisfaction as follows; a pleasant or positive emotional state resulting from a person's assessment of his or her work or experience (Steers & Black, 1994). Kalleberg defines job satisfaction as the general emotional orientation of employees towards their workplace tasks (Kalleberg, 1977) as Bartel describes all of the employee's work emotions as a whole (Bartel, 1981). According to Bennett, job satisfaction refers to the level of positive perception of employees' work (Bennett, 1994). In addition to these approaches about job satisfaction, Beer's definition of job satisfaction reveals a broader scope. According to Beer, job satisfaction is attitude of employees towards workplaces, jobs, colleagues and other psychological objects in the workplace. A positive attitude to these elements indicates job satisfaction and a negative attitude to job dissatisfaction (Beer, 1964).

3.1.Importance of Job Satisfaction

Satisfaction or dissatisfaction has consequences that affect both employees and organizations as well as society. Employees' job satisfaction is positively reflected both to their happiness, to their organization and to society. Otherwise, it may lead to employee burnout, organizational conflicts and even negative consequences such as having unhappy citizens for the society. Job satisfaction affects the individual's entire life satisfaction.

It has been evaluated that the employee with high job satisfaction will contribute positively to the organization and the employees with low job satisfaction will harm the organization with situations such as not coming to work with excuses, indifference to work, ignoring the rules and values of the workplace and expressing complaints continuously. It is seen that job satisfaction is very important for the continuity of the organization, achieving its targets and performance in an environment where competition conditions are increasing (Akat & Budak, 2002).

3.2.Job Satisfaction Approaches

Approaches explaining job satisfaction can be summarized as content and process motivations.

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Content Approaches: Maslow's Hierarchy of Needs, Herzberg's "Double Factor Theory", Alderfer's "ERG Theory" which work on factors that influence and direct human behaviors and argue that this is the desire of people to satisfy needs and desires.

McClelland's "Need for Success" and Fromm's "Theory of Needs" are theories working on the factors that influence and direct human behavior and advocate that it is the desire of people to satisfy their needs and desires.

Process Approaches: Process approaches explain the external factors that lead the individual to certain behaviors. Since they do not cover the motives and needs underlying the behaviors and motivations exhibited, they are composed of external factors given to the individual from the outside (Koçel, 2007).

Process Theories concentrate on specific psychological processes under behavior and the contınuum of perceiving actions that affect behavior (Schermerhorn & Bond, 1997). Vroom's Expectation / Hope Theory ", Porter and Lawler's ekl Expectation Theory", Adams's "Rightness / Equality Theory" and Locke's "Diversity / Purpose Management Theory" approaches.

3.3.Factors Affecting Job Satisfaction

Job satisfaction is an important factor that directly affects employee performance. However, job satisfaction varies from person to person. Employees are motivated by different issues, some are affected by wages, some are affected by promotion, others are affected by working conditions and workplace relations in workplace and social factors. On the other hand, the job itself has been identified as the most affecting dimension of job satisfaction (Meral, 2018). Factors affecting job satisfaction are grouped under two headings.

Individual Factors Affecting Job Satisfaction: Personality traits, age, gender, marital status, education, occupation, seniority, status and socio-cultural environment are listed as accuracy and trust.

Organizational Factors Affecting Job Satisfaction: In addition to personal factors, a number of organizational factors are effective in the job satisfaction of the individual. Job itself, wage, promotion, working conditions, behaviors of colleagues, manager relations, communication, feedback, job security, decision making practices, equal rewards, appropriate working environment are among these factors.

3.4. Results of Job Dissatisfaction

Job dissatisfaction leads to the following disadvantages:

Decrease in Performance: The employee in this situation cannot make the necessary contribution willingly or unwillingly, wastes time on different subjects by disrupting his / her job and the quality of service decreases.

Increasing Disruptive Behaviors: Knowingly and voluntarily damaging the organization, obeying the rules, exhibiting aggressive behaviors to their superiors and colleagues cause destructive behaviors.

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Absenteeism, Increasing Tendency to Work and Leaving Work: Increasing willingness to leave, coming or not coming to work, increasing labor turnover rate and consequently increasing costs.

Employee Moral Deterioration: This leads to employee morale deterioration and therefore inefficient work.

Health Expenditures: Psychology leads to disorders and health problems and thus health costs increase.

Stress: Job dissatisfaction and uncertainty cause stress and lead to health problems such as burnout syndrome.

4. Organizational Commitment

Organizational commitment can be defined as the degree to which the employee adopts the aims and norms of the organization and the affective commitment he / she feels towards the organization and the desire to stay in the organization.

According to Gouldner (1960), organizational commitment is conceptualized as a one-dimensional and homogeneous structure. However, organizational commitment is not homogeneous nor a dimensionless variable, but rather multidimensional. In general, organizational behavior theorists focus on the attitudinal dimension of commitment, and social psychologists focus on the behavioral dimension of commitment and conduct research according to these two different perspectives.

In the multi-loyalty approaches, both behavioral and loyalty approaches are used. Although the values of each of the factor in the multi-loyalty approach are different for the individual, the structure of the personality and so on. Attitude towards each of them is different with the effect of individual characteristics (Bakır, 2013).

4.1.Factors Affecting Organizational Commitment

When the studies on the subject are examined, it is seen that different groupings are made, but the most common one is grouping as individual, organizational and non-organizational factors.

Individual Factors: More personal characteristics (gender, marital status, age, position, education, etc.) come to the forefront.

Organizational Factors: The feature and importance of the work, management and leadership style, organizational culture, wage justice, organizational climate, organizational trust, human resources management practices, audits, rewards, penalties if any, teamwork, role ambiguity and role conflict are expressed (Gündoğan, 2009).

Non-Organizational Factors: Depending on economic conditions, country conditions such as unemployment rate and the possibility of finding a job are the factors that affect employee loyalty (Gündoğan, 2009).

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4.2.Organizational Commitment Approaches

Allen and Meyer, March and Simon, Mowday, Steers and Porter, Boulian, while explaining commitment in terms of attitude, Becker, Staw, Salanick discussed the behavior of commitment. In later periods, as the third species, Reichers developed a multi-loyalty approach.

4.3.Results Of Organızatıonal Commitment

The most basic results of the level of organizational commitment; can be divided into two positive and negative results. The various consequences of organizational commitment are assessed below.

Organizational Commitment and Performance:

Employees with a high commitment to the organization are expected to increase their performance as they have a high sense of responsibility and will be more diligent with their job awareness. (Mathieu & Zajac, 1990).In addition, there should be supportive factors such as employee personality traits, reward approach, and sense of equality.

Organizational Commitment and Intention to Leave: There is an inverse relationship between intention to quit and commitment to the organization. As the commitment increases, the rate of turnover decreases.

Organizational Commitment and Stress: Low level of organizational commitment and stressful working environment can cause job dissatisfaction and even quitting (Mathieu & Zajac, 1990).

Organizational Commitment and Absenteeism: As an employee's negative behavior; it is defined as not coming to work during norma**l working hours. Employees with strong organizational ties do not exhibit such negative behavior.**

4.4.Organizational Commitment And Job Satisfaction

While organizational commitment has positive emotions and attitudes towards the organization of the employee, job satisfaction can be expressed as the relationship between the employee and the business environment. Also job satisfaction is one of the important factors leading to organizational commitment (Meral, 2018).

Porter, Steers, Mowday, Boulian, and Steven (1978) conducted a study on job satisfaction and organizational commitment, and as a result of the research, they obtained a linear relationship between these two variables. It is stated that if employees' perception of job satisfaction is high, their organizational commitment will be high.

McIntyre et al; (2002) conducted a study examining organizational commitment and job satisfaction in the working group. Similarly, they found that job satisfaction had a significant and strong impact on organizational commitment.

5. Research Methodology

In this section, the purpose, model, method and findings of the research are given.

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5.1.Purpose of The Research

The main purpose of this study is to determine the effect of flexible working on job satisfaction and the role of organizational commitment in this effect. In addition to this basic purpose, the participants' perception of flexible working; attitudes towards job satisfaction and organizational commitment; The relationships between flexible working, job satisfaction and organizational commitment were also investigated.

5.2.Research Model

The model of the research is given in Figure 1.

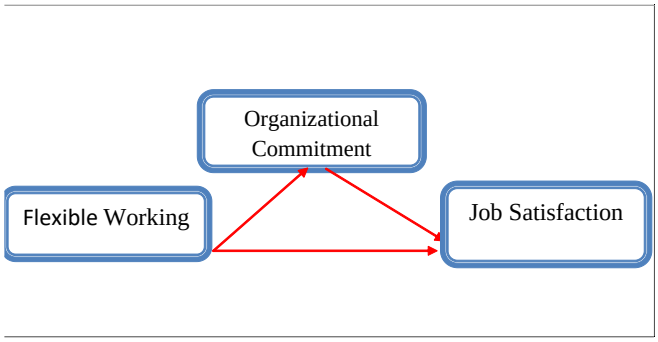

Figure 1. The model of the research

5.3.Hypotheses of The Research

The hypotheses of the research are as follows:

H1: Flexible working positively affects employees' commitment to the organization.

H2: Flexible working positively affects the job satisfaction of the employees.

H3: Organizational commitment has a mediating role in the effect of flexible working on job satisfaction.

5.4.Scales Used in The Study

The Flexible working Scale developed by (Albion, 2004) was used to determine the attitudes and perceptions of employees regarding flexible working arrangements.

Organizational Commitment Scale developed by Allen and Meyer (1990) used to measure the organizational commitment of the employees was used.

The Minnesota Job Satisfaction Scale (Weiss, Dawis, England, & Lofquist, 1967) developed by Weiss et al. (1967) to measure job satisfaction was used.

5.5.Activities For Providing Validity And Reliability

Factor analysis was applied to the scales used in the study to determine the factor structures and structure validity has been revealed.

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Factor analysis is a multivariate statistical analysis aimed at obtaining a small number of identifiable and significant variables from multiple variables measuring the same structure (Büyüköztürk, 2011).

In this context, principal components and varimax rotation methods have been used because of the fact that the factors are suggested in the analyzes based on the idea that they are related to each other. In order to determine whether the scales have internal consistency, reliability analysis was performed and Cronbach's Alpha reliability values were calculated for overall reliability and reliability of the sub-dimensions.

Correlation matrix, Barlett test and Kaiser-Meyer Olkin test are used to assess the suitability of the data set for factor analysis.

If the p value of Barlett test is $p < 0.05$, it is accepted that there is a relationship between the variables (Büyüköztürk, 2011). KMO sampling adequacy tests the correlation between the variables and factor analysis and the lowest acceptable limit is 0.50. Generally accepted KMO values and comments are as follows: (0.5-weak, 0.6-medium, 0.7-good, 0.8-very good, 0.9-excellent)

5.6.Validity Analysis of Scales

Flexible Working Scale: The KMO value was found to be 0.766 and the Bartlett sphericity test was over 0.50 and 0.05 significance level, so the data set was found to be suitable for factor analysis. It is based on the criterion that the variance explanation ratio is 0.50 and above. Total explained variance was found as 62,760%. The reliability of the scale in the work life balance subscale was 0.892, it was found to be very reliable, the reliability of the barriers subscale was 0.760 and the scale was found to be reliable. The Cronbach's Alpha value indicates that the scale has internal consistency.

Organizational Commitment Scale: The KMO value was found to be 0.828, and since Bartlett's sphericity test was over 0.50 and it was significant at a significance level of 0.05, the data set was found to be appropriate for factor analysis. Total explained variance was found as 66,740%. The reliability of the scale in the affective commitment sub-dimension was 0.933, it was found to be perfectly reliable, its reliability in the continuation commitment sub-dimension was 0.619, and it was found to be moderately reliable, the reliability of the normative commitment sub-dimension was 0.572 and remained below the acceptable value of 0.6. Accordingly, only the variables of affective commitment and continuation commitment were included in the study.

Job Satisfaction Scale: The KMO value was found to be 0.842, which is the acceptable limit. The KMO coefficient found shows that the data are suitable for analysis. It is based on the criterion that the variance explanation ratio is 0.50 and above. Total explained variance was found to be 69,497%. The internal consistency coefficient Cronbach mads Alpha value was calculated to calculate the reliability of the 20 items in the scale. The reliability of the external saturation subscale of the scale was 0.891, it was found to be highly reliable, the reliability of the internal saturation subscale was 0.875 and the scale was found to be very reliable.

According to the results of exploratory factor analysis, there are two factors with eigenvalue greater than 1. Accordingly, it was determined that the scale consisted of two dimensions. The Cronbach's Alpha value indicates that the scale has internal consistency.

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5.7.Methodology

Quantitative analysis method was used for data analysis. The method of quantitative analysis is described as analysis of the data collected for the purposes of the research by making a statistical analysis and thus reaching the findings (Dawson, 2015). For this purpose, Statistical Program for Social Scientists (SPSS 25.0) was used.

The main focus of the research is all flexible working employees. However, since it is not possible to reach all of them, the employees of the institutions with flexible working practices that can be reached and obtained permission were taken as samples.

The research was carried out with 82 information forms that were accessed and received by e-mail, online login or printout from the employees who were contacted and wished to participate.

The 82 questionnaires obtained as a result of the study performed by easy sampling method are suitable for acceptable sample sizes (Altunışık, 2010).

The descriptive analyzes of the research were carried out with descriptive methods such as median, standard deviation, frequency and percentage. Pearson Correlation analysis and linear regression analysis were used to determine relationships and effects. Intermediary variable analysis was based on Baron and Kenny's mediation effect analysis method. Sobel test statistic was used to test whether the role of the mediator variable was significant in predicting the dependent variable of the independent variable. The significance level of all analyzes was $p < 0.05$; confidence interval was accepted as 95%.

Correlation and regression analyzes were performed by examining the skewness and kurtosis values of the distribution of normality.

In the studies carried out in social sciences, instead of Shapiro Wilk and similar normality tests, it is suggested that these values should be examined and these values should be in the range of ± 1, 50 and interpreted as normal distribution (Tabachnick & Fidell, 2013). All skewness kurtosis values obtained in the study were within the range of ± 1, 50 (Table 1.).

Table 1. Skewness Kurtosis Values

Scale / Sub Dimension	skewness	kurtosis
Flexible working		
Work-Life Balance	-0,838	0,841
Barriers	-0,363	-0,067
Organizational Commitment		
Affective C.	-0,718	0,177
Continuance C	-0,362	-0,116
Job Satisfaction		
İnternal JS	-0,434	-0,449
External JS	-0,491	-0,170

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6. Findings

In this section, the findings obtained as a result of the analysis of the data are presented as subheadings.

6.1.Demographic Findings

In this section, the findings obtained as a result of the analysis of the data are presented as subheadings. Findings related to gender, age, education and marital status of the participants are given below.

A total of 82 employees, 62 (75.6%) male and 20 (24.4%) female, participated in the study. According to age groups, 25.6% of participants were under 20 years old, 14.6% between 20-30 years old, 34%, between 31-40 years old, 23.2% between 41-50 years old and 2, 4% are 51 years and older.

45,1% of the participants are high school / vocational high school graduates, 32,9% are university graduates, 20,7 % are master degree and 1.2% are PhD graduates. Again, 63.4% of the participants were married, 36.4% were single and 42.7% had no children; 22% have one, 29% have two, 6% have more than 2 children. Accordingly, 26.8% of the participants had less than 5 years, 25% years of 5-10 years, 14% years of 11-15 years and 32%, of them had a total seniority of 16 years and over.

41.5% of the participants are Factory employee, 34.1% are General Directorate employee , 13.4% are Branches or Offices employee and 11% are Regional Directorates employee.

When the monthly salary are examined, 50% of the participants are receiving 2.200-5.000 TL, 35% of 5.000-10.000 TL, 11% are receiving more than 10.000 TL and 2.6% of them have minimum wage.

6.2.Relationships between Flexible Work, Job Satisfaction and Organizational Commitment

Correlation findings showing the relationships between flexible work, job satisfaction and organizational commitment are given in Table 2.

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Table 2. Correlation Findings between Flexible Working, Job Satisfaction and Organizational Commitment

		1	2	3	4	5	6
Flexible working	**r**	1	0,197	0,199	,283**	,400**	,276*
(Work-Life Balance)	**p**		0,076	0,074	0,010	0,000	0,012
Flexible working	**r**		1	0,107	0,133	,290**	0,096
(Barriers)	**p**			0,337	0,232	0,008	0,393
Job Satisfaction (External)	**r**			1	,572**	,413**	,259*
	p				0,000	0,000	0,019
Job Satisfaction (İnternal)	**r**				1	,551**	,386**
	p					0,000	0,000
Organizational	**r**					1	,316**
Commitment (Affective)	**p**						0,004
Organizational	**r**						1
Commitment (Continuance)	**p**						

** Correlation is significant at p <0.05.*

*** Correlation is significant at p <0.01.*

According to the analysis results;

There is a significant (p <0.05), positive and low (r = 0.283; r = 0.276) relationship between Flexible Working (Work-Life Balance) and internal Job Satisfaction and continuance commitment. Flexible working (Work-Life Balance) had a significant (p <0.05), positive and moderate (r = 0.400) relationship with affective commitment. In this case, as the work-life balance increases, internal job satisfaction and continuance commitment increases at a lower level, while affective commitment increases moderately.

There is a significant (p <0.05), positive and low (r = 0.290) relationship between Flexible Working (Barriers) and affective commitment. Affective commitment increases as flexible working does not interfere with career development and job relationships.

There is a significant (p <0.05), positive and moderate (r = 0.572; r = 0.413) relationship between external job satisfaction and internal job satisfaction and affective commitment. There was a significant (p <0.05), positive and low (r = 0.259) relationship between external job satisfaction and continuance commitment. As external job satisfaction increases, internal job satisfaction and affective commitment increase moderately, while continuance commitment increases at a low level.

- There is a significant (p <0.05), positive and moderate (r = 0.316) relationship between affective commitment and continuation commitment. As affective commitment increases, continuity commitment increases.

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6.3.The Effect of Flexible working on Organizational Commitment

Table 3. presents the regression findings that demonstrate the impact of Flexible Working on Organizational Commitment.

Table 3. The Effect of Flexible Working on Organizational Commitment

Regression Model (r=0, 430; r2=0, 185 F=18, 126; p=0, 000)	Non-Standardized Parameters		Standardized Parameters	t	p
	B	standard error	ß		
Constant	2,063	0, 405		5, 096	0, 000
Flexible working	0, 450	0, 106	0, 430	4, 257	0, 000

* Dependent Variable: Organizational Commitment

Accordingly, flexible working has a significant effect on affective commitment (t = 4,257; p = 0,000). The regression equation between flexible working (X) and organizational commitment (Y) was found to be Y = 2,063 + 0,450X.

Flexible working, which is an independent variable, explains 18.5% of the organizational commitment which is a dependent variable. Based on this result, the hypothesis "H1:" Flexible working positively affects employees' commitment to the organization "is not statistically rejected.

6.4.The Effect of Flexible Working on Job Satisfaction

Table 4. shows the regression findings showing the effect of flexible working on job satisfaction.

Table 4. The Effect of Flexible Working on Job Satisfaction

Regression Model (r=0, 265; r2=0, 070 F=6,021; p=0, 016)	Non-Standardized Parameters		Standardized Parameters	t	p
	B	S. Error	ß		
Constant	2,231	0,501		4,458	0,000
Flexible working	0,321	0,131	0,265	2,454	0,016

Dependent Variable: Job Satisfaction

Accordingly, flexible working has a significant effect on job satisfaction (t = 2,454; p = 0, 016). The regression equation between flexible working (X) and job satisfaction (Y) was found to be Y = 2,454 + 0, 321X. In addition, the variance (r2) explained by the variables on each other is 7%.

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Based on this result, the hypothesis "H2: Flexible working positively affects the job satisfaction of employees is not statistically rejected.

The following results were obtained from our analyzes created to test the mediating role of organizational commitment in the effect of flexible working on job satisfaction.

According to the results of the regression analysis indicated in Table 4., the effect of flexible working on job satisfaction was found to be significant (B = 0.321; Beta = 0.265; p = 0.016).

According to the results of the regression analysis indicated in Table 3., the effect of flexible working on organizational commitment was found to be significant (B = 0.450; Beta = 0.430; p = 0.000).

6.5 The Mediating Effect Of Organizational Commitment On Relationship Between Flexible Working And Job Satisfaction

In order for the final requirement of the model to be realized, when flexible working and organizational commitment are included in the analysis, the impact of flexible working on job satisfaction should be reduced or completely eliminated. To determine this condition, multiple regression analysis in Table 5. was performed.

Table 5. The Result Of Multiple Regression Analysis Examining The Mediating Role Of Organizational Commitment on relationship between Flexible Working and Job Satisfaction

Regression Model (r=0,556; r2=0,309 F=17,699; p=0,000)	Non-Standardized Parameters		Standardized Parameters	t	p
	B	S. Hata	ß		
Constant	0,937	0,500		1,876	0,064
Organizational Com.	0,627	0,120	0,542	5,234	0,000
Flexible working	0,038	0,126	0,032	0,306	0,761

Regression analysis to determine the mediating role of Organizational Commitment in the relationship between Flexible Working and Job Satisfaction was found to be statistically significant (F = 17,699; p = 0,000). When the independent variables, Flexible Working and Organizational Commitment were analyzed, it was seen that Organizational Commitment was significant (t = 5.234, p = 0.000), but Flexible Working was not significant (t = 0.306, p = 0.761). In this case, with the addition of Organizational Commitment, the relationship between Flexible Working and Job Satisfaction turned out to be meaningless. Therefore, Organizational Commitment mediates in the relationship between, Flexible Working and Job Satisfaction.

Based on the findings, the hypothesis "H3: Organizational Commitment has a mediating role in the effect of Flexible Working on Job Satisfaction is not statistically rejected.

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6.6.Summary

The findings of the effects of flexible working on the organizational commitment and job satisfaction and mediating role of Organizational Commitment are summarized in Figure 2.

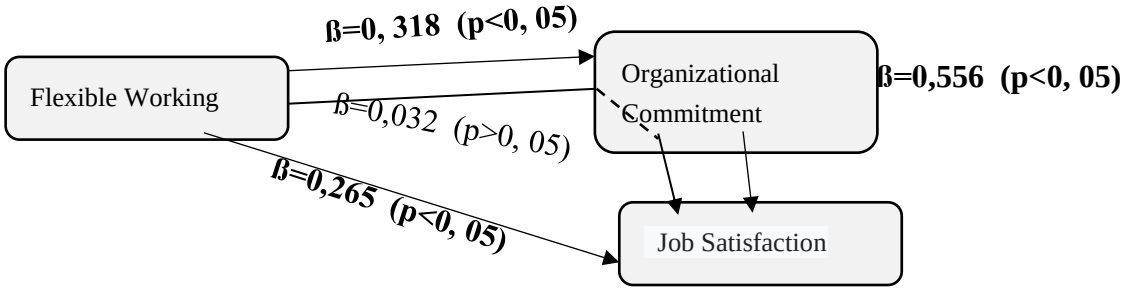

Figure 2. Research Summary (The Effect of Flexible Work on Organizational Commitment and Job Satisfaction and Intermediation Role of Organizational Commitment)

6.7.Analysis of Flexible Working, Organizational Commitment and Job Satisfaction According to Demographic Variables

In this section, whether flexible working, organizational commitment and job satisfaction differ significantly or not according to demographic variables are examined under subheadings.

In order to determine the relationship between socio-demographic characteristics of the participants and the variables of the research, difference analyzes were conducted. One-way analysis of variance (One-Way ANOVA) was used to determine the difference between the groups in the comparison of quantitative data.

Gender: When the group averages are considered, it is seen that women's perception of flexible working is not an obstacle in terms of career development and job relationships and job satisfaction is higher.

Age; Flexible working and organizational commitment did not differ significantly by age (p> 0, 05). However, job satisfaction showed a significant difference according to age (p <0.05). As a result of the multiple comparison (post-hoc) test, it was found that job satisfaction of participants aged 20 years and younger was higher than that of participants aged 31-40 years.

Educational Status; Organizational commitment did not differ significantly according to educational status (p> 0, 05). However, flexible working and job satisfaction showed a significant difference according to education level (p <0, 05). As a result of the multiple comparison (post-hoc) test, it was found that the positive perceptions and job satisfaction of university graduates and upper were higher than those of high school and vocational high school graduates.

Marital status; Flexible Working, Organizational Commitment and Job Satisfaction perceptions did not differ according to marital status (p> 0, 05).

Total Seniority; Flexible Working, Organizational Commitment and Job Satisfaction perceptions did not differ according to seniority (p> 0, 05).

Seniority; Flexible Working, Organizational Commitment and Job Satisfaction perceptions did not differ according to seniority (p> 0, 05).

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Place of Work: The positive perception of Flexible Working and Job Satisfaction of employees in Regional Directorate and General Directorate were significantly higher than those of Factory employees (p <0, 05).

7. Conclusion

Globalization, intense economic competition, and change in information and production technologies affect both employees and businesses. Employers aim to increase their employees productivity, efficiency and loyalty by providing better working conditions to their employees, through flexible working arrangements.

Starting from this, 82 employees participated in this study which was conducted to determine the effect of flexible working on job satisfaction and organizational commitment and the role of organizational commitment in the relationship between flexible working and job satisfaction. Employees include participants of all ages, from 20 years of age and over to 50 years and older. Among the participants, every level of education from high school graduates to doctoral graduates is represented and 55% of them are at least university graduated or higher educated. In addition, when marital status is examined, two thirds of the respondents are married and approximately 60% have children.

Approximately half of the participants have a total seniority year of less than 10 years and half of them have more than 10 years.

Seniority in the workplaces they work for is less than 5 years in half of the participants and 5 years and over in the other half. In addition, approximately 60% work in the Head Office, Regional Directorate and Branches / Offices. The monthly fee is between 2,200-5,000 TL in half of the participants. The minimum wage is only 2.6%. The remaining participants receive a monthly salary of more than TL 5,000. In addition, approximately 35% of the participants can determine their working hours themselves and already benefit from the flexibility of the workplace. The ratio of those who do not benefit from them is about 40% for working hours and about 33% for working place.

The first result of the research is that employees have a positive attitude towards flexible working arrangements. The participants think that flexible working arrangements in general contribute to the work - life balance and do not create career obstacles in working life and obstacles in relations with managers and colleagues. In particular, they believe that flexible working arrangements play an important role in fulfilling family responsibilities, being more committed to workplace tasks and balancing life responsibilities.

In addition, when the relationships between flexible working, job satisfaction and organizational commitment were examined, important results were obtained. First, with flexible working; There was a statistically low positive correlation between job satisfaction (p <0.05) and a statistically moderate positive correlation between organizational commitment. As a matter of fact, 8% of job satisfaction; 18.5% of the organizational commitment can be caused by flexible working. Therefore, it was concluded that flexible working arrangements had a significant effect on both job satisfaction and organizational commitment levels.

Regarding the mediation role of Organizational Commitment, it is concluded that organizational commitment is mediating role in the effect of flexible working on job satisfaction.

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This is because the relationship between flexible working and job satisfaction has become statistically insignificant with the inclusion of organizational commitment. Therefore, organizational commitment has a mediating role in the effect of flexible working on job satisfaction, and organizational commitment has been found to be complete mediator ” variable in this relationship**.** In summary, while flexible working increases job satisfaction and organizational commitment, the increase in organizational commitment increases job satisfaction.

Flexible working, organizational commitment and job satisfaction showed significant differences with respect to demographic variables.

In terms of **Flexible Working** perception; there is no significant difference according to gender, age, marital status and seniority (p> 0.05). However, positive evaluations regarding flexible work are higher for employees who have bachelor's degree or higher than those who have graduated from High School and Vocational School. (p <0,05). In addition, it was observed that the employees working at the General Directorate and Regional Directorate had a more flexible working evaluation than the factory employees, those with higher monthly wages had a more favorable flexible work evaluation than those with low wagesa and those who can determine working hours flexibility and those benefiting from workplace flexibility have a more favorable flexible work evaluation than those who do not benefit from them.

Organizational Commitment did not differ according to gender, age, education level, marital status, total seniority, seniority in current workplace, monthly salary and working hours flexibility (p> 0, 05). However, it is seen that employees who work in the Regional Directorates have more organizational commitment than Factory employees and employees who take advantage of workplace flexibility have more organizational commitment than others (p <0.05).

Job Satisfaction did not differ in terms of gender, marital status and seniority (p> 0.05). However, those under the age of 20 have more job satisfaction than those in the age range of 31-40, employees in Head Office and Regional Directorate or Branches have more job satisfaction than Factory employees;the monthly salary is between 5,000 and 10,000 TL, and between 2,200 and 5,000 TL; have more job satisfaction It was seen that those who can determine the working hours themselves and who benefit from the flexibility of the work place have more job satisfaction than those who do not (p <0.05).

The intensity of working hours and difficult working conditions makes the attracting and retaining of talented employees difficult for logistics firms. The study present the effect of flexible working arrangements on increasing job satisfaction and employee loyalty.

Therefore, in order to attract talented employees and to increase women employees in the sector, to be the leader in international competition as being an employee friendly company, to apply flexible working arrangements is unavoidable for logistics firms.

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MAKALE

SUSTAINABILITY THROUGH BUSINESS MODEL AND SUPPLY CHAIN INNOVATION: AN EXPLORATORY STUDY ON INCLUSIVE BUSINESS MODELS IN TURKEY

Dicle YURDAKUL[1]

Abstract

Inclusive business, which is a concept that is attracting increasing attention, aims to provide goods, services or livelihoods in a scalable way by enabling people living at the bottom of the economic pyramid to take part in the value chain of the company's core business. This study aims to investigate private sector's level of engagement in inclusive business, the changes put forward in the supply chains of the companies which implemented these models and the relationship between inclusiveness and business model innovation. According to the results of the survey research, there is still a lack of interest and/or awareness regarding inclusive business among Turkish companies, particularly in terms of including the low income producers in the supply chain as suppliers. On the other hand, the research also shows that there is a strong relationship between supply chain innovativeness and inclusiveness, as well as company's future intentions to engage in inclusive business. Considering these findings, this study argues that developing the innovativeness capabilities of companies not only in terms of their products and services, but also their business models has the potential to increase companies' adoption of inclusive business.

Keywords: Inclusive Business, Innovativeness, Supply Chain, Supply Chain Innovation, Sustainability

JEL Classification: M10, M14, M31

İŞ MODELİ VE TEDARİK ZİNCİRİ YENİLİKÇİLİĞİ İLE SÜRDÜRÜLEBİLİRLİK: TÜRKİYE'DE KAPSAYICI İŞ MODELLERİ ÜZERİNE KEŞFEDİCİ BİR ARAŞTIRMA

Öz

Giderek daha fazla ilgi çeken bir kavram olan kapsayıcı işletmeler, ekonomik piramidin en alt katmanında yer alan bireylerin, şirketin ana iş kolunun değer zincirinde görev alması yoluyla, onlara ölçeklenebilir bir şekilde mal, hizmet veya geçim kaynağı sağlamayı amaçlamaktadır. Bu çalışma, özel sektörün kapsayıcı işlere katılım düzeyini, bu modelleri uygulayan şirketlerin tedarik zincirlerinde ortaya konan değişiklikleri ve kapsayıcılık ile iş modeli inovasyonu arasındaki ilişkiyi incelemeyi amaçlamaktadır.Anket araştırmasının sonuçlarına göre, özellikle düşük gelirli üreticilerin tedarik zincirine dahil edilmesi açısından, Türk şirketleri arasında kapsayıcı faaliyetler konusunda halen ilgi ve/veya farkındalık eksikliği söz konusudur. Öte yandan, araştırma aynı zamanda tedarik zinciri yenilikçiliği ile kapsayıcılık ve şirketin kapsayıcı bir işe girme konusundaki gelecek niyetleri arasında güçlü bir ilişki olduğunu göstermektedir.

Bu bulgular göz önüne alındığında bu çalışma, şirketlerin ürün ve hizmet yenilikçiliğinin yanı sıra iş modelli yenilikçiliği becerilerini de geliştirmelerinin kapsayıcı iş modellerini benimseme düzeylerini artırma potansiyeline sahip olduğunu öne sürmektedir.

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JEL Sınıflaması: M10, M14, M31

1. Introduction

As the role of the private sector in development is increasing, it is becoming more and more important to reveal the necessary factors for fulfilling this role in a way that provides the highest benefit for both companies and the society. Although the debate about the role of companies in creating benefits is as old as the existence of companies, the perception of this role differs and brings in new discussions year by year with the increase in environmental and social problems.

There are different dimensions of these debates, starting from the impact on economic added value and job creation to the efforts to solve the social and environmental problems of the world. However, considering the changes in consumers' perception of "value creation" and the demands of governments from private sector to take a role of in solving the problems related to economic, environmental and social sustainability, it becomes inevitable that the companies take roles beyond creating economic value.

With this perspective, different terms and concepts are put forward with the influence of academia, development institutions, governments and the private sector. One of the important concepts put forward in this process is the concept of inclusive business which constitutes the main theme of this study. Inclusive enterprises are defined as those that provide goods, services or livelihoods in a scalable way by enabling people living at the bottom of the economic pyramid to take part in the value chain of the company's core business as suppliers, entrepreneurs, distributors, retailers or customers (G20 Inclusive Business Framework).

As of 2016, 10.9% of the world's population lives below the 1.90 US $ (purchasing power parity) level, which is considered to be the extreme poverty line. Ending poverty, which is one of the most fundamental problems related to economic and social sustainability, is the first of the 17 Sustainable Development Goals (SDG) set by the United Nations Development Program (UNDP) within the 2030 agenda. It is seen that these 17 goals, which have been agreed upon by the governments, development organizations, academia and civil society on a global scale, have been recognized and accepted by the private sector and many companies have integrated them into their sustainability strategies by focusing on some of these goals according to their fields of activity. At this point, inclusive business models emerge as a private sector approach that can make a significant contribution to the achievement of SDG#1, "No Poverty".

With this approach in mind, this study aims to investigate private sector's level of engagement in inclusive business, the changes put forward in the supply chains of the companies which implemented these models and the relationship between supply chain innovation and inclusiveness. Accordingly, a comprehensive questionnaire was developed to understand the current level of supply chain inclusiveness and supply chain innovativeness of companies and the relationships between these variables and companies' intentions to engage in inclusive business.

Data received from 122 companies operating in various sectors in Turkey were included in the analysis. Findings, discussions and recommendations for action plans and policy development are presented in next chapters.

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2. Literature Review

Inclusive business approach focuses on finding permanent and sustainable solutions to poverty, which is one of its main objectives. On the other hand, inclusive business models target the main strategy of the company to ensure that goals related to profitability and social sustainability are met in tandem. In order to achieve this, traditional business models needs to be investigated with an innovative approach.

Integrating corporate social responsibility into the main strategy of the company is not only a necessity but also brings many advantages for the company's long-term success. Due to its positive effects on corporate reputation (Mitra, 2011; Zeng et al, 2013), consumer satisfaction and brand loyalty (Dragomir & Anghel 2011; Martinez, Perez and del Bosque, 2013; Oberseder et al, 2013), employee morale (Wolf, 2013) and financial performance (Callan and Thomas, 2009; Chang and Kuo, 2008; Lin et al., 2011) corporate social responsibility significantly improves corporate sustainability.

Integrating individuals living at the bottom of the income pyramid into the supply chain in different roles such as consumer, supplier, entrepreneur, distributor and retailer, requires a shift from the traditional business models to an innovative, agile and inclusive approach. First of all, successful operations in and with the BOP markets requires a thorough understanding of the local markets' and customers' needs (Rangan et al., 2011; Weidner, Rosa and Viswanathan, 2010; Calton et al., 2013; Sharma and Lee 2012), how local capabilities interact with social context and technological applications (Dey et al., 2013); local adaptation in designing products (Viswanathan and Sridharan, 2012) and support of government regulations and trained staff who can make system adjustments (Berger and Nakata, 2013). In addition, it is important to evaluate the future of these initiatives in these markets, especially in terms of the scalability (Cooney and Shanks, 2010).

On the other hand, it is of great importance that these models be stakeholder-oriented in order to be successful (Kuzma and Kuzhabekova, 2011). The information obtained from the relationships established with different stakeholders increases the sustainable innovation capacity of companies and the effectiveness of corporate social responsibility activities (Fang, Huang and Huang, 2010). For example, consumers are encouraging companies to become socially responsible through both pressure (Lungu et al., 2014) and support. Corporate responsibility increases consumer satisfaction (Prud'homme and Raymond, 2013) and causes them to agree to pay higher prices for the products of socially responsible companies (Bask et al., 2013). On the other hand, the pressure of non-governmental organizations and changing expectations of the society also lead companies to integrate corporate social responsibility into their business models and supply chains (Mzembe and Meaton, 2014). In addition, taking the opinions of employees in these processes (Bolis, Brunoro and Sznelwar, 2014) and ensuring their actual involvement in the development and implementation stages (Metzner and Fischer, 2010) is very important for the success of these initiatives.

On the other hand, another factor that is emphasized in sustainability studies is the creation of a supportive and encouraging legal basis which is of great importance for the acceleration and continuity of these efforts. Governments and the business world need to set common goals and act together (VanSandt and Sud, 2012).

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On the other hand, long-term commitment of all stakeholders, including the members of the supply chain, is needed for sustainability-based business models to be successful. Since the expected outputs of these models will be realized in the long term, the level and duration of this commitment are among the most important factors affecting their success. Similarly, some studies suggest that engagement of internal stakeholders, i.e. senior management and employees, is more effective than external factors in the success of these business models (Duran-Encalada and Paucar-Caceres, 2012; Reiman et al., 2012; Hill and Rapp, 2014). In this context, building a supportive corporate culture is also critical.

Research suggesting collaborations between supply chain members argue that external governance should be applied through stakeholder collaboration to ensure the sustainability of the supply chain (Gimenez and Tachizawa 2012, Li et al., 2014). All members of the supply chain should cooperate and contribute in order to ensure that the profitability perspective is complemented with sustainable practices across the chain (Glover et al., 2014). Previous studies suggest the development of sustainable procurement and supply chains for inclusive businesses (Grob and Benn 2014) through supplier development efforts to improve capabilities (Lu, Lee and Cheng, 2012), increased collaboration and education of the suppliers, auditing, monitoring and measuring supplier performance (Morali and Searcy 2013). Furthermore, applying an innovative sustainable supply chain management (SSCM) perspective to BOP projects help multinational companies to achieve their sustainable development goals as it includes economic, social and environmental dimensions of sustainability (Gold, Hahn and Seuring, 2013). On the other hand, SSCM requires leadership support, expert know-how, internal procedural integration and close and intense supplier relationships (Spence and Bourlakis, 2009; Wolf, 2011; Lee et al., 2014; Varsei et al., 2014).

Considering these discussions, this study aims to investigate the role of private sector in social sustainability particularly through the level of engagement in inclusive business, the changes put forward in the supply chains of the companies which implemented these models and the relationship between supply chain innovation and inclusiveness.

3. Methodology

In accordance with the aim of the study, a quantitative research approach was adopted. A comprehensive questionnaire was developed for data collection which includes 7 point likert scale questions, open ended questions and multiple choice questions (41 substantive and 10 demographic questions) to understand the current level of supply chain inclusiveness and supply chain innovativeness of companies and the relationships between these variables and companies' intentions to engage in inclusive business. Main variables measured through the questionnaire include supply chain inclusiveness, future intention for inclusiveness, supply chain innovativeness and finally, company characteristics.

A link to a self-administered online survey was sent by email to senior executives of companies from different sectors, including SMEs, large national companies, multinational companies and social enterprises.

Following data collection, data cleansing was run through consistency checks (identifying out of range, inconsistent or extreme values) and treatment of missing responses. Variable re-specification and scale transformation were done when needed.

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After data screening and cleansing, 122 completed surveys were used for further analysis. Data analysis was conducted using the appropriate statistical techniques through SPSS software.

4. Findings

First, descriptive analysis was run to understand the current situation among Turkish companies in terms of supply chain inclusiveness. As shown in Table 1, the mean scores for supply chain inclusiveness were found to be low, with a mean score of 2,78 for doing business with the poor as suppliers in local operations and 3,21 for doing business with the poor in the distribution channel in local operations. The scores for international operations were slightly higher, with mean scores of 3,06 and 3,67 respectively. As discussed in the previous studies on sustainable development, it is not enough for companies to include low income people in their operations; but they also should invest in the skills development of the disadvantaged groups - regardless of the role they play in the value chain of the company - to create a long-term social impact. Therefore, companies were also asked about how much they invest in skill and knowledge development of the poor, beyond the legal and obligatory skills development programs and educations. The mean score of the participant companies in terms of investing in the skill and knowledge development of the poor as suppliers was found to be 3.74, while the score for distribution channel members was 3,58.

Table 1. Supply Chain Inclusiveness

Item	Mean	Std. Deviation
Supply Chain Inclusiveness_Doing business with the poor as suppliers (for example, buying products and/or services from low income producers) in local operations	2,78	1,638
Supply Chain Inclusiveness_Doing business with the poor in the distribution channel (as carriers, retailers etc.) in local operations	3,21	1,949
International Supply Chain Inclusiveness_Doing business with the poor as suppliers (for example, buying products and/or services from low income producers) in international operations	3,06	2,069
International Supply Chain Inclusiveness_Doing business with the poor in the distribution channel (as carriers, retailers etc.) in international operations	3,67	2,280
Investing in skill and knowledge development of the poor as suppliers	3,74	1,508
Investing in skill and knowledge development of the poor as distribution channel members	3,58	1,699

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As discussed in the literature, inclusiveness in the business model requires companies to alter their current ways of doing business in significant ways.

This requires a perspective shift, which is often accompanied by the level of innovativeness, and being open to innovation in terms of the changes in the business model. Considering this, companies were asked to rate their level of innovativeness in terms of their supply chain operations. As shown in Table 2, participant companies' scores for supply chain innovativeness were also low. The highest mean value, 3,08 belongs to the item related to adapting company's offerings of products and services according to the needs of the poor (consumers). On the other hand, mean scores for the two items that are critical for supply chain inclusiveness, namely Item 3: Changed your distribution of products and services to do business with the poor and Item 4: Made changes in the development, production and distribution of your products in order to do business with the poor, were relatively lower, 2,72 and 2,83 respectively.

Table 2. Supply Chain Innovativeness

Item	Mean	Std. Dev.
Adapted your firm's offerings of products and services according to the needs of the poor	3,08	1,577
Made changes in your target market segment to target poor consumers	2,83	1,609
Changed your distribution of products and services to do business with the poor	2,72	1,558
Made changes in the development, production and distribution of your products in order to do business with the poor	2,83	1,609
Developed new capabilities that are critical to gaining competitive advantage through doing business with the poor	3,02	1,618
Formed any new forms of partnerships with other industry actors to do business with the poor	2,30	1,411

Considering the low scores for supply chain inclusiveness and innovativeness of the participant companies, it is important to investigate the inclusiveness levels of the members of the supply chain that the company is working with. Interestingly, participants indicate that the companies in their supply chain do better in terms of level of inclusiveness. Participant companies reveal that their supply chain members include poor people in their business models (5,51) and that these businesses are operating successfully (5,34). According to these findings, participants think that the companies in their supply chains perform better than they do, in terms inclusiveness.

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Table 3. Supply Chain's Inclusiveness

Item	Mean	Std. Dev.
Companies in our supply chain include poor people in their business models	5,51	2,982
Companies in our supply chain are successful in their businesses which include poor people.	5,34	3,006
Companies in our supply chain support our inclusive operations	4,27	1,816

Having discussed the importance of companies' level of innovativeness in terms of adapting and changing their business models, this exploratory research also aimed to investigate the relationship between supply chain innovativeness and engagement in inclusive business and other forms of strategic corporate social responsibility. The results of the Pearson Correlation analysis reveal a strong relationship between supply chain innovativeness and international inclusiveness (r=,654 p=0,01), as well as company's future intentions to engage in inclusive business (r=,678 p=0,01). On the other hand, the relationship between supply chain innovativeness and inclusiveness in local operations (r=,391 p=0,01) and strategic corporate social responsibility (r=,328 p=0,05) was found to be moderately strong.

Table 4. Correlations-Supply Chain Innovativeness

Variable	Pearson Correlation Coefficient	Sig. (2-tailed)
Inclusiveness	,391**	0,01
International Inclusiveness	,654**	0,01
Future Intention for Inclusiveness	,678**	0,01
Engaging in Strategic Corporate Social Responsibility	.328*	0,05

**Correlation is significant at the 0.05 level (2-tailed).*

***Correlation is significant at the 0.01 level (2-tailed).*

5. Discussion

Inclusive business is a relatively new concept in the development discussions, yet, its importance is increasing tremendously due to the interest of private sector to these business models which propose opportunities for profitability and social impact at the same time. Considering that the literature hosts limited discussions on the topic, this exploratory study aimed to contribute to the field through an investigation on inclusiveness in supply chains, particularly through an understanding on business model and supply chain innovativeness.

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As revealed by participant companies' low levels of supply chain inclusiveness, it can be argued that there is still a lack of interest and/or awareness regarding inclusive business among Turkish companies, particularly in terms of including the low income producers in the supply chain as suppliers. Lack of awareness regarding successful examples of inclusive business –both in terms of profitability and social impact- appears as a barrier in the way to improving the inclusiveness levels of companies, which shows the importance of knowledge and know-how sharing and showcasing best practices. On the other hand, the local supply chain inclusiveness scores were lower compared to international operations. A possible explanation might be the differences between countries in legal requirements, yet, this point needs further elaboration to clarify the reasons of this difference between the local and international operations. Companies' answers also reveal that skills development efforts were also lower than the scale average, which points out the need to increase awareness among companies about the importance of investing in skills and knowledge development for the mutual benefit of the supply chain member and the company (Lu, Lee and Cheng, 2012).

On the other hand, findings of this study reveals that participant companies think the companies in their supply chains perform better than they do, in terms of their level of inclusiveness, and that they are successful in these inclusive businesses. Furthermore, they also point out the fact that the companies in their supply chains support their inclusive operations, with a mean score of 4,27. This finding brings in the discussion that a collective approach towards inclusiveness and social sustainability can increase the social impact created through these initiatives. Extant research points out to the importance of collaboration particularly in the BoP markets. Partnerships help adapting to the subsistence marketplace-specific dynamics, and partners from multiple sectors may help in addressing the problem of institutional gaps in these markets (Rivera-Santos, Rufin and Kolk 2012). Consequently, establishing partnerships and ensuring goal alignment within the supply chain may help in scaling up the impact created by inclusive operations.

Finally, this study aimed to bring up the discussion about the importance of innovativeness in building inclusive operations. Inclusive business approach requires companies to investigate their business models with a critical and innovative perspective in order to change these models to become more inclusive in various dimensions. The findings of this research also supports this hypothesis through the strong relationship found between supply chain innovativeness and international inclusiveness, as well as company's future intentions to engage in inclusive business. Consequently, it is possible to argue that developing the innovativeness capabilities of companies not only in terms of their products and services, but also their business models has the potential to increase companies' adoption of inclusive business.

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MAKALE

THE RELATIONSHIP BETWEEN GREEN HUMAN RESOURCE MANAGEMENT AND GREEN SUPPLY CHAIN MANAGEMENT

Nurten POLAT DEDE [1]

Abstract

Recently, the results of green human resource management (GHRM) and green supply chain management (GSCM) practices of companies such as environmental protection, sustainable development and gaining competitive advantage are widely discussed in the literature. As the activities of the companies to increase their ecological performance within the scope of sustainability become widespread in all sectors, it is seen that some companies begin to play important roles in supply chain processes by designing HRM practices, which are referred to as the best green human resource management practices. This study seeks to answer the questions of (i) what are the main components of GHRM and GSCM applications and (ii) which HRM and SCM applications produce effective results in terms of firms' ecological performance in ensuring GHRM and GSCM integration. In this respect, the study consists of two main parts. In the first part of the study, a conceptual model explaining the effects of GSCM and GHRM on the ecological performance of firms as a result of their separate and joint interactions is proposed for the first time in the national literature. In the second part of the study, research conducted with senior supply chain unit managers and HRM directors of leading companies in the sector with their environmentally sensitive practices. The research was conducted with an in-depth interview method, which is one of the qualitative data collection methods. As a result of the analyzes, significant differences were found between GSCM and GHRM relations between supply chain unit managers and HRM unit managers. Besides, the level and commitment of the senior management and other department managers to adopt environmental values were determined by all participants as the most important human factor in determining the effectiveness of GHRM and GSCM practices.

Keywords: Human Resource Management, Supply Chain Management, Sustainability, Green Human Resource Management, Green Supply Chain Management.

JEL Classification: M10, M12, M54, L91, Q56.

YEŞİL İNSAN KAYNAKLARI YÖNETİMİ VE YEŞİL TEDARİK ZİNCİRİ YÖNETİMİ ARASINDAKİ İLİŞKİLER

Öz

Son dönemde, firmaların yeşil insan kaynakları yönetimi (YİKY) ve yeşil tedarik zinciri yönetimi (YTZY) uygulamalarının; çevre koruma, sürdürülebilir kalkınma ve rekabet avantajı elde etme gibi sonuçları, literatürde yaygın olarak tartışılmaktadır. Firmaların, sürdürülebilirlik kapsamındaki ekolojik performanslarını artırmaya yönelik faaliyetleri tüm sektörlerde yaygınlaştıkça, bazı firmaların insan kaynakları departmanlarının da en iyi yeşil insan kaynakları yönetimi uygulamaları olarak ifade edilen İKY uygulamalarını tasarlayarak, şirketlerinin tedarik zinciri süreçlerinde roller üstlenmeye başladıkları görülmektedir.

Bu çalışmada (i) YİKY ve YTZY uygulamalarının temel bileşenlerinin neler olduğu ve (ii) YİKY ve YTZY entegrasyonunun sağlanmasında hangi İKY ve TZY uygulamalarının firmaların ekolojik performansı açısından etkili sonuçlar ürettiği sorularına yanıt aranmaktadır. Bu doğrultuda çalışma iki temel bölümden oluşmaktadır.

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Çalışmanın ilk bölümünde YTZY ve YİKY'nin birbirinden ayrı olarak ve birlikte etkileşimleri sonucunda firmaların ekolojik performanslarına olan etkilerini açıklayan kavramsal bir model ulusal literatürde ilk kez önerilmektedir.

Çalışmanın ikinci bölümünde ise; çevreye duyarlı uygulamaları ile sektörde öncü olan holdinglerin tedarik zinciri üzerinde yer alan üst düzey birim yöneticileri ve İKY direktörleri ile gerçekleştirilen bir araştırma yer almaktadır. Araştırma nitel bilgi toplama yöntemlerinden biri olan, derinlemesine görüşme yöntemi ile gerçekleştirilmiştir. Yapılan analizler sonucunda, YTZY ve YİKY ilişkilerinde birim yöneticileri ve İKY birim yöneticileri görüşleri arasında önemli farklılıklar saptanmıştır. Bununla birlikte tüm katılımcılarca, üst yönetimin ve diğer bölüm yöneticilerinin çevreci değerleri benimseme düzeyleri ve taahhütleri, YİKY ve YTZY uygulamalarının etkinliğini belirlenmesinde, en önemli beşeri unsur olarak tespit edilmiştir.

Anahtar Kelimeler: İnsan Kaynakları Yönetimi, Tedarik Zinciri Yönetimi, Sürdürülebilirlik, Yeşil İnsan Kaynakları Yönetimi, Yeşil Tedarik Zinciri Yönetimi.

JEL Sınıflaması: M10, M12, M54, L91, Q56.

1. Introduction

In recent years, sustainability efforts have been one of the most powerful weapons in the wars of companies to improve and protect their public image. Today, companies need different management systems for reasons such as sectoral and organizational factors, costs of logistics activities (Nikbakhsh, 2009), legal regulations, orientation to social responsibility activities (Sari, 2017) and meeting customer needs (Srivastava, 2007). These systems; supply chain management, environmental management, human resources management and sustainability. These applications are put into practice in companies and they are brought together to produce more than the value they will produce alone.

Recently, companies have invested heavily in establishing, developing and integrating supply chain management (SCM), environmental management (EM) and human resource management (HRM) systems. In particular, the tendency of customers to choose environmentally-friendly products has made the suppliers' social and environmental practices an important criterion in supplier selection of companies (Ahi & Searcy, 2013; Gold, Seuring & Beske, 2010).

Coordination and cooperation of the supply chain is the most critical success factor with globalization. The supply chain is also expressed as a network forming the purchase options of raw materials, the production of intermediate goods or final products, the distribution of finished products to customers and the distribution options (Ganeshan & Harrison, 1995: 1).

Supply chain management (SCM), is defined as a series of approaches used to integrate suppliers, manufacturers, wholesalers and retailers to meet the needs of stakeholders while minimizing costs across the supply chain system so that the products are produced and distributed in the right place, at the right time, in the right amount.

To meet the demands of the customers in the most accurate and fastest way, these are the systems that handle suppliers, manufacturers, distributors and customers in an integrated way by using information technologies (Vonderembse, Uppal, Huang & Dismukes, 2006).

Environmental management is a form of management that takes into account the harm that it may cause to the environment in the design, production, packaging and distribution activities of the companies in its high-level management decisions and minimizes these damages with the necessary measures and performs them within the scope of social responsibility practices (Chan, 2009; Cramer, 1998).

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Green supply chain (GSC) is a type of supply chain where strategies to produce environmentally responsible products or services are combined (Cruz & Matsypura, 2009; Sarkis, 2012). It reduces the negative environmental impacts of companies and increases their efficiency, giving them a competitive advantage over their competitors in innovation and processes (Thürer, Godinho Filho, Stevenson & Fredendall, 2013).

Green supply chain management (GSCM) is a form of management obtained by applying environmental management principles to supply chain management. Being an integrated system, green supply chain management is acknowledged by both academics and executives that each system contributes more than the contribution it can make individually (Jabbour & De Sousa Jabbour, 2016). Today, green supply chain management has reached a strategic position for companies in supply chains as a sub-dimension of sustainable supply chain management philosophy with covering environmental awareness and gaining a certain development.

Kopicki, Berg and Legg (1993), classify the approaches of companies in environmental management in three ways, the first of which is reactive. Companies with a reactive approach in environmental management implement practices for the purchase of recyclable raw materials or semi-finished products for production, filtration of the carbon footprint that harms the environment during the production stage, and the use of recyclable labels for manufactured products. Financial resources allocated to environmental activities are at a low level and the aim is to fulfill the laws. Companies that have adopted a proactive approach; take precautions before environmental problems occur. However, these practices are not combined with the company's business strategies. The last approach is expressed as a value-creating approach (Van Hoek, 1999). Business strategies are the motivation of the companies that adopt this approach towards voluntary environmental management. It is used by companies that have adopted a customer focus and differentiation strategy (Tatoglu, Frynas, Bayraktar, Demirbag, Sahadev, Doh & Koh, 2019). Senior Management has a strong environmental commitment to green environmental management activities and the environmental commitment is shared among the supply chain partners. At the value creation stage, operating systems develop a redesign of products for assembly, conduct environmental analyzes at all stages of the product life cycle, and develop collaborations with other chain members (Van Hoek, 1999). GSCM is a strategic subject in these companies.

Another critical issue in today's conditions, as well as the supply chain management performance of enterprises, is to increase the strategic contribution of human resources. The concept of strategic human resources management (SHRM) was introduced in the early 1980s and developed. The association of HRM policies and practices with organizational goals and strategies has brought the concept to the agenda.

Snell, Youndt and Wright (1996), defined strategic human resource management as the design of HRM systems to achieve sustainable competitive advantage through people. The subject of SHRM is to investigate which strategic choices are made regarding the use of labor in firms and why some companies manage human resources more effectively than others (Boxall & Purcell, 2000: 185).

Green human resources management (GHRM), on the other hand, is a new topic in the literature as a result of the widespread sustainability activities of companies. Some researchers have tried to draw attention to GHRM (Mandip, 2012; Renwick, Redman & Maguire, 2013).

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GHRM consists of efforts to develop the best green HRM application sets for minimizing or eliminating the damages that may be caused by the activities of the companies in all business processes (Zaid, Bon & Jaaron, 2018).

In general, researchers working in the field of business focus on the core issues of SCM such as purchasing, production and distribution, while they do not work on HRM, one of the soft elements. It is believed that researchers working on HRM are not interested in the literature on SCM. Human resources management departments in enterprises are not directly responsible for supply chain management, product development, process development, technology development, purchasing, distribution, recycling. However, HRM can positively or negatively influence the company's SCM and GSCM performance, either as an organizer or as a practitioner of organizational policies (Ellinger & Ellinger, 2014; Gowen III & Tallon, 2003; Lengnick-Hall, Lengnick-Hall & Rigsbee, 2013; McAfee, Glassman & Honeycutt, 2002).

Strategically, SCM makes significant contributions to resources and capabilities such as information exchange and joint planning between companies in the chain, cooperation based on the needs of end-users, long-term working and trust between the parties, fair sharing of risks and gains, creating common vision and culture (Baki, 2004). Environmental management (EM) is defined as an important managerial capability that ensures the continuity of social and ethical responsibility (Arda, Tatoğlu & Alpkan, 2018). HRM, on the other hand, supports the contributions of SCM and EM through human resources and capabilities in enterprises.

Within the scope of the research, it was found that the number of publications investigating the relations between GHRM and GSCM was negligible in the searches made in large databases such as Ulakbim, Scopus and ISI Web of Science database. In our country, a published study investigating the relationship between GHRM and GSCM was not found in searches in these databases. This result is not surprising given that the studies in the field of GHRM in the national literature are relatively at an early stage compared to the studies in the field of GSCM. In fact, internationally, the relations between GSCM and GHRM have started to be discussed with a long delay. Researchers working on GSCM until the last few years seem to prefer to focus on the technical aspects of the subject and ignore the human elements of the green supply chain.

In this study, it is aimed to explain the relations between the two fields by bringing together the GSCM and GHRM fields which progress independently in the national literature. It is also sought to answer the questions of (i) what are the main components of GHRM and GSCM applications and (ii) which HRM and SCM applications produce effective results in terms of firms' ecological performance in ensuring GHRM and GSCM integration.

In this respect, the study consists of three main parts. In the first part of the study, the concepts of sustainability, environmental management, supply chain management and human resources management are explained to provide the basis for the concepts and processes that will be examined in explaining the relations between GHRM, GSCM and companies' environmental performance.

In the second part of the study, the activities of green product design, green material management / manufacturing, green distribution / marketing and reverse logistics (Ghobakhloo, Tang, Zulkifli & Ariffin, 2013), which form GSCM business processes, are explained by using the opinions of researchers working on GSCM.

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After explaining the concept of GSCM and its dimensions, GHRM concept is explained within the framework of green HRM implementation proposals that can be applied in GSCM systems and processes. The conceptual model explaining the effects of GSCM and GHRM on environmental performance separately and the contribution of GSCM and GHRM as a result of their interactions (GSCM * GHRM) for the first time in the national literature. In the model, the relationship between GHRM formed by EM and HRM and GSCM formed by EM and SCM will be studied. With the theoretical dimension of the study, it is aimed to provide holistic perspective that will enable them to increase their ecological sustainability performance to the literature and business professionals.

In the third part of the study, there is a qualitative research conducted with senior unit managers and HRM directors located on the supply chain of large-scale holding companies that have stated that GSCM and GHRM applications are included in their companies. Also, the purpose and importance of the research, the data collection method and sample of the research, the questions of the research, the validity and reliability of the research, the research findings and the discussion about the research findings are presented in this section.

In the conclusion section, the contributions, importance and limitations of the research for theoretical and practitioners are mentioned and suggestions are made for future research.

2. Conceptual Background for Integration of GHRM and GSCM Systems

In this part of the study, the concepts of sustainability, environmental management, supply chain management and human resources management will be explained first to provide the basis for the concepts and processes that will be examined in explaining GHRM and GSCM relations.

2.1. Sustainability and Environmental Management

Today, environmental protection and sustainable development are among the most important issues for all industries. Businesses have to accept these two concepts among their priorities, formulate their policies and programs accordingly, and establish an environmental management system appropriate to the structures of their businesses.

Sustainability, which is widely discussed, is expressed as a participatory process that creates a perspective in the society to ensure the continuity of the economic, environmental and social resources of the society and to maintain the most accurate use of these resources (Gladwin, Kennelly & Krause, 1995). According to Daly and Cobb (1994), sustainability is to meet the current needs with available resources in a way that does not harm the needs of future generations.

Sustainability is used as sustainable development within the framework of questioning whether the will necessary for the economic and social development of the society is implemented correctly and adequately (Akgül, 2010: 135). The economic levels of institutions and their impact on national and global economic systems are related to the economic dimension of sustainability. The impacts of institutions on living and non-living natural systems, including ecosystem, soil, air and water, are related to the environmental dimension. The social dimension of sustainability is related to the impact an organization has on social systems in its environment (Global Reporting Initiative, 2006).

The first motivation for sustainable development studies in the literature is based on the report published by the Environment and Development Commission in 1987.

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According to this report, countries need to achieve their growth targets in a way to support environmental, social and economic development. Businesses began to implement environmental policies, particularly when governments made it necessary to control water and air-related wastes (Morrow & Rondinelli, 2002). Non-governmental organizations, environmental awareness in the society, legal regulations and customers' expectations are shown as important reasons for enterprises to develop environmental policies.

According to the theory of institutionalization, one of the most important goals of firms is to achieve legitimacy by adapting to the society in which they are located (Meyer & Rowan, 1977). Businesses are seen as responsible for most of the carbon emissions in the past and present. The main reason of the environmental management activities of the companies is to ensure the legitimacy and continuity of the society by adapting to the environment, society and culture. Therefore, companies continue to research on innovative technologies in order to minimize the effects of environmental damages by producing less harmful products to the environment (Hosain & Rahman, 2016) and they allocate a significant portion of its resources to these studies, inform the society with the reports they have published and want to raise or protect their social image in relation to their impact on the environment. Besides, it is not enough that environmentally friendly products are produced, they are also expected to consider the environment in procurement, production, packaging, storage, distribution and recycling processes.

EM is a management system established by enterprises to develop a certain environmental policy in order to reduce the negative impacts on the environment and nature (Arda et al., 2018). The environmental management system provides developments of environmental protection systems and processes to ensure that environmental impacts are taken into consideration in operational decisions. Environmental management is not only for control purposes. It has the effect that companies fulfill their social responsibilities related to environment, reduce their risks and increase their market opportunities. According to Van Hoek (1999), environmental management activities not only reduce the environmental damage of companies but also increase their efficiency, create a competitive advantage through innovation and improvement of processes. Contrary to popular belief, environmental management is not an emerging management system.

Firms have been implementing environmental management systems for years to fulfill their legal responsibilities, to obtain information about the risks arising from the pollution or danger caused by the activities of the company, to increase production efficiency and to prevent the unnecessary expenditures (Tepedelen & Özdemir, 2003).

Environmental management practices that companies have independently performed for years have been gathered under a single structure under the International Standards Organization (ISO) 14001 EMS User Guide Specifications. ISO 14001 Standard defines the basic elements of an effective environmental management system. These elements form a management system that includes the resources needed to develop, implement and review organizational structure, planning activities, responsibilities, procedures, processes and environmental policy (Epstein & Roy, 1998). When the objectives and objectives of the Environmental Management System ISO 14001 are considered, the impacts of the companies on the environment are documentable and not only provide a good image but also contribute to the economy.

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In practice, there are environmental criteria and guidelines developed by non-profit organizations such as UN Global Compact, the Guide to Corporate Sustainability, UN Indicators of Sustainable Development, Global Reporting Initiative GRI, Dow Jones Sustainability Index, OECD Environmental Indicators, EPA Report on the Environment, EEA Indicators, European Environment Agency, Environmental Performance Index (EPI), ISO 14031 Environmental Performance Evaluation (EPE). Companies use different environmental performance indicators according to their operating characteristics, the sector they use or the reporting systems they use and the impact of their stakeholders. Different products and sectors can have different effects on the environment in the production and supply chain management processes. For example, one sector can cause more carbon dioxide emissions, while another sector can lead to more water consumption. This may lead to changes in sustainability indicators and importance levels by sector (Nakıboğlu & Bulgurcu, 2017). The environmental performance indicators used by researchers working on green supply chain management were determined by Ahi and Searcy (2015) in their study. These indicators are shown in Table 1 below.

Table 1: Environmental Performance

Environmental Performance Criteria	Total direct and indirect toxic emissions
	Air emission
	Total greenhouse gas emissions/ozone harmful gases
	Water use
	Total energy use
	Costs due to environmental issues
	Amount of waste water
	Amount of material recycled
	Environmental management system (i.e. ISO 14000)
	Carbon footprint calculations
	Green product design

2.2. Supply Chain Management

Modern transport and other technologies have led to the development of global trade. While these developments create opportunities for companies, they have brought some difficulties. It is becoming increasingly difficult to obtain clear information about the supply conditions of raw materials to companies in various parts of the world. While the traditional supply chain becomes more complex with globalization, environmental and social performances have become increasingly important as well as the economic benefits of the chain.

Supply chain management can be defined as the strategic realization of the flow, supply, shipment and storage of raw materials, semi-finished and finished products throughout the operating and distribution systems (Christopher, 1998).

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Integrated supply chain comprises; operations planning, procurement and purchasing, production, inventory management, storage, distribution, after-sales customer relations and recycling processes. Briefly, supply chain management covers all stages from the procurement of raw material to the final consumer (Bowersox, Closs, Cooper & Bowersox, 2013).

Supply chain management includes supply and demand management, raw material procurement, production, storage, inventory management, order management, distribution and marketing activities and ensures the sustainability of these activities (Yüksel, 2004). There are three types of flows in the supply chain: material flow, information flow and financial flow. Material flow; consists of physical product flow from suppliers to customers, and a reverse flow of return, service, recycling and product disposal. In the flow; spare parts, raw materials and intermediate products come from suppliers and continuous flow is very important to keep customers. While the information flow includes order notification and shipment status information, the financial flow regulates the money flow in the chain (Christopher, 1998).

The rapidly changing environment of competition forces companies to respond to these challenges by establishing collaborative relationships with their customers and suppliers. In the classical supply chain, relationships are often price-based and competitive. Modern supply chain management is based on collaboration, problem-solving, and strategic integration of suppliers and distributors (Bowersox et al., 2013). The effectiveness of collaborative supplier relationships depends on building trust among the firms in the chain.

2.3. Human Resource Management

The first reference to the concept of human resources management was made by Miles in 1965. It expresses a people-oriented understanding focused on the needs, training and development of individuals working in enterprises, (Truss, Gratton, Hope-Hailey, McGovern & Stiles, 1997). In the historical development of human resources, it is seen that three basic phases are experienced: personnel management, HRM and strategic HRM. The roles played by the HR manager vary at each stage. The differentiating structure of manpower, changes in the organization of the work and the forms of employment (depreciation of the concept of time and space in terms of labor force) and the increasing importance of the "human" element in the success of enterprises brought about a significant change in HR policies and practices (Yüksel, 1997: 33).

Nowadays, being able to direct human and intellectual capital in line with business objectives constitutes the most important competitive advantage of companies (Polat Dede, 2018). HRM departments can influence employee competencies, organizational citizenship behaviors (Sun, Aryee & Law, 2007), organizational commitment (El-Kassar & Singh, 2019), organizational participation and motivation (Mcmeekin & Coombs, 1999) and contribute their organizational strategies through practices and policies they develop (Boxall & Purcell, 2000).

There are two basic approaches in defining the strategies of human resources management departments. These approaches are expressed as reactive and proactive approaches.

In the reactive approach, organizational strategy forms the basis for HRM management strategies and policies. In this approach; HR practices such as performance appraisal, employment, training and remuneration make significant contributions to executives in the implementation of organizational strategic plans.

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In the proactive approach, it is seen that human resources departments have more proactive roles in the strategy determination process (Wright & Snell, 1998). In this case, HR managers assume important responsibilities both in the formation and implementation of strategies.

The application and strategies developed by human resources departments to support the strategic plans and implementations of the enterprise depend on internal and external compliance criteria (Wright & Snell, 1998). According to this; each HR application in the company should be compatible with another HR application. In other words, one HR application in the enterprise should not reduce or eliminate the impact of the other HR application. External compliance is the compliance of HRM practices and systems with all organizational objectives and strategies (Truss & Gratton, 1994). External compliance is based on the contingency approach from management theories. According to the contingency approach, the success of HRM strategies depends on the adaptation and implementation of business strategies (Delery & Doty, 1996).

3. Developing the Conceptual Model

In the literature review, EM, SCM and HRM applications are explained separately and the concepts that will form the basis of the model are examined. In the model, EM and SCM dimensions were used for GSCM integration and EM and HRM dimensions were used as the basis for GHRM integration. In the next part of the study, the effects of GSCM and GHRM on environmental performance separately and the contribution of GSCM and GHRM as a result of their interactions (GSCM * GHRM) will be discussed. In the model, the environmental performance of the companies is considered within the framework of the concept of sustainability. An integrated conceptual model

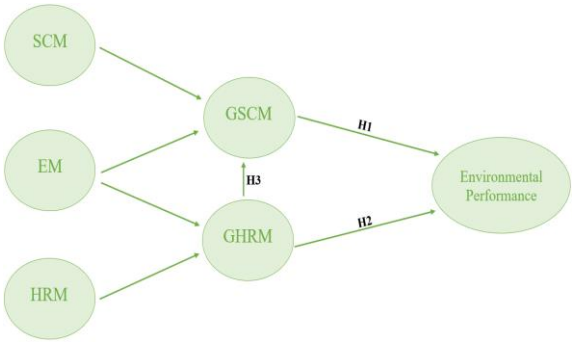

Figure 1. Proposed Conceptual Model (GSCM, GHRM and Environmental Performance Relationships)

Relations between SCM, EM, HRM dimensions and environmental performance of firms, GSCM relationships formed by EM and SCM and GHRM relationships formed by EM and HRM dimensions are shown in Figure 1. The multiplicative relationship and additive relationship between variables in the model can be formulated as follows.

F1 GSCM Performance = f (SCM +EM).

F2 GHRM Performance = f (HRM +EM).

F3 Environmental Performance = f (GSCM +GHRM).

F4 Environmental Performance = f (GSCM × GHRM).

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According to Formula 1, SCM and EM independently affect GSCM performance. The relationships between SCM and EM are not multiplicative. Similarly, in Formula 2, the relationships between HRM and EM are not multiplicative. HRM and EM independently have effects on GHRM. The main question of the study is the relationship between GSCM and GHRM is shown in Formulas 3 and 4. According to Formula 3, GSCM and GHRM independently affect the environmental performance of firms. The fact that one is zero does not eliminate the effect of other factors. The relationship in this formula is additive, not multiplicative.

3.1. Green Supply Chain Management

Due to increasing carbon emissions and climate change in recent years, environmental protection initiatives are being considered globally. Green Supply Chain Management is one of the largest initiatives initiated by the industrial sector to minimize the negative environmental impacts of value chain activities (Zhu, Sarkis & Geng, 2005).

While sustainable supply chain management activities focus on all three of the economic, social and environmental performance indicators, GSCM is a subsystem of sustainable SCM (Brandenburg, Govindan, Sarkis & Seuring, 2014; Seuring & Müller, 2008).

GSCM expresses the long-term cooperation aimed at minimizing the environmental impacts of the activities of the companies and reducing the negative effects of the activities of all companies on the chain. In short, the concept of GSCM is the greening of all phases of the supply chain against the environment (Ageron, Gunasekaran & Spalanzani, 2012). However, the efforts of the companies in the chain to cooperate in all processes require high trust and long-term relationships. The essence of supply chain management; cooperation is based on buyer-supplier relations (Vickery, Jayaram, Droge & Calantone, 2003).

Handfield, Walton, Seegers and Melnyk (1997), focus on the interactions between the supplier and the buyer to improve the environmental performance of the buyer. Gavaghan, Calahan-Klein, Olson & Pritchett (1998), in their study, focused on buyer-supplier cooperation in order to improve the environmental performance of suppliers. Vachon & Robert (2006), emphasized that buyer companies gather information to evaluate and control the supplier's environmental performance.

Green supply chain management consists of many sub-processes. These; green product design, green material management / manufacturing, green distribution / marketing and reverse logistics (Ghobakhloo et al., 2013). Green product design is an effective process in supplier selection.

Among the other factors, green management approaches are taken into consideration when selecting suppliers. Green production/material management is the process of making environment-friendly requirements during production. Green distribution is an important factor affecting the green supply chain. Many factors, from the fuel used by the vehicle to the frequency of transportation, affect green distribution performance.

However, determination of distribution points, determination of transport type to be used, control systems, just-in-time production and distribution policies affect both forward and reverse logistics networks (Büyüközkan & Vardaloğlu, 2008). GSCM applications can be classified as more internal and external. Internal environmental management, eco-design and investment recovery activities are classified under the Internal GSCM title. Green procurement and cooperation with customers are grouped as External GSCM (Zhu, Sarkis & Lai, 2008).

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Table 2: Green Supply Chain Management

Internal GSCM (Green Production)	Evaluate materials and energy consumption and consider efficiency.
	Designing products that can be reused, recycled; parts and materials that can be recovered.
	Product design without hazardous substances.
	Use of a minimum variety of materials and components in product production.
	Reducing the use of raw materials as much as possible.
	Reduction of toxic substance consumption.
External GSCM	Audit of suppliers in terms of environmental performance.
	Selection of suppliers according to environmental criteria.
	Collaborate with suppliers on environmental management.
	Having the rules and requirements related to environmental management in the purchasing conditions.
	Develop suppliers to meet environmental requirements.
	Cooperating with suppliers for green design purposes.

From this point of view, our first hypothesis is given as the GSCM's dimensions constitute an important resource for the organization and contribute to the environmental performance and competitive advantage of the organization.

Hypothesis 1: There is a significant and positive relationship between GSCM applications and the environmental performance of the company.

Hypothesis 1a: There is a significant and positive relationship between internal GSCM applications and the environmental performance of the company.

Hypothesis 1b: There is a significant and positive relationship between external GSCM applications and the environmental performance of the company.

3.2. Green Human Resource Management

Organizational structure and processes are of great importance in the development of environmentally friendly features of organizations.

Organizational determinants have strong effects on distinguishing firms from their competitors with their environmental performance as they are in the internal structure of the organization and they are features that make the organization different from other organizations.

Bruntland Report (1987), Stockholm conference (1972), Rio de Janerio (1992) conference, Eco-Management and Audit Scheme (EMAS), BS 7750 Environmental Management Standard, ISO 14000 Environmental Management System Standards Series formulated by International Standards Organization (ISO), Kyoto Protocol (1997) and Paris Agreement (2015) are important initiatives for environmental protection in the world. All these developments have led to changes in management understanding and business conduct in national and international companies.

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Enterprises have implemented their environmental systems appropriate to their business structures and the green management approach has become widespread (Chan, 2011; Deshwal, 2015; Jabbour & Santos, 2008). One of the other important developments is the issues related to the environmental and social impacts of the enterprises have gained a strategic character discussed in the high-level board meetings. Green management practices, which express that companies operate with a sense of environmental responsibility, have influenced the functioning of all business functions. In companies with a high level of environmental awareness and sensitivity in top management, this understanding has been realized faster (Dai, Montaabon & Cantor, 2014). Purchasing, production, distribution, marketing, research and development, accounting and finance, human resources, public relations, etc. all unit managers are expected to behave by the green management approach. Rani and Mishra (2014), states human resources departments in institutions can play an important role in the development and implementation of sustainability strategies. While the work on GHRM is still very recent, firms can revise or redesign their GHRM systems, taking into account environmental elements and the enterprise's environmental strategies in each of their traditional HRM practices (selection, training, rewarding and promotion, etc.). Green HRM implementation proposals that can be applied in HRM systems and processes are summarized in Table 3 below.

Table 3: Green Human Resources Management

Green selection and placement	Using environmental criteria in the selection and placement process, prioritizing the candidate's prior work experience in environmental management and environmental awareness (Daily & Huan, 2001).
	Entrepreneurial attractiveness through environmental management and eco-friendly practices and the active role of HRM departments in creating brand identity, managing the perception of being the workplace that talents prefer to work with developed projects (Jabbour & Santos, 2008).
	Written environmental responsibilities in job descriptions (Jabbour & Santos, 2008).
	In the recruitment process, the company and HRM departments use environmental selection and placement techniques, e-recruitment practices (Jabbour & Santos, 2008; Daily & Huang, 2001).
	Orientation training and practices related to environmental management and environmental sensitivities of the company in the socialization processes of new employees.
Green training and development	Providing environmental education to employees for awareness, talent, expertise and attitude change (Daily, Bishop& Massoud, 2012).
	Workshops that bring together competent employees in green management and others.
	To gain a green manager style and attitudes.

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Green training and development	Providing environmental training to managers to raise awareness and talent, provide expertise and change attitudes.
	Establishment of information management systems related to environmental management, environmentally friendly practices and policies.
	HRM departments design their educational development practices and consider environmental issues during the implementation phase, become role models, use e-learning and development practices.
Green performance management and evaluation	Transformation of the company's green goals, objectives and responsibilities into the objectives and responsibilities of sub-unit managers (Jabbour & Santos, 2008).
	Determination of individual green targets, goals and responsibilities of employees in the interviews where performance targets are determined (Jabbour & Santos, 2008).
	Adding green performance criteria and indicators to the performance management system and evaluation (Jabbour & Santos, 2008).
	Review of the existing performance management system and identify performance criteria that do not meet environmental management objectives (Jabbour & Santos, 2008).
	Reflection of the level of achievement of environmental goals of managers on performance valuation scores and persuasion of the fact that performance score differences result from environmental performance.
	The use of environmental performance criteria in the valuation of the performance of the employees and the persuasion of the managers and employees who see the results of the valuation and ensuring the commitment of the senior management on this matter.
	Ensuring active communication among employees at all levels on environmental management.
Wage and reward systems	Rewarding systems for senior executives with “green targets” (Jabbour & Santos 2008).
	Creation of a variable wage and reward system based on employees' environmental management skills and gains (Jabbour, Santos & Nagano, 2010).
	Rewarding and encouraging employee suggestions that contribute to the company's environmental performance (Wehrmeyer, 2017).
	Use of financial or employee incentives (Wehrmeyer, 2017).
	Raising awareness and confidence in the employee that environmental performance will be rewarded
Employee engagement and empowerment	Encourage employees to make improvements or make recommendations on environmental management (Daily et al., 2012).

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Employee engagement and empowerment	Psychological empowerment and motivation of employees in environmental management (Daily et al., 2012).
	Executive behaviors that support and motivate employee participation in environmental management.
	Establishment of environmental teams for environmental activities.
Employee discipline management	Linking to the rules and regulations of employee behavior to protect the environment in line with the company's environmental policy, disclosure of sanctions in case of violation of rules and regulations (Hosain & Rahman 2016; Wehrmeyer, 2017).
Organizational culture and organizational climate	To support an environmentally friendly (green) culture in environmental management.
	Provide views and suggestions on staff at senior management meetings to make senior management's support for green organizational culture visible to employees (Jabbour & Santos 2008).

The principles and values of environmental management can be transformed into GHRM applications together with one or more of the HRM processes. Each GHRM application (e.g. environmental education only) or a combination of different GHRM applications can contribute positively to the enterprise's environmental performance. In line with the above explanations, the second proposal is given because the dimensions of the GHRM are an important resource for the organization and may contribute to the environmental performance and competitive advantage of the organization.

Hypothesis 2: There is a significant and positive relationship between GHRM applications and the environmental performance of the company.

GSCM and GHRM independently affect the environmental performance of firms. In addition, GSCM and GHRM can also influence environmental performance by engaging in multiplicative relationships.

In this respect, our third hypothesis is given below, as the dimensions of the GHRM are an important resource for GSCM applications and contribute to the organization's environmental performance and competitive advantage through GSCM.

Hypothesis 3: GHRM applications have a mediating effect between GSCM applications and environmental performance.

Hypothesis 3a: GHRM applications have a mediating effect between internal GSCM applications and environmental performance.

Hypothesis 3b: GHRM applications have a mediating effect between external GSCM applications and environmental performance.

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4. Research Method

4.1 The Purpose and Importance of Research

The main purpose of this research is to find out how GSCM and GHRM are applied in holdings which declare that GSCM and GHRM applications are included in their companies and which are considered to be the pioneers of environmentally friendly product production and innovation in the sector. For this purpose, it has been tried to determine which practices (green raw material selection, green supplier selection, recycling, green product design, preferred type of transport, green packaging etc.) are used to improve the environmental performance of product design, material management/manufacturing, distribution/marketing and reverse logistics business processes that form SCM functions and processes of these companies.

As another aim of the research, it is tried to examine which HRM applications and systems and are integrated into GSCM systems and rate of integration in these holdings.

Also, perceptions of senior unit managers and HRM managers about which human factors are more important in the success of GSCM practices were also investigated. Another important point is that the perceptions and opinions of the senior unit managers and HRM managers about the reasons of green management application of the companies have been tried to be determined in the study.

4.2. Data Collection Method and Sample of Research

In the research, a focus group interview, which is one of the qualitative information gathering methods, was used. In the study, a conceptual model explaining the relationship between GHRM and GSCM is proposed based on the information collected on GHRM and GSCM. In the study, a conceptual model explaining the relationship between GHRM and GSCM is proposed based on the information collected on GHRM and GSCM. A focus group interview is one of the most commonly used methods of qualitative research. The interview method is a powerful method to reveal people's perspectives, experiences, emotions and perceptions (Bogdan & Biklen, 1992). The focus group provides “a rich and detailed set of data about people's experiences, perceptions, thoughts, feelings and impressions of their own words” (Dilshad & Latif, 2013).

The main body of the research is holding companies declaring that they have implemented GSCM and GHRM in Istanbul. Due to time and cost constraints, the whole population could not be reached. Judgmental sampling method, which is one of the non-probability sampling techniques, was used as the sample selection method.

The reason for the selection of holdings in the research is that they contain companies from different sectors with different levels of environmental risk such as chemistry, aluminium, construction and finance and that the attitudes of the senior executives within the holding are the most important determinant in both GHRM and GSCM applications.

Moreover, it is thought that the top managers of environmentally friendly companies will be the most knowledgeable about GHRM and GSCM, and the idea that more holistic data can be obtained from these managers has been an important motivation for focus interviews with these managers.

In addition, as the researchers report that there is a positive relationship between the scale size of the enterprise and the resources allocated by the firms for strategic human resources applications, large-scale holdings were preferred.

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Luborsky and Rubinstein (1995), argues the subject of determining sample size is controversial since there are no standard scales that define human characteristics such as cultural and social criteria in that qualitative research. A theoretical sampling approach was used in the study. In this approach, the number of samples is not determined from the beginning, data collection continues until the point where the findings of the research question can have repeated each other (Coşkun & Bozyiğit, 2019: 614; Yıldırım & Şimşek, 2013: 143). Therefore, the sample size was not initially determined in the study. Starting from the 23rd and 24th participants in the 12th holding, where the answers started to repeat each other, addition of new participants were terminated.

The research was carried out between 8 April 2019 - 22 May 2019. Firstly, an appointment was made for the appropriate time by calling the companies. The analysis was based on the responses of 24 participants in 12 holdings. Interviews lasted approximately 30-60 minutes and were recorded by the researcher. The recording device was not used for reasons such as lack of permission and ensuring that interviewers were sincerer and more open in the interview. The interviews were conducted with two senior executives/managers in each holding company, one of which is in HRM and the other one in charge of one of the other functions in the supply chain management. HRM managers were preferred in appointments and support was taken from the HRM manager in reaching the other managers/executives but in some companies, this process has been reversed. Interviews were conducted simultaneously with two managers in 8 companies. In 3 companies, 2 executives were interviewed in their offices on the same day in different time zones. Only one company could not make an appointment on the same day, and 2 managers were interviewed on separate days.

In the research, the managers of the units in the supply chain were asked 6 questions about green supply chain management, and the managers of the human resources department were asked 7 questions about green human resource management and its effect on green supply chain management. A semi-structured interview form was used in the study. While creating questions the studies of (Atrek & Özdağoğlu, 2014; Coşkun & Bozyiğit, 2019; Jabbour & Sousa Jabbour, 2016; Longoni, Luzzini & Guerci, 2018) were used.

In addition to these questions, the participants were also asked about non-financial reporting (i.e. GRI sustainability, integrated reporting, etc.), how many people work in the enterprise and in which sectors they have activities.

Before finalizing the research questions, as a preliminary test, opinions of 2 faculty members working in human resources management and 2 faculty members working in supply chain management were obtained for the research questions.

In addition, from 2 separate enterprises, 2 executives from human resources management and 2 executives from supply chain management were interviewed.

As a result of the feedback received from 4 academicians and 4 professionals from the sector, the interview form questions were finalized.

Descriptive and content analysis methods were used in the analysis of the research data.

Content analysis is used in qualitative research to provide systematic interpretation and analysis of the findings. Descriptive analysis, on the other hand, allows categorizing, summarizing and interpreting the data as a source (Coşkun, Altunışık, Bayraktaroğlu & Yıldırım, 2015: 324; Coşkun & Bozyiğit, 2019: 615).

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4.3. Research Questions

The research has 3 main questions. Other questions are based on these three main questions. The main questions of the research are as follows; *1. "Why green supply chain practices matter to your company?" 2. "What kind of applications do you make in the green supply chain process?", 3. "Are there any contributions and practices of HRM departments in the green supply chain?*

4.4. Research Constraints

The research was conducted through focus interviews with a total of 24 senior executives from 12 Holding companies. 2 executives were selected from each holding company as one from the supply chain and the other from the HRM unit. The results are limited to the data obtained through these interviews. However, this limitation arises from the purpose and questions of the research. The sample of the research consists of holding companies which perform both GSCM and GHRM activities aimed at increasing the ecological performance of SCM business processes. In other words, holdings that only implement GHRM or GHRM applications are excluded. In our country, the number of companies that implement both GSCM and GHRM applications is very limited. For example, in our country, between November 2018 and November 2019, the number of holdings that accepted to be evaluated in the sustainability index is 8 and the number of all companies is 50. Interviews were conducted with senior executives to obtain the healthiest answers for the research questions. Therefore, it is necessary to be careful about the interpretation and generalization of the results.

Secondly, only in-depth interview method, which is one of the qualitative research types, was used. As environmental HRM applications in SCM processes become widespread in the sector in the following years, quantitative methods can be used in future researches or more comprehensive data can be obtained by using qualitative and quantitative methods together.

4.5. Validity and Reliability of the Study

It is emphasized that a preliminary test should be conducted in order to ensure reliability in the studies conducted by using an in-depth interview method (Coşkun et al., 2015; Coşkun & Bozyiğit, 2019: 615). A preliminary test was conducted in the research and the questions were finalized in line with the feedback received from 8 participants. The same questions were asked to the participants in the same way. All interviews were conducted by the researcher. For the study to be convincing, firstly, the analysis of the findings was explained and then the findings were interpreted.

In the study, who was interviewed, how the findings were obtained, and which analysis method was used, were explained in detail. Hence, it is thought that the study meets the reliability and validity conditions (Coşkun & Bozyiğit, 2019: 615).

5. Findings

The findings section provides information about the demographic characteristics of firms and participants, and then provide answers to the questions asked by managers on HR and Supply Chain.

The research was carried out in holding companies which declared that they have applied GSCM in Istanbul. The senior managers of 12 holdings stated that they provide environmental training in their companies.

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In addition, 11 out of 12 holdings stated that they prepared GRI sustainability reports, and one stated that they used integrated reporting in which financial and non-financial data were published together. The subsidiary companies within these holdings have ISO 90001 Quality Management System certificate, ISO 14001 Environmental Management System certificate and OHSAS 18001 Occupational Health and Safety Management System certificate. The number of employees is more than 500 and they are large-scale enterprises. The subsidiary companies are active in sectors such as chemical, petroleum, plastics, paper, construction, cement, energy, logistics, automotive, tourism, food, finance and insurance.

Table 4: Title of the Participants in Companies

Company	Participant	Title	Participant	Title
Company 1	Participant 1	Unit manager of operations (reporting to assistant general manager)	Participant 2	Human resources director
Company 2	Participant 3	General manager and member of the board	Participant 4	Human resources director
Company 3	Participant 5	Assistant general manager for product development	Participant 6	Human resources director
Company 4	Participant 7	General manager and member of the board	Participant 8	Human resources director
Company 5	Participant 9	Assistant general manager for procurement	Participant 10	Human resources group manager
Company 6	Participant 11	Assistant general manager of marketing	Participant 12	Human resources director
Company 7	Participant 13	Assistant general manager for procurement	Participant 14	Human resources director
Company 8	Participant 15	Supply chain director	Participant 16	Human resources manager
Company 9	Participant 17	Supply chain director	Participant 18	Assistant general manager / human resources and industrial relations
Company 10	Participant 19	Assistant general manager for materials planning&logistics	Participant 20	Human resources director
Company	Participant	Title	Participant	Title
Company 11	Participant 21	Assistant general manager of production	Participant 22	President - human resources and corporate communications
Company 12	Participant 23	Supply chain director	Participant 24	Human resources director

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Two managers from each company were interviewed. While writing the properties of the firms; they were coded as company 1, company 2 and so on, and the participants were coded as participant 1, participant 2 and so on. For example, participant 1 is the unit manager of operations and participant 2 is the human resources director. Participant 1 and participant 2 work in the same company (company 1). In some tables, the number of answers exceeded the number of participants because the participants answered more than one question. The titles and working areas of the participants are shown in Table 4 above.

Table 5 shows the frequency and percentage values of the questions asked to human resources managers and their responses. 7 questions were asked to HR managers.

In the first question "Why does green management apply to your company?', answers were given by human resources (HR) managers as; legal obligation with 41%, occupational health and safety with 24%, social pressures with 24%, and competition with 11%.

The second question is "What are the human factors that affect the environmental performance in the green supply chain process?". In this question, answers were given by HR managers as; senior management commitment with 27%, organizational culture with 23%, employee involvement with 20%, environmental motivation with 17%, green innovation with 10% and corporate green social responsibility with %3.

Questions 3, 4, 5, 6, and 7, which were asked to HR managers in the research, are related to five HRM practices that are expected to have an impact on environmental performance in the GSCM processes. The third question is "What are your selection and placement practices to improve environmental performance in the GSCM process?". In this question, answers were given by HR managers as; using the environmental criteria with 44%, E-recruitment with 31%, orientation with 19% and create a brand identity with 6%.

Table 5: Responses of HRM Managers to the Questions

Question	Reply	Frequency	Percentage
1. Why does green management apply to your company?	Legal obligation	7	41
	Occupational health and safety	4	24
	Social pressures	4	24
	Competition	2	11
	TOTAL	17	100
2. What are the human factors that can affect the environmental performance in the green supply chain process?	Senior management commitment	8	27
	Organizational culture	7	23
	Employee involvement	6	20
	Environmental motivation	5	17
2. What are the human factors that can affect the environmental performance in the green supply chain process?	Green innovation	3	10
	Environmental voluntary activities of employees	1	3
	TOTAL	30	100

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3. What are your selection and placement practices to improve environmental performance in the GSCM process?	Using environmental criteria	7	44
	E-recruitment	5	31
	Orientation	3	19
	Create a brand identity	1	6
	TOTAL	16	100
4. What are your training and development practices to improve environmental performance in the GSCM process?	Environmental awareness and consciousness training	10	29
	E-training and development	8	23
	Recycling training	7	20
	Occupational health and safety	7	20
	Environmental training for managers	3	8
	TOTAL	35	100
5. What are the remuneration and rewarding practices for improving environmental performance in the GSCM process?	Rewarding green innovations	6	32
	Rewarding proposals and projects	6	32
	Performance management system	4	21
	Rewarding managers based on green targets	3	15
	TOTAL	19	100
6. What are your employee participation and empowerment practices in order to improve environmental performance in the GSCM process?	Suggestion systems	9	31
	Managerial behavior	9	31
	Team working	7	24
	Internal communication	4	14
	TOTAL	29	100
7. What are your practices to create a green organizational culture and green organizational climate in order to improve environmental performance during the GSCM process?	Managerial behavior	10	33
	Training and development	8	27
	Performance management	7	23
	Green selection and placement	5	17
	TOTAL	30	100

In the fourth question, “What are your training and development practices to improve the environmental performance in the GSCM process?”, answers were given by HR managers as; environmental awareness and consciousness training with 29%, E-training and development with 23%, recycling training with 20%, occupational health and safety with 20% and environmental training for managers with 8%.

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In the fifth question, "What are the remuneration and rewarding practices for improving environmental performance in the GSCM process?", answers were given by HR managers as; rewarding green innovations with 32%, rewarding proposals and projects with 32%, performance management system with 21% and rewarding managers based on green targets with 15%. The sixth question is "What are your employee participation and empowerment practices in order to improve environmental performance in the GSCM process?". In this question, answers were given by HR managers as suggestion systems with 31%, managerial behavior with 31%, and team working with 24% and internal communication with 14%. The seventh question is "What are your practices to create a green organizational culture and green organizational climate in order to improve environmental performance during the GSCM process?". In this question, answers were given by HR managers as; managerial behavior with 33%, training and development with 27%, performance management with 23% and green selection and placement with 17%.

Table 6: Responses of SCM Managers to the Questions

Question	Reply	Frequency	Percentage
8. Why does green management apply to your company?	Total quality management	9	28
	Legal obligation	8	24
	Business strategy	6	18
	Occupational health and safety	5	15
	Environmental Awareness	5	15
	TOTAL	33	100
9. What are the human factors that can affect the environmental performance in the supply chain process?	Senior management commitment	11	31
	Unskilled labor	8	22
	Lack of environmental awareness	7	19
	Lack of reward and incentives	5	14
	Organizational culture	5	14
	TOTAL	36	100
10. What aspects of the environment do you pay attention to in your purchasing processes?	Sustainability of production	9	35
	Raw material selection	8	31
	Green supplier selection	6	23
	Recycling	3	11
	TOTAL	26	100

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11. What aspects of the environment do you pay attention to in your production processes?	Product design	10	32
	Raw material selection	8	26
	Total quality management	7	23
	Recycling	5	16
	Lean manufacturing	1	3
	TOTAL	31	100
12. What practices do you have in your green distribution processes?	Transportation mode	8	42
	Green packaging	6	32
	Reverse logistics	5	26
	TOTAL	19	100
13. What activities does GHRM implement in the GSCM processes?	Training and development	10	32
	Employee involvement	7	23
	Managing culture	6	19
	Rewarding and incentives	4	13
	Selection and placement	4	13
	TOTAL	31	100

Table 6 shows the frequency and percentage values of the questions asked to SCM managers on the supply chain and their responses. 6 questions were asked to SCM managers in the supply chain.

The 8th question shown in Table 6 is the same as the first question asked to the HR managers in Table 5 “Why does green management apply to your company?”The 8th question is “Why does green management apply to your company?”.

In this question, answers were given by supply chain (SC) managers as; total quality management with 28%, legal obligation with 24%, business strategy with 18%, occupational health and safety with 15% and environmental awareness with 15%.

Similarly, the 9th question shown in Table 6 is the same as the second question asked to the HR manager in Table 5, “What are the human factors that can affect the environmental performance in the supply chain process?”

In the 9th question, “What are the human factors that can affect the environmental performance in the supply chain process?”, answers were given by SC managers as; senior management commitment with 31%, unskilled labor with 22%, lack of environmental awareness with 19%, lack of reward and incentives with 14% and organizational culture with 14%

10-11-12th questions were only asked to managers on the supply chain. The managers in this group were asked which practices they use for the protection of the environment in the procurement, production and distribution processes of the company.

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The 10th question is “What aspects of the environment do you pay attention to in your purchasing processes?”. In this question, answers were given by SC managers as; sustainability of production with 35%, raw material selection with 31%, green supplier selection with 23% and recycling with 11%.

In the 11th question, “What aspects of the environment do you pay attention to in your production processes?”, answers were given by SC managers as; product design with 32%, raw material selection with 26%, total quality management with 23% , recycling with 16% and lean manufacturing with 3%.

The 12th question is “What practices do you have in your green distribution processes?”. In this question, answers were given by SC managers as; transportation mode with 42%, green packaging with 32% and reverse logistics with 26%.

In the 13th question, it’s asked that which HRM practices are implemented for the personnel to improve the environmental performance of the company in its supply chain processes. The 13th question is “What activities does GHRM implement in the GSCM processes ?”

In this question, answers were given by SC managers as; training and development with 32%, employee involvement with 23%, managing culture with 19%, rewarding and incentives with 13% and the selection and placement with 13%.

6. Discussion

HR managers and SC managers were divided into two groups and different questions were asked to investigate the relations between GSCM and GHRM in the study. The first two questions were jointly asked to both groups. In the first question, the managers in both groups were asked why their companies applied green management practices. With this question, it is aimed to determine and compare the opinions of both HR managers and SC managers about why green management is applied in their companies.

In the research, the answers given by the managers in the supply chain to the reasons of green management understanding in the companies were different from those of HR managers.

While managers on the supply chain express their total quality management philosophy as an important determinant of their green management approach, it is noteworthy that HR managers never mention total quality management. Another important difference is that while managers in the supply chain mention business strategies (18%), HR managers do not. SC perceive environmental management practices as a strategic opportunity that constitutes the competitive advantage of the enterprise by 18% among their responses. SC managers are aware of the need to integrate total quality management and environmental management practices by 28% among their responses.

It is stated in the literature that the integration of TQM and EM applications will produce more synergistic results for the enterprise (Arda et al., 2018). Among the answers given by the SC managers, the reason for the green management understanding of 24% was stated as legal obligations.

Among the answers given by HR managers, the reason for the green management approach was stated as 41% legal obligation, 24% social pressures and 11% competition.

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When the answers of HRM managers are compared with the answers given by SCM managers; it is seen that HR managers perceive environmental practices in their companies at a lower rate as a means of providing strategic superiority to competitors. HR managers see environmental practices mostly as a product of institutional isomorphism (Meyer & Rowan, 1977). However, researchers report that there is a relationship between the environmental performance and financial performance of enterprises (O'Donohue & Torugsa, 2016).

The second common question, "What are the human factors that affect the supply chain process?" was answered the same as "senior management commitment" by both executive groups which inconsistent with the literature. Various researchers state that top management attitudes are the most important determinants of environmental performance (Daily & Huang, 2001; Green, Zelbst, Meacham & Bhadauria, 2012). The decisions taken regarding environmental management are the top management decisions. These activities increase costs, at least in the initial phase and they may require the company to allocate significant resources. The sensitivity of the senior management to the environment and its approach to the issue affect the environmental policies of the enterprise. The extra-role behaviors and altruism that senior management will show for environmental performance are more effective than a certificate and written policies.

Although the strategic nature of human resources management functions is frequently expressed in the literature, HR management decisions are also dependent on the commitment of senior management, the perspective of people and departments and the resources allocated to human resources practices.

Unskilled labor (22%) and lack of environmental awareness (19%) were important human factors affecting environmental performance among the answers given by SC managers. Inadequate performance and inaccurate decisions of the employees who have deficiencies in the knowledge and skills required by the work they perform; may lead to negative environmental consequences.

The low environmental awareness expressed by the SC managers is an important human factor that reduces the environmental performance that the researchers agree to be common in the literature. Researchers report evidence of relationships between environmental awareness and environmental behavior.

The inadequacy of reward systems (14%) and organizational culture (14%) was expressed as factors affecting human-related environmental performance in the supply chain.

Fewer expressions of reward systems may result from the fact that environmental behavior is not just a matter of expectation of material compensation. When people embrace environmental values, they can show altruistic environmental behaviors without rewards. However, among the answers given, 14% are expected to receive financial or honorary rewards for the environment. Among the responses of HR managers, organizational culture (23%) was stated more important human elements than SC managers (14%). According to Jabbour and Santos (2008), organizational culture is one of the most important elements in the implementation of the green supply chain.

Among the responses provided by HR managers, environmental voluntary activities of employees (3%) were the least expressed human factors affecting environmental performance. This result is an unexpected remarkable finding in the study.

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The literature emphasizes the importance of the practices of voluntary environmental teams in terms of environmental performance. Kumar, Mangla, Luthra & Ishizaka (2019), states that human factors such as organizational culture and employee participation positively affect the voluntary environmental factors of the employees in his study on human factors affecting GSCM. As an impacting factor, the GSCM environmental performance, for example, organizational culture, is a more important human factor than the voluntary environmental activities of employees. This result obtained in the study is in line with the research results of (Kumar et al., 2019).

Questions 3, 4, 5, 6, and 7, which were asked to HR managers in the research, are related to five HRM practices that are expected to have an impact on environmental performance in the GSCM processes.

HR unit managers stated that the selection and placement processes also consider environmental criteria when choosing the candidate. Renwick et al. (2013) stated that prior experience, knowledge and skills related to the environment should be taken into consideration when choosing candidates in the GHRM field. In this context, it was stated in the answers given by the HR managers that companies prefer professionals and new graduates that participate in environmental social responsibility activities. Among the answers provided by HR managers, the use of the company's environmentalist brand image as a strategy to attract talent to the business is mentioned only once. The sustainability reports that these companies publish on their web pages for information purposes, company policies regarding environmental management and voluntary social responsibility practices should not be seen as the aim of gaining legal and social acceptance.

It is recommended that these studies be turned into strategic human resources practices. In the literature, it is stated that the image of green business in recruitment processes enables talented employees to prefer business more (Guerci et al., 2016).

The transition of HRM departments to E-HRM applications causes them to redesign all HRM functions within the framework of the green management approach. Among the answers given to the research questions, it was found that the managers prefer E-recruitment in recruitment (31%) and E-training and development (23%) in training and development. According to these results, it can be stated that GHRM implementations have started to be adopted by HRM departments and it has started to be a role model. However, while writing job descriptions in job analysis processes, an expression that environmental responsibilities are integrated into job descriptions has not been stated by managers.

Jabbour & Santos (2008) and Renwick et al. (2013) stated that environmental responsibilities should be included in their job descriptions. Orientation programs, on the other hand, will have beneficial results for the transfer of the importance given by top management to the subject and related policies on the environmental issues to the recruits. It is thought that orientation programs will play a major role in instilling the green values of the corporate culture to the new employees.

In the research, organizing environmental awareness training was stated as the most important factor contributing to the improvement of environmental performance in GSCM processes among the answers given by the managers. Mandip (2012) stated that training on waste management, energy efficiency and recycling should be used to improve GSCM performance.

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In the study, among the answers of the managers, it was stated that the proposals and projects(32%) and innovations (32%) considered to contribute to the environment after the evaluation, were awarded in the enterprise. Rewarding managers based on green targets (15%) were the least expressed.

The frequency of using remuneration based on direct green targets in the research is 3 among HR answers' This shows that the rate of systematic integration of green practices into the wage scale is low in the companies involved in the research. However, in the researches, relationships between remuneration and environmental behaviors are found (Wehrmeyer, 2017; Jabbour et al., 2010).

When "employee participation and empowerment practices to improve environmental performance in the GSCM process" was asked, HR managers gave the most frequent answers as suggestion systems and managerial behavior (31% both).

Suggestion systems are one of the most effective tools that increase employee contributions and strengthen employees in environmental management (Daily et., Al. 2012). The support of suggestion systems by the company managers is very important in this process. This is because the encouragement and motivation of SC managers for employee ideas and projects is the determining factor in the implementation of the suggestion system.

In studies investigating the relationship between organizational culture and GSCM performance, organizational culture is one of the main factors affecting environmental performance (Schuler & Jackson, 2014). It is the responsibility of employees at all levels to establish the green management approach in the enterprises (Masri & Jaaron, 2017).

Managerial behavior was the most expressed answer with 33% among the HR managers to the question "What are your practices to create a green organizational culture and green organizational climate in order to improve environmental performance during the GSCM process?". This result is in line with other studies in the literature (Daily & Huang 2001).

Among the answers given by HR managers in the research, training development, performance management and selection placement practices are expressed as the practices that form the green organizational culture. Selection placement is the least expressed HRM practice among answers. However, recent researches in the literature also show that green recruitment practices in placing green values in organizational culture; It reveals that it produces more effective results than training and development practices (Masri & Jaaron, 2017).

Questions 10, 11 and 12 of the study were asked to supply chain managers. These questions were asked to determine the practices of the company for the protection of the environment in the procurement, production and distribution processes. The questions asked to the supply chain managers regarding the practices carried out for the protection of the environment in the procurement processes were answered with priority based on continuity of production. This result can be interpreted as an interesting irony of firms that shows "firstly the continuation of production then the green approach" when making the choices in the supply chain.

The applications that SC managers emphasize in purchasing; raw material selection, green supplier selection, recycling.

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In order to minimize environmental damage in production processes, the most frequently stated applications by SC managers are as follows; product design, raw material selection, total quality management, recycling and lean manufacturing.

In order to minimize environmental damage in the distribution processes, the most frequently stated applications by SC managers are as follows; transportation mode selection, green packaging and reverse logistics.

In the last question, SCM managers were asked what HRM practices the HRM department performed in supply chain processes to improve environmental performance. SC managers gave "training and development" mostly as an answer to this question. The second and third most given answers were employee involvement and organizational culture. The two least-mentioned practices were equally rewarding and incentives and selection and placement. Training and development, employee participation and empowerment, management of organizational culture are the most important applications in the effective management of ISO 90001 Quality Management and ISO 14001 Environmental Management systems (Daily and Huang, 2001; Jabbour & Sousa Jabbour, 2016). It can be interpreted that the environmental criteria are the least implemented in the least expressed rewarding & incentives and selection & placement systems. Failure to add environmental criteria to selection and placement systems and fee scales will reduce HRM departments' contribution to environmental performance in GSCM applications.

7. Conclusion

In this study, GSCM applications of firms are classified in two ways as internal and external GSCM applications (Zhu, Sarkis & Lai, 2008). Internal GSCM is defined as the integration of the green management approach into their systems (Zhu, Sarkis & Lai, 2008).

It is stated that HRM policies, practices and processes developed by the HRM departments can contribute relatively more to the environmental performance of the enterprise, especially in internal GSCM practices (Kumar et al., 2019).

In the external GSCM activities, it is emphasized that all the companies in the chain are responsible for each other's activities in terms of environmental value as well as the common added value created (González, Sarkis & Adenso-Díaz, 2008; Vickery et al., 2003). It was pointed out that each firm is in a part of value production in the process from raw material to final end-buyer, and that a single company's environmentally friendly product and innovation activities cannot have impacts at the macro level.

In the EPI 2018 report, prepared by Yale Center for Environmental Law & Policy (Yale University) based on their environmental performance, Turkey was ranked 108th among 180 countries (The Environmental Performance Index, 2018). According to the "World Health Statistics 2018" report of the World Health Organization, Turkey was ranked 15th among the most polluted countries and it shows the importance of handling the issue within the framework of public policies and the legal regulations in this process.

Especially the demands of the EU, the importance given by foreign investors to the issue and widespread sustainability reporting or integrated reporting applications have been transforming companies to take measures in terms of environmental impacts from voluntary activities to compulsory business behaviors.

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If an enterprise continues to work with suppliers in spite of the negative business behavior socially or environmentally, the reputation of the enterprise, its brand value, its relations with investors or non-governmental organizations are also damaged (Vachon & Robert 2006). Therefore, companies need to focus not only on their economic benefits but also on their social and environmental performance in the management of their supply chains. Each company needs to collaborate with both supplier and buyer companies in its value chain and produce joint projects in order to deal with environmental issues (Gavaghan et al., 1998). At this point, companies that want to solve the problems in external GSCM activities should create their internal GSCM systems (González et al., 2008; Vickery et al., 2003).

This study was carried out to draw attention to the positive effects of GSCM and GHRM applications on environmental performance when GSCM and GHRM applications are integrated. China and North America are the countries with the highest number of studies on the integration of SCM and EM systems. GHRM studies are a new topic that has recently been studied in the world. GHRM has also started to be implemented by companies in our country. The fact that GHRM applications in the business world are at an early stage is also reflected in the studies in the literature. There are few empirical and theoretical studies in the national literature. In this sense, the study aims to contribute to both theory and practice by trying to integrate a new issue such as GHRM into GSCM processes. In this context, a comprehensive literature review was carried out and the opinions of academicians and practitioners were taken. In the study, both a conceptual model was proposed, and qualitative research was carried out.

In the study, GSCM and GHRM dimensions were put forward and the relationships between these dimensions were examined. In the findings part of the research, the subject was discussed, and inferences were made in line with the opinions of the researchers in the literature. We believe that the study will have some important implications for academicians and practitioners working on GSCM and GHRM.

Finally, as it is seen in the findings, the most important human factor determining the environmental performance of the GSCM is determined by the senior management commitment. The size of the budget allocated by the top management of the company for environmental management and the share it gives to human resources from this budget directly affect HRM's environmental management practices. The HRM department, which receives a large amount of budget from the senior management, allocates it to its internal practices in line with the budget and implements the applications. In this respect, it can be stated that the senior management can provide support to the HRM department, which supports the GSCM processes to be environmentally sensitive and manageable, at the budget allocated by the senior management.In addition, the level of adoption of environmental values by senior management and other department managers will be decisive in the culture of the enterprise. All of these will also determine the scope and content of the HRM's systems and applications to be developed by the HRM departments. The decision choices of HRM such as the inclusion of environmental targets in wage systems, adding environmental criteria in performance management systems, preferring environmental criteria in recruitment may be possible with the support of senior management. while considering environmental factors in several HRM systems, such as training and development, employee engagement and empowerment, and managing culture.

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The lack of environmental criteria in some HRM practices, such as selection and placement, performance evaluation, remuneration and rewarding practices, will reduce HRM's contribution to GSCM environmental performance results. Unless HRM practices are considered as a whole, it is not possible to achieve the desired level of efficiency in environmental performance.

8. Future Research Directions

Future researchers may investigate the relationship between HRM practices and employees' innovative work behavior in environmentally friendly products and processes at the individual level. They may investigate how HRM practices affect environmental performance through increased employees' organizational citizenship behaviours toward environment. In addition, measuring the perceptions of employees and unit managers about the GHRM practices developed by HRM units can contribute to the discussions in the field.

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PRIORITIZING INNOVATION FACTORS BY USING ANALYTIC NETWORK PROCESS

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Abstract

The emergence and development of the fourth industrial revolution affects production systems. This new revolution also has an impact on logistics, which has a direct relationship with production. Organizations give importance on innovation, technological change and product differentiation to compete with their rivals. Innovativeness creates better understanding of customer needs and wants, catch up their rivals and become more proactive in seeking the market opportunities for organizations. Therefore, improving logistics services using innovations can help improving strong customer relationships, derive barriers to competition, increase customer loyalty, change costs and conduct market activities more effectively. In this context, the objective of this study is to prioritize the innovation factors in logistics industry using a pairwise comprehensive method named Analytic Network Process (ANP). This model is proposed to define a ranking between selected criteria for innovation based decisions. This methodology demonstrates, which criteria has the most important role in the innovation processes.

Keywords: ANP, Decision-making, Innovation, Logistics Industry.

JEL Classification: L80, O30, J44

YENİLİK FAKTÖRLERİNİN ANALİTİK AĞ SÜRECİ KULLANARAK ÖNCELİKLENDİRİLMESİ

Öz

Dördüncü sanayi devriminin ortaya çıkışı ve gelişmesi üretim sistemlerini etkilemektedir. Bu yeni devrimin, üretim ile doğrudan ilişkisi olan lojistik üzerinde de etkisi bulunmaktadır. Örgütler, rakipleriyle rekabet edebilmek için inovasyon, teknolojik değişim ve ürün farklılaşmasına önem vermektedirler. Yenilikçi olmak, müşteri ihtiyaç ve isteklerini daha iyi anlamak, rakiplerini yakalamak ve pazar fırsatlarını aramada işletmeleri daha proaktif hale getirir. Bu nedenle, yenilikleri kullanarak lojistik hizmetlerini iyileştirmek, güçlü müşteri ilişkilerini geliştirmeye, rekabete engel oluşturmaya, müşteri sadakatini arttırmaya, maliyetleri değiştirmeye ve piyasa faaliyetlerini daha etkin bir şekilde yürütmeye yardımcı olmaktadır. Bu bağlamda, bu çalışmanın amacı, lojistik sektöründeki inovasyon faktörlerini Analitik Ağ Süreci (AAS) olarak adlandırılan bir yöntem kullanarak önceliklendirmektir. Bu model, inovasyona dayalı kararlar için seçilen kriterler arasında bir sıralama oluşturmak için önerilmiştir. Bu metodoloji, inovasyon süreçlerinde hangi kriterlerin en önemli role sahip olduğunu göstermektedir.

Anahtar kelimeler: AAS, Karar Verme, İnovasyon, Lojistik Endüstrisi.

JEL Sınıflaması: L80, O30, J44

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1. Introduction

With the globalization of the economy and increase of competitive pressure, many companies have tried to shape their costs and service advantages by continuously improving their logistics performances. Logistics industry is critical example of the birth and development of a vital new service-based industry, that transformed from the business concept of transportation to that of serving the entire logistical needs of customers (Chapman et al., 2003). For a global world, an effective logistics operation can provide a competitive advantage for companies and increase a company's market share (Daugherty et al., 1998; Mentzer et al., 2001). Globalization stimulate organizations to find new markets, increase their production rates and resource efficiency which logistics plays a crucial role in the transportation of materials, products and services through the supply chain. Therefore, logistic operations are capable of reducing costs and providing delivery solutions according to the customer's need, that focuses on enhancing customer satisfaction by adding value, which also adds value to overall firm's output (Grawe, 2011). Logistic operation success depends on adaptability to the challenges of their industry environment in rapidly changing competitive environment (Daugherty et al. 2011). Although the opportunity to create a competitive advantage through logistics, has inspired researchers and practitioners to consider diverse critical factors leading to higher levels of logistics performance, there is not clear and exact definition of innovation concept in logistic service. In fact, in 2005 Flint and his friends stressed out that logistics research has largely ignored innovation. After understanding the importance of innovation in logistics, researchers have started to study on new innovative improvements in the logistics firms. These researchers have suggested some innovative activities such as focusing on customer value orientation (Flint et al., 2005, Busse 2010; Busse and Wallenburg 2011), technologies for logistics service providers (LSP) (Lin, 2007; Hsu and Wallace, 2007), the new business strategy (Chapman et al. 2003; Kim et al., 2012), external relations with LSP (Bellingkrodt and Wallenburg, 2013; Dai, 2015) and adoption of logistic innovation (Tanskanen, 2015) to help logistics firms to identify which key factors can create competitive advantages through successful innovative activities.

The purpose of this research is to examine which external and internal factors affect innovation decisions in logistics firms. To answer this question, firstly the criteria are defined according to logistic innovation literature and then Analytic Network Process (ANP) model is used to find out which criteria are most important for logistics industry. In the second section of this paper the relation between innovation and logistics is examined and the descriptions of criteria are explained. After that, in the third section the decision making methodology is given and the results are discussed. Finally, fourth section tries to give some concluding remarks.

2. Innovation and Logistics

In a modern business environment, characterized by demanding customers, higher competition, and uncertainty, innovation is a major contributor to the long-term success and growth of a firm (Cichosz et al., 2017).

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Today, logistics goes beyond the role of traditional role in "transportation" to offer its customers' a strategic weapon to create sustainable competitive advantage.

Improving logistics services using innovation can help develop strong relationships with customers, derive barriers to competition, increase customer loyalty, change costs and conduct market activities more effectively. For logistics firms that serve the market in the new economy, technology, knowledge and relationship networks are three necessity for service innovation (Chapman et al., 2003). The current progress of the logistics industry is focused on innovative management approach which means companies that will increase the use of the new management process to systematically implement and improve (Viederyte, 2016). Logistics innovation has been defined as any logistics-related service that is regarded as new and helpful to a particular focal audience (Flint et al. 2005).

Innovation in the service sector is described by Sundbo and Gallouj (1999) as an incremental innovation in which small adjustments are made to processes and are rarely expressed as radicals (Sundbo & Gallouj, 1999). On the other hand, service innovation is seen as a multidimensional process and its organizational aspect is dominant when compared with the production sector. Service organizations use innovation to improve market performance and efficiency, such as cost-effectiveness, productivity, quality of service, inventory management, process improvement, value, price and information. These developments have become the main drivers of market competition in the services industry (Chapman et al., 2003).

Angeleanu (2015) stated that “the explosion in global trade that has occurred in the last two decades is in part a reflection of the innovations in logistics […] that have led to a reduction in the costs of shipping goods and services across borders”. Logistics innovation can range from very basic to very complex, and can be applied to internal operations or services with business partners (Cichosz et al., 2017).

There are two important classification of innovation, incremental and radical innovations. Incremental innovations indicate minor changes and usually takes place in the process of efficiency improvement. Radical innovations, at the same time known as revolutionary innovations or destructive innovations and are recognized by the customers and have a direct effect on them. Some examples of radical innovation as a process innovation are, introduction of the standardized container on a mass scale in international trade, developing cross-docking, introduction of Vendor Managed Inventory (VMI). Technological innovations for logistics include Materials Resource Planning (MRP) systems, Electronic Data Interchange (EDI), Global Positioning Systems (GPS), barcoding, RFID tags and so on. In addition to incremental innovations, radical ones not only reduce cost and time, but also increase the consistency and flexibility of logistics operations (Cichosz et al., 2017).

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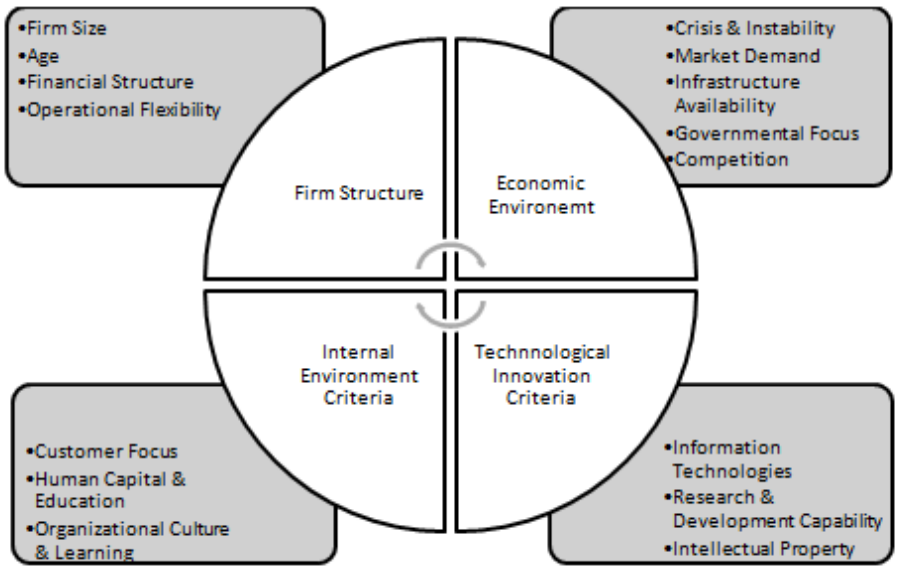
Viederyte (2016) argues that the development of process innovations in transport, logistics and e-systems will be determined by growing passenger and goods carriage flows and the cargo handling volumes; increasing concentration of people in cities, resulting in uneven loading of road infrastructure and increasing traffic jams; increasing pollution of the environment and the greenhouse effect; stronger competition because of third countries which lowers prices. Therefore, to stay competitive innovation is important for logistics and transportation.

Service quality and consumer expectations are constantly increasing for safer, environmentally friendly and faster transportation. Angeleanu (2015) supported that new technological trends in logistics (Cloud Logistics, Supergrid Logistics, Anticipatory Logistics, Omni-Channel Logistics and Additive Manufacturing like 3D Printing) have a positive impact on logistics and supply chain processes, improve the performance of companies, increase efficiency and provide lower logistics costs.

2.1. Descriptions of Criteria

Based on the literate review and the results of discussions with stakeholders, four priority criteria and sub-criteria were identified by the group of experts. Table 1 shows the four main criteria; firm structure, economic environment, technological innovation criteria and internal environment criteria and sub-criteria selected to find out which factor is the most influencing factor of innovation decision for logistic firms.

Table1. Main and sub criteria relationship diagram



2.2. Technological Innovation Criteria

Technological innovation factors are studied by many researchers like Baark *et al*., (2011), Christensen (1995), Burgelman *et al*., (2004), Yam. *et al*., (2004) to draw underestimations, approaches and components to find out a firm's technological or innovation capabilities.

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Technological capability refers that technological readiness, consists of research and development activity, information technology (IT) infrastructure, R&D professions and ability to create intellectual property (Sumrit and Anuntavoranich, 2013).

a. Information Technologies: Information technologies (IT) are essential source of competitive advantage and improved productivity for logistics industry.

So IT's are infrastructures to make communications for managing business-to-business relations more efficiently, and the aggregation of IT systems of cooperating partners increases organizational flexibility and readiness to respond to changing environment at minimized costs (Rajaguru and Matanda, 2013). There are different informational portal such as Electronic data interchange (EDI), the Internet, value added network (VAN), point of sales (POS), electronic ordering system (EOS), logistics information system, computer telephony integration and enterprise that are commonly used portals in logistics industry (Lin, 2008). On the other hand customer services are very important for logistic services to create customer satisfaction and loyalty. According to Jiebing and Yongjiang (2013); "Customer knowledge management with IT application is positive related to value delivery in business model innovation through increasing knowledge accessibility for both firms and customers". ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management) are new systems that combine technology and process to enable logistic services, in which allows higher standards for customer service. ERP is a system that enables enterprises to use the labor force, machines and materials, they need to produce products and services efficiently, on the other hand CRM systems are used to create and continue ties with customers to gain earnings (Rajaguru and Matanda, 2013). In logistic services, companies use information technologies to decrease cost of production by optimization and to increase customer relations (Mesjasz-Lech, 2015).

b. Research & Development Capability: Research and Development (R&D) operations are the most crucial part of the technological innovation and intangible investments are critical to organizations (Evangelista et al.,1997). According to OECD, Research and development is "… comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications" (OECD,2005). Many studies are tried to define antecedent factors of firm innovation capabilities (Christensen, 1995; Chiesa et al., 1996; Burgelman et al., 2004, Yam et al., 2004). The R&D capability which is emphasizing creativity, creating new value for customers, and increasing innovation to tap the various facets of innovation capability (Calantone et al., 2002), is the intersection point of these studies. The basic functions of R&D capabilities of firm are to expand its existing technologies and establish new technologies or improve R&D functions.

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The number of researchers (employees of R&D department), success rate of R&D product or services, self-generated innovative products and R&D intensity are the basic content of the R&D capabilities (Wang et al., 2008).

c. Intellectual Property: In the service economy, intellectual property (IP) is a key component in "creating an image for your business in the minds of your current and potential customers and in positioning your business in the market" (Sukarmijan and Sapong, 2014). Strong IP rights led to increased use of intangible assets, such as trademarks, brands and patents in licensing and commercialization activities (Arora and Fosfuri, 2003). Companies must protect their intellectual property in order to generate revenue from their innovative capacity and creativity for further innovation investment.

On the other hand, intellectual rights are used with marketing mix such as advertisement, PR applications, sales & promotion activities, that differentiate organization product and services, that consumers can easily identify and differing marketing strategies (Sukarmijan and Sapong, 2014).

2.3. Economic Environment Criteria

There is an important relationship between the economic environment and the innovation performance of firms.

a. Crisis&Instability: The economic crisis makes business opportunities less precise, making companies less willing to invest in long-term activities where returns are risky. Most companies react by reducing spending, including investment and innovation (Archibugi et al., 2013). The research of Paunov (2012) provides a quantitative analysis on Latin American firms' innovation performance during the 2008–2009 global crisis period. The research findings indicate that investments in innovation decreased significantly for during the 2008–2009 global crisis and one in four firms cut back on innovation projects. In addition, participating in such projects is important for the development of technological performance, and the global crisis may adversely affect firms' decisions on innovation (Paunov, 2012). Besides, economic crises allow businesses, industries and all nations to reorganise productive facilities and search for new opportunities. Smart companies think that the economic crisis will not last forever and that the recovery will come sooner or later (Archibugi et al., 2013).

b. Market Demand: Demand factors; customers, tastes, customs and purchasing power are important factors that can affect a country's innovativeness (Fabrizio et al, 2017). In today's world the demands are increasing and companies must be ready to respond these changes. If management can sense these changes they can be organized and ready to meet the new requirements (Grawe et al., 2011).

c. Infrastructure Availability: Infrastructure is one of the important factors which generate opportunities and arises from physical assets, human capital, and general technical structure.

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Conceicao et al. indicates that, for knowledge based economies infrastructure for education, called as knowledge infrastructure, is also important. The education system, research and teaching activities are important indicators of infrastructure for education.

Another important factor for innovation in knowledge-based economies is technological infrastructure, which consists of science, engineering, and technical knowledge available to industry (Conceicao, Heitor, & Francisco, 2003). Basic research infrastructure and institutional infrastructure are important factors for a country's innovativeness (Fabrizio et al, 2017).

d. Governmental Focus: A country's innovativeness is seen as the outcome of several factors, a government policy is one of those important factors that may promote innovation (Fabrizio et al, 2017). The governmental factors such as regulations, the legal environment, the efficiency or the effectiveness of the government (public utilities, public transportation, security, education and health...) has an important effect on innovation.

Also the government policies can affect the potential of firm innovation and also can contribute or prevent the firm's innovation and economic welfare (Guan & Yam, 2015). Patanakul and Pinto (2014) suggested that government should have innovation policies that act in combination in both direct and supporting roles for promoting and sustaining innovations. The government should maintain a set of innovation policies that defines clear targets that can boost firms toward technological changes. Kim et. al. (2012) supported that patent protection is a critical determinant of innovation and that patentable innovations contribute to economic growth.

e. Competition: For innovation strategies the sectoral environment affects the strategic decision making of the managers. While competitive environments are difficult for firms, they may require firms to be more innovative in order to compete with rivals. Wang and Dass (2017) supported that in a more competitive environment, managers should be careful in their strategic decision, the higher risk associated with greater competition may reduce firms' innovation activity. Global competition has changed the rules for managing the innovation function of multinational corporations (MNCs). The companies that are competing globally need to promote innovative products, services and processes globally, quickly and effectively. Sustainable competitive advantage is largely based on the ability to access and process worldwide market and technology knowledge to accelerate and improve the innovation output (Fallah & Lechler, 2008). Fabrizo et al. (2017) supported that there are several factors affecting the innovativeness of the country. Competitiveness of the market in which the firms are competing is one of those important factors.

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2.4. Firms Structure Criteria

a. Firm Size: Firm size is a critical factor affecting the decision of long-term or short-term strategies. For instance small and medium enterprises (SMEs) is short-term oriented rather than large enterprises for strategic planning (Hwang, Hwang, & Dong, 2015). Hwang et al. point out several important differences related with the firm size. For example, large enterprises can suggest higher wages and security with their huge financial assets to attract skilled and experienced labor, particularly scientists and engineers. This is not easy for SMEs to provide this. Moreover, large enterprises often have the required financial assets that let them resist to the failure or bad results of R&D projects (Hwang, Hwang, & Dong, 2015).

Pellegrino and Savona stated that larger firms are probably deal with innovation activity because they are less probable to be influenced by liquidity restraints and can benefit from economies of scale. (Pellegrino & Savona, 2017). Cobo-Benita et al. (2016) stated that a combination of large firm size, cooperation with international partners and organizational innovation, is a sufficient condition for success in innovation performance.

b. Age : In literature there are several studies which have focused on how innovation behavior changes with the age of the firm. There are two opposite views regarding the affect of firm age on innovation. Indeed, researches suggested that there may be both negative and positive influences of firm age (Coad, Segarra, & Teruel, 2016; Sorensen and Stuart 2000).

The fact that older firms have learning effects allows them to innovate more effectively with their past experience and skills. In addition, older companies can accumulate resources, managerial knowledge, as well as the ability to accumulate reputation and market (Coad, Segarra, & Teruel, 2016). Also, as organizations age, they produce more innovations, or their ability to produce new innovations or patents seems to develop with age (Sorensen and Stuart 2000). Besides older firms may face with number of challenges related with the firm's ability to change. With respect to small firms, there may also be counter effects. For example, younger firms do not start with their routines and abilities and need to build them quickly for entry (Coad, Segarra, & Teruel, 2016). Sorensen and Stuart supported that the increasing distance between the organization's innovative capabilities and the technological frontier creates possibilities for new firms whose internal routines are more compatible with the current state of technological development. In addition, it is seen that many important innovations are pioneered by young, entrepreneurial companies (Sorensen and Stuart 2000). The challenge is for young firms, starting from the beginning, they should quickly set and also catch up higher-level of innovation capabilities. Young firms may therefore initially lack the internal capabilities to benefit from R&D investment. Coad et al. indicates that young firms have specific innovation drawbacks, and that they participate in riskier R&D, although over time the returns to R&D become more predictable. In addition, innovation by younger firms is more likely to be associated with employment growth (Coad, Segarra, & Teruel, 2016).

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c. Financial Structure: To promote the development of innovation, firms should increase their R&D expenditure. Innovation spending may involve several different types of costs such as wages and salaries of research personnel, skilled workers, educated scientists, engineers and other specialists. Because of processes characterizing R&D (investigation, preparation, incubation, illumination, verification and application), innovation activities are generally considered as long-term projects.

Firms are ambiguous about how much effort and material is needed to finish each project, or how market demand will be (Guariglia and Liu, 2014). Evaluating long-term and risky projects and diversifying risk will crucially affect the financing of innovation (Hsu et al., 2014).

Some studies in literature about innovation and finance point out high innovation potential for firms (Pellegrino & Savona, 2017). Because of the asymmetric information between shareholders, creditors and firm managers, together with limited liability, financial structure effects the firm's investment, innovation or output (Maurer, 1999). Asymmetric information also generates moral hazard problems, resulting in conflicts of interest between shareholders and managers (Guariglia and Liu, 2014).

d. Operational Flexibility: In order to improve innovation, companies invest extremely in the development of technological capabilities that offer the skills and abilities to use variety of resources and know-how. Zhou and Wu stated that, as organizational capabilities increase in a specific field, it encourages further utilization in that area.

As companies increase their experiences and become more efficient in using their available knowledge, the self-reinforcing nature of learning leads to more productive activities. Strategic flexibility reinforces the positive impact of technological capability on research; that is, when strategic flexibility is high, more technological capability is associated with more explorative innovation (Zhou and Wu, 2010). Technological innovation offers the promise of more adaptable and streamlined production processes. Flexible technologies enable a firm to continuously enhance operational decisions in response to fluctuations in the market (Mittendorf, 206). Because of the globalization, the development of information technology, and the variety of customer requirements make many businesses face highly volatile and uncertain environments resulting from short product life cycles and frequent and uncertain changes in demand. For such enterprises, flexibility has increasingly become a core strategic competency (Yu et al., 2015). Especially in times when the economic conditions are violent, buyers tend to be more conservative and more cautious in placing orders. And also in times of uncertainty buyers are not so willing to hold inventory. This generates an expectation of quick response when they place an order. In these situations also operational flexibility gains importance to meet the market demands (Grawe et al., 2011).

2.5. Internal Environment Criteria

Organizational factors are important as contextual factors on influencing organizational innovation.

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In research's, scholars are become more concerned on capabilities like organizational innovation that are already embedded in firms. They emphasize the importance of customer-focused, human capital & education, organizational culture & learning, leadership and management skills for innovation in firm's performance (Pedrosa, 2015; Flint et al, 2008).

a. Customer Focus: In today's business environment, customer focus is distinctive competence for all kind of companies.

According to recent studies, if company wants to make innovation in its logistics operations, they have to identify and understand their customers' needs (Pedrosa et al, 2015; Flint et al, 2008). For this reason, the researchers involve customers in innovation development processes to increase both firm performance and customer acceptance and utilization rates in organizations (Flint et al., 2008; Wagner and Sutter, 2012). According to Flint (2008) understanding the dynamics of customer value perceptions offers significant opportunities for logistics innovation.

In parallel with, managers can understand logistics relevant changes in customer perceptions regarding functional, service, and relationship desires, and monetary and non-monetary sacrifices.

b. Human Capital & Education: One of the most important resource for innovation is individual knowledge stock of its employees. Human capital defines as knowledge resources that consist of skills, experience, expertise, ideas, knowledge, competencies, abilities and values of employees inside organization (Bontis , 2001; Youndt et al, 2004).

In addition, Hudson (1993) added combination of genetic heritance, education, experience, attitude about life and business can also shape the human capital of organizations. Human capital is both supportive and essential for innovation performance because employee's knowledge, expertise and competencies are vital in today's complex and dynamic competitive environments (Hsu and Wang, 2012; Subramanian and Youndt, 2005). Organizations which has wide variety of human capital can be more entrepreneur that can proactive to market opportunities, easily and speedly to take risks and refuse threats (Han and Lin, 2014). By the way human capital can minimize decision making mistakes and so increase innovation performance (Luthans and Youssef, 2004). Martín-de-Castro and friends (2011) claimed that "High-quality talents with good education and sophisticated skills can develop increased cognitive abilities, leading to more productive and efficient activity to improve their job performance, which helps enterprises have better entrepreneurial judgment, run business more smoothly and ultimately improve the firm's innovative performance" (Martín-de-Castro et al., 2011).

c. Organizational Culture & Learning: In organizations, innovation performance success is closely related with implementing creative ideas within the organization by organizational learning (OL). According to Arago'n and his colleagues organizational learning is "a collective capability based on experiential and cognitive processes and involving knowledge acquisition, knowledge sharing, and knowledge utilization" (Arago'n-Correa et al.,2007).

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Concurrently OL creates firm climate that values experimentation and risk taking, applies new knowledge & ideas, tolerates mistakes and failures, rewards nontraditional thinking and increases ability to understand and apply them (Arago'n-Correa et al., 2007). Learning process in organization covers searching for information, assimilating, developing and creating new knowledge on products, processes, and services (Bayarçelik, Taşel & Apak, 2014).

Previous studies proposed that organizational learning influences on organizational performance (Wheelwright and Clark, 1992; Hult et al., 2004; Alegre and Chiva, 2008; Flint et al., 2005, 2008). McKee (2005), suggested that product innovation as an organizational learning and he added that routing the organization towards learning supports innovation effectiveness and efficiency. Hult and his friends (2004) proposed that if a firm has been qualified as an innovative, management must build and encourage the organizational climate and systems that embody a clear learning orientation. On the other hand, Panayides and So (2005) study's which is investigating logistic innovation, showed that organizational learning mediates the relationship between relationship orientation and logistics innovation.

Also Flint's (2008) found out the relationship between knowledge and logistics innovation as they pointed out a direct positive relationship between supply chain learning and logistics innovation.

d. Management Skills and Leadership: The effects of the manager and the leader on innovation processes are discussed from different perspectives in literature.

Middle and top managers are required organizational capability to create innovative culture for employees in organizations and they are facilitators of innovation in existing companies (Covin and Miles, 1999). In addition executives encourage entrepreneurial thinking by allowing autonomy to produce creative proposals, obtaining support funding from internal stakeholders, form a concurrence decision-making between senior management team (Börjesson et al. 2014). Besides, they can create an innovative organizational climate by promoting self- development, new learning techniques, supporting to take risk (Un, 2010; Yang, 2012). Management team are also accountable for developing working environment that encourage the new innovative ideas, research and development on new technologies such as cloud computing, artificial intelligence, augmented reality, and support their adoption of innovative thinking (Jassawalla and Sarshittal, 2002).

3. Research Method

3.1. The Decision Making Methodology

The Analytic Network Process Model (ANP) is a method used to measure intangible factors by using pairwise comparisons with judgments that represent the dominance of one element over another with respect to a property that they share. Various criteria make decision problem complex and time consuming.

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In this study to analyze priorities analytic network process is applied. Basic ANP structure is given step by step to define firstly comparison matrix then weighting each criterion.

Step 1: Decision goals

Decision maker/s has/have to determine decision goal/s at the beginning of phase. According to goal decision maker determines the decision model to select appropriate methodology.

Step 2: Gathering decision criteria

Starting from goals, define criteria starting from in the lower and middle level hierarchical structure with alternatives.

Step 3: Solving model

The purpose of ANP is establishing binary comparisons between criteria and alternatives that references the 1-9 scale created by Thomas L. Saaty (1996) as shown in Table 2. These priorities are derived, based on pairwise assessments using judgment, or ratios of measurements from a scale if one exists. The process of prioritization solves the problem of having to deal with different types of scales, by interpreting their significance to the values of the decision maker/s.

Table 2. Scale of relative importance

Intensity of Importance	Definition
1	Equal importance
2	Weak
3	Moderate importance
4	Moderate plus
5	Strong importance
6	Strong plus
7	Very strong
8	Very, very strong
9	Extreme importance

Source: Saaty (1997, 1980)

A ratio scale is a set of numbers that is invariant under a homogeneous attribute transformation (multiplication by a positive constant). The constant rescinds when the ratio of any two numbers is composed. The local weight vectors obtained in the second step are placed in the supermatrix in positions corresponding to the representative elements in the row in the affecting column.
On the first level we consider a decision goal G, on the second level, we have n independent evaluation criteria: C1, C2,...,Cn, such that $\sum_{i=1}^{n} w(C_i) = 1$, where w(Ci) > 0, i = 1,2,...,n, w(Ci) is a positive real number – weight, or, relative importance of criterion Ci subject to the goal G.

Beykoz Akademi Dergisi, 2019; Özel Sayı
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On the third level m variants (alternatives) of the decision outcomes V1, V2,...,Vm are considered such that again $\sum_{r=1}^{m} w(V_r, C_i) = 1$, where w(Vr,Ci) is a non-negative real number - an evaluation (weight) of Vr subject to the criterion Ci, i = 1,2,...,n. This system is characterized by the supermatrix W:

$$W = \begin{bmatrix} \mathbf{0} & \mathbf{0} & \mathbf{0} \\ \mathbf{W_{21}} & \mathbf{0} & \mathbf{0} \\ \mathbf{0} & \mathbf{W_{32}} & \mathbf{I} \end{bmatrix}, \quad (1)$$

where W21 is the n×1 matrix (weighing vector of the criteria), i.e.

$$\mathbf{W}_{21} = \begin{bmatrix} w(C_1) \\ \mathrm{M} \\ w(C_n) \end{bmatrix}, \quad (2)$$

and W32 is the m×n matrix:

$$\mathbf{W}_{32} = \begin{bmatrix} w(C_1,V_1) & \Lambda & w(C_n,V_1) \\ \mathrm{M} & \Lambda & \mathrm{M} \\ w(C_1,V_m) & \Lambda & w(C_n,V_m) \end{bmatrix}. \quad (3)$$

The columns of this matrix are evaluations of variants by the criteria, I is the unit matrix. W is a column-stochastic matrix, i.e. the sums of columns are equal to one. Then the limit matrix W∞ (we can calculate the resulting priority vector of weights of the variants Z which is given by formula (4). The variants can be ordered according to these priorities.

$$Z = W32W21 \quad (4)$$

In real decision systems with 3 levels there exist typical interdependences among individual elements of the decision hierarchy e.g. criteria or variants. Consider now the dependences among the criteria. This system is then given by the supermatrix W:

$$W = \begin{bmatrix} \mathbf{0} & \mathbf{0} & \mathbf{0} \\ \mathbf{W_{21}} & \mathbf{W_{22}} & \mathbf{0} \\ \mathbf{0} & \mathbf{W_{32}} & \mathbf{I} \end{bmatrix}, \quad (5)$$

where the interdependences of the criteria are characterized by n×n matrix W22:

$$\mathbf{W}_{22} = \begin{bmatrix} w(C_1,C_1) & \Lambda & w(C_n,C_1) \\ \mathrm{M} & \Lambda & \mathrm{M} \\ w(C_1,C_n) & \Lambda & w(C_n,C_n) \end{bmatrix}.$$

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In general, matrix (5) is not column-stochastic, hence the limiting matrix does not exist. Stochasticity of this matrix can be saved by additional normalization. Then there exists a limiting matrix W∞ and the vector of weights Z can be calculated by formula (6).

$$\mathbf{Z} = \mathbf{W}_{32}\left(\mathbf{I} - \mathbf{W}_{22}\right)^{-1}\mathbf{W}_{21} \tag{6}$$

As the matrix W22 is close to the zero matrix, as the dependences among the criteria are usually weak, it can be approximately substituted by the first 4 terms and we get:

$$\mathbf{Z} = \mathbf{W}_{32}(\mathbf{I} + \mathbf{W}_{22} + \mathbf{W}_{22}^{2} + \mathbf{W}_{22}^{3})\mathbf{W}_{21}. \tag{7}$$

For group decision making, judgments must be combined so that reciprocal of the synthesized judgments must be equal to equal synthesis so that geometric mean is a unique way to do that (Saaty,1990).

3.2. Prioritizing Innovation Factors

Our importance identification model includes firm structure, technological factors, internal environment, and economic environment.

Firm structure (A) includes such sub-criteria that firm size (A1), age (A2), financial structure (A3), operational flexibility (A4); technological factors (B) includes research and development (B1), information technology (B2), intellectual property rights (B3); internal environment (C) includes customer focus (C1), human resources and education (C2), organizational culture (C3), organizational learning (C4), leadership (C5), and management skills (C6); economic environment (D) includes crisis and instability, market demand, infrastructure availability, government focus, and competition. When those criteria compared with each other relation matrix is found in Table 3 and 4. Those “x” represent there is a meaningful relationship for decision makers. That means at least one of the decision makers found that relationship.

Survey based on pairwise comparison of each criterion conducted to logistics industry. Survey sent to 82 logistics firms in Turkey and 39 relevant survey accepted. When 39 decision makers considered it is fair enough to give an idea about survey results. ANP consider each decision member as a group member. So 39 group member making tends to give better results because of the broader knowledge available and also because of the possibility of debates that may arise and change people’s understanding — such changes in understanding that lead to improvements in the model or judgments are an important aspect of this process that can lead to improved decisions (Whitaker, 2007). Data were collected considering analytic network structures from pairwise questionnaires from 39 experts in the logistics field, with at least three years’ experience in the strategic innovation of logistics operations. The number of decision makers in terms of model work is sufficient because methodology is sufficient for at least one decision maker for the decision-making problems to make a decision (Saaty, 1990).

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39 members reflect the general view of a segment applied here. That is, group decision making is used. The data received were statistically processed accordingly in a preliminary study of the authors.

The cluster themselves must be compared to establish their relative consequentiality and utilize it to weight the corresponding blocks of the supermatrix to make it column stochastic.

A cluster impacts another cluster when it is linked from it, that is, when at least one node in the source cluster is linked to nodes in the target cluster. The process is reiterated for each cluster in the network to obtain the matrix. The clusters are withal pairwise compared to establish their consequentiality with veneration to each cluster they are linked from, and the resulting matrix of numbers is utilized to weight the corresponding blocks of the pristine unweighted supermatrix to obtain the weighted supermatrix. This matrix is then raised to powers until it converges to yield the constraint supermatrix. The relative values for the companies are obtained from the columns of the inhibition supermatrix that in this case are all the same because the matrix is irreducible.

Table 3. ANP relationship matrix

		Firm Structure				Technological Factors			Internal Environment	
		Firm Size	Age	Financial Structure	Operational Flexibility	Reseach & Development	Information Technology	Intellectual Propert Rights	Customer Focus (MO)	HR & Education
Firm Structure	Firm Size					X	X	X		X
	Age					X		X		
	Financial Structure					X	X	X		X
	Operational Flexibility					X	X		X	X
Technological Factors	Reseach & Development								X	
	Information Technology								X	
	Intellectual Propert Rights									
Internal Environment	Customer Focus (MO)									
	HR & Education									
	Organisational Culture									
	Organisational Learning									
	Leadership									
	Management Skills									
Economic Environment	Crisis & Instability									
	Market Demand									
	Infrastructure Availability									
	Governmental Focus									
	Competition									

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Table 4. ANP relationship matrix (cont.)

						Economic Environment				
		Organisational Culture	Organisational Learning	Leadership	Management Skills	Crisis & Instability	Market Demand	Infrastructure Availability	Governmental Focus	Competition
Firm Structure	Firm Size	x	x		x		x			x
	Age	x	x							
	Financial Structure					x	x		x	x
	Operational Flexibility	x	x			x	x		x	x
Technological Factors	Reseach & Development	x	x				x		x	x
	Information Technology						x		x	x
	Intellectual Propert Rights		x				x		x	x
Internal Environment	Customer Focus (MO)						x			x
	HR & Education									
	Organisational Culture									
	Organisational Learning					x	x		x	x
	Leadership					x				x
	Management Skills					x	x		x	x
Economic Environment	Crisis & Instability									
	Market Demand									
	Infrastructure Availability									
	Governmental Focus									
	Competition									

Criteria which are given in pairwise cooperation cluster for their influence on the criterion they are linked from to define the importance of their influence on the main criterion. Then, these priorities are then entered in the supermatrix for the network.

Table 5: Unweighted super matrix

	A_1	A_2	A_3	A_4	B_1	B_2	B_3	C_1	C_2	C_3	C_4	C_5	C_6	D_1	D_2	D_3	D_4	D_5
A_1	0	0	0	0	0.072	0.297	0.031	0	0.199	0.257	0.319	0	0.087	0	0.168	0	0.126	
A_2	0	0	0	0	0.039	0	0.022	0	0	0.503	0.442	0	0	0	0	0	0	
A_3	0	0	0	0	0.030	0.127	0.088	0	0.081	0	0	0	0.133	0.215	0	0.117	0.206	
A_4	0	0	0	0	0.094	0.036	0	0.037	0.159	0.242	0.401	0	0	0.127	0.157	0	0.185	0.052
B_1	0	0	0	0	0	0	0	0.043	0	0.081	0.359	0	0	0	0.096	0	0.106	0.068
B_2	0	0	0	0	0	0	0	0.061	0	0	0	0	0	0	0.072	0	0.063	0.175
B_3	0	0	0	0	0	0	0	0	0	0	0.146	0	0	0	0.059	0	0.156	0.111
C_1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.140	0	0	0.134
C_2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C_3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C_4	0	0	0	0	0	0	0	0	0	0	0	0	0	0.163	0.110	0	0.043	0.129
C_5	0	0	0	0	0	0	0	0	0	0	0	0	0	0.085	0	0	0	0.069
C_6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.073	0.105	0	0.089	0.078
D_1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D_2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D_3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D_4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D_5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0,00	0,00	0,00	0,00	0,24	0,46	0,14	0,14	0,44	1,08	1,67	0,00	0,09	0,58	1,12	0,00	0,76	1,15

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Table 6: Limit super matrix

	A_1	A_2	A_3	A_4	B_1	B_2	B_3	C_1	C_2	C_3	C_4	C_5	C_6	D_1	D_2	D_3	D_4	D_5
A_1	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108
A_2	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071
A_3	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074
A_4	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063
B_1	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084
B_2	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042
B_3	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032
C_1	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
C_2	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072
C_3	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058
C_4	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047
C_5	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055
C_6	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091
D_1	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043
D_2	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057
D_3	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
D_4	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032
D_5	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021

Based on the limited super matrix we calculated the weights of each criterion. Table 6. reflects each criterion weigh in any column which are same along row. Those weights present priority that means A1 has 10,8%, C6 has 9,1%, B1 has 8,4%, A3 has 7,4% and A2 has 7,1% ratio over all. Which initials A1, C6, B1, A3, and A2 gains the highest priority in all.

4. Conclusion and Discussions

The application of multi-criteria decision making (MCDM) methods in prioritizing innovation strategy problems related to logistics operations can provide useful insight for decision-makers towards more qualified decisions.

This study demonstrated the application of ANP method which enables interrelationships among the decision levels and attributes in a more general form. This method analyses by integrating interdependent relationships within and among a set of criteria.

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Results shows that for innovation decision most important criterion is firm size (0.108) which is one of the most important factors influencing the decision of long-term or short-term strategies for companies.

Innovation also is a critical strategic decision factor that requires time for the accomplishment of strategic objectives. There are several studies which points out the importance of firm's size related with skilled labor, financial assets etc. The second criterion is management skills (0.091). Top managers encourage entrepreneurial thinking by allowing autonomy to produce creative proposals, obtaining support funding from internal stakeholders, building decision-making consensus among the top management team. And also, they can create an innovative corporate culture by enhancing learning opportunities, and encouraging commitment to learning and risk-taking. The next important factor is research and development capacity (0.084). The basic functions of R&D capabilities of firm is to expand its existing technologies and establish novel technologies or improve R&D function. Also, analysis presents less important criteria such as infrastructure availability (0.011), competition (0.021), and governmental focus (0.032), respectively.

Table 7: Priority of Innovation criteria

Priority	Criterion	Weights
1	Firm size	0.108
2	Management skills	0.091
3	Development capacity	0.084
…		
16	Governmental focus	0.032
17	Competition	0.021
18	Infrastructure availability	0.011

Depending to the literature, the results underline the importance given to a selected criterion. The decisions taken by the management could be taken more carefully. A future practical implementation can be done by applying different decision making methods such as Fuzzy AHP/ANP, TOPSIS, ELECTRE, and etc. with considering different group of criteria.

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WORKING CAPITAL MANAGEMENT, PERFORMANCE AND MARKET VALUE OF LOGISTICS COMPANIES LISTED ON BORSA ISTANBUL

Narman KUZUCU[1]

Abstract

In this research, we aim to examine the influence of working capital management on performance and market value of companies in logistics industry. We use a panel data analysis methodology with a data set covering eight logistics companies listed on Borsa Istanbul in the period 2009 to 2018. In order to estimate the relationship between working capital management and performance of companies we use return on assets (ROA) and market to book value (MB) as dependent variables in the research models. The main results indicate that net working capital (NWC) is not related to current year's profitability, but with a time lag, it is positively related to next year's profitability. Contrarily, NWC is negatively associated with MB of logistics companies. Financial leverage, which is one the control variables, is found statistically significant, and the relationship between leverage and profitability is negative. Leverage is positively associated with MB. The results suggest that leveraged companies are more likely to obtain less return or to suffer from losses; however, leverage enhances firms' market value. Considering the limitations related to the research period and the number of logistics firms listed on Borsa Istanbul, the results should be interpreted with some caution.

Keywords: leverage, logistics industry, net working capital, performance, working capital management
JEL Classification: G30, G32

BORSA İSTANBUL'DA İŞLEM GÖREN LOJİSTİK İŞLETMELERİNİN ÇALIŞMA SERMAYESİ YÖNETİMİ, PERFORMANS VE PİYASA DEĞERLERİ

Öz

Bu çalışmada amacımız lojistik sektöründeki işletmelerde çalışma sermayesi yönetiminin işletme performansına ve piyasa değerine etkisini incelemektir. Bu amaçla, 2009 – 2018 yılları arasında Borsa İstanbul'da işlem görmüş sekiz lojistik sektörü işletmesine ait veriler panel veri analiz yöntemine tabi tutulmuştur. Araştırma modellerinde, net çalışma sermayesi (NÇS) ve şirketlerin performansı arasındaki ilişkiyi tahmin etmek için bağımsız değişkenler olarak, aktif kârlılık ve piyasa değeri / defter değeri (PD/DD) oranları kullanılmıştır. NÇS'nin ilgili yılın kârlılığı ile ilişkili olmadığı, ancak bir sonraki yılın kârlılığıyla istatistiksel olarak pozitif ilişkili olduğu sonucuna ulaşılmıştır. Beklenilenin aksine, NÇŞ'nin lojistik şirketlerinin piyasa değerleriyle negatif ilişkili olduğu görülmüştür. Kontrol değişkenlerinden biri olarak modele kattığımız finansal kaldıraç oranının istatistiksel olarak anlamlı ve kârlılıkla ilişkisinin negatif olduğu bulunmuştur. Diğer yandan PD/DD ile yani şirketlerin piyasa değeriyle ilişkisi ise pozitiftir. Sonuçlara göre, finansal kaldıraçlı lojistik firmaların daha az kâr etmesi veya zararlara katlanması olası iken, kaldıracın şirketlerin piyasa değerlerini güçlendirdiği bulunmuştur. Çalışmanın kapsadığı halka açık lojistik firma ve yıl sayısına ilişkin kısıtlar dikkate alınarak, ulaştığımız sonuçlara ihtiyatlı yaklaşılması gerekmektedir.

Anahtar kelimeler: çalışma sermayesi yönetimi, kaldıraç, lojistik sektörü, net çalışma sermayesi, performans

JEL Sınıflaması: G30, G32

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1. Introduction

Corporate performance is the main concern of financial managers in logistics industry as well as in the other sectors. Profitability and share stock price are the key indicators of performance of a company. In this research, we aim to examine the impact of working capital management over performance and market value of companies in logistics industry.

Current assets and liabilities collectively form working capital of a business. Working capital management (WCM) involves managing cash, inventory, receivables and payables (Brealey, Myers, Allen, 2014, p. 775). Net working capital refers to the difference between a company's short-term assets and liabilities (Brealey et al, 2014, p. 132; Brigham and Ehrhardt, 2013, p. 633). Companies operating in logistics industry apparently do not have inventory since they do not have merchandise and finished goods. However, they need to manage their cash holdings, short-term investments, receivables and short-term debt as well as other businesses.

Operations managers, logistics experts and production specialists are generally in charge for improving a firm's working capital position. Accordingly, marketing managers and logistics experts cooperate to keep the inventory at optimal level. Finance department plays role in deciding how much cash holdings should be kept and how to finance working capital (Brigham and Ehrhardt, 2013, p. 632). Higher working capital decreases the riskiness of companies because a company, which runs at higher levels of working capital (current assets), can easily overcome unexpected shortages. However, this results low returns (Brigham and Ehrhardt, 2013, p. 634).

Working capital performance is generally measured by cash conversion cycle (CCC). CCC refers to the period between the expenditure for the purchase of inventory and the collection from the sales (Kieschnick et al, 2013). In other words, CCC is the process in which firms purchase or produce inventory, hold it for a time, and then sell it and receive cash. Thus, working capital management relates to managing inventory conversion period, average collection period and payables deferral period (Brigham and Ehrhardt, 2013, p. 638-639). Necessarily, investing in operating working capital will extend CCC. Therefore, higher the operating working capital, lower the CCC of a business. However, there is not a consensus as to the link between firm's overall performance and working capital empirically.

In logistics industry, companies do not have a considerable level of inventories. As a separate industry, logistics business is considered as a service sector, and does not relate to sales of goods. Working capital management in logistics industry relates to receivables and payables other than cash holdings. Financial managers manage collection period and payables deferral period for financial performance of their company. Does working capital management actually enhance corporate performance? The research question of this paper is whether working capital management affects performance of a logistics business. We refer to performance in two meanings: corporate profitability and performance of stock price.

We organize the remainder of the paper as follows. In the next section, we provide a brief review on working capital literature.

This section reviews not only empirical research studies on the relationship between the working capital management and the corporate performance, but also the literature on the performance of Turkish logistics firms.

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We describe and explain the data and methodology used in the third section. The empirical study and the empirical results are presented in this section. Finally, in the last section, we summarize and highlight our results and a conclusion is drawn.

2. Literature Review

We divide this section into three parts. In the first part, the empirical research on the relationship between working capital and firm performance is reviewed and discussed systematically with evidences from different countries. In the second part, the evidence from Turkish firms is reported. In the third part, the research on the performance of Turkish logistics companies is summarized.

3. Empirical Evidences from Different Countries

There is a large empirical research literature on working capital management through industries and countries. However, a lack of systematic theory development is missing as Singh and Kumar (2014) noted. The research studies generally test whether WCM has effect on firm performance, and the results are not similar. Most of the empirical studies result that less investments in working capital is associated with higher firm performance (Banos-Caballero, Garcia-Teruel & Martinez-Solano, 2014; Deloof, 2013; Garcia-Teruel & Martinez-Salano, 2007; Nobanee, Abullatif & AlHajjar, 2011; Shin & Soenen, 1998; Wang, 2002). Accordingly, higher CCC increases inventory-holding expenses such as storing and insurance. Furthermore, higher working capital leads to higher interest expenses (Kieschnick et al, 2013).

Additionally, some research focused on components of working capital. Deloof (2003) reported negative relations between number of days accounts receivable and inventory, and profitability. As well, he found a negative relation between profitability and number of days accounts payable against the common belief. The results of Garcia-Teruel and Martinez-Salano (2007) related to receivables and inventory are similar, but they found no relation between accounts payable and profitability with a huge data set of Spanish firms. The study of Gill et al (2010) support their finding on payables.

On the other side, a number of empirical studies including Bhunia and Das (2012), Martinez Sola et al (2013), Sharma and Kumar (2011), Gill et al (2010) and Raheman et al (2010) advocate positive impact of CCC on firm performance. Because investing in working capital prevents production interruption and the loss of demand due to the scarcity of products. Additionally, longer trade credit periods stimulate sales and lowers transactions costs converting receivables into cash (Martinez-Sola et al, 2013).

Some research suggests that lower levels of working capital lead to lower financing costs and financial flexibility (Autukaite & Molay, 2011; Banos-Caballero et al, 2014). Ganesan (2007) also asserts that lower investments in working capital decrease the risks of firms. On the other side, many studies advocate that net working capital level is linked to the cash flow availability of firms (Fazzari, Hubbard & Petersen, 1988).

Accordingly, firms, which generate internal finance, have higher net working capital (Chiou, Cheng & Wu, 2006; Hill et al, 2010). Hill et al (2010) also assert that working capital requirement is different in different industries.

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This suggests that investing in working capital has different impact on performance across industries.

Autukaite and Molay (2011) examined the contribution of cash holdings and working capital to firm value for French listed companies. They conclude that an additional euro invested in net working capital is worth less than holding cash. Similarly, Kieschnick et al (2013) investigated the effect of operating working capital on shareholders' wealth, using a huge data set of US corporations. They found that an additional dollar invested in working capital is worth less than an additional dollar held in cash. This result shows the negative relationship between net working capital and the performance of a company. Furthermore, they documented that investing in providing credit to customers creates more value than investing in inventory.

Recent studies examine the presence of concave relation between working capital and firm performance, which suggests an optimal NWC. Banos-Caballero et al (2012) documented a concave relationship between NWC and operating performance with a sample of small and medium-sized Spanish firms. Thus, reduction of investments in working capital may have negative effect on firm performance. Accordingly, an additional increased investment in working capital may also have a negative impact on firm profitability. Studying a sample of UK firms, Banos-Caballero et al (2014) documented an inverted U-shape relation between NWC and stock performance. Aktas, Croci & Petmezas (2015) report the relation between working capital and stock performance is positive for the firms with lower working capital. This result suggest that there is an optimal level of NWC. The firms, which increase or decrease working capital level to the optimal level of NWC, raise their stock performance (Aktas et al 2015). Altaf & Shah (2017) and Singhania & Mehta (2017) investigated the non-linear relationship between a firm's working capital and performance with data sets of firms from south Asian countries. They found that there is an inverted U-shaped relationship between working capital and firm performance.

4. Empirical Research Studies on Turkish Companies

In this section, we review research studies related to working capital management of Turkish companies and the research papers on the performance of Turkish logistics companies. Interestingly, the research issues and methodologies performed on working capital management using Turkish listed companies are diversified. Some featuring studies are summarized herein.

Yücel and Kurt (2002) investigated the effect of working capital on the profitability of Turkish listed firms with a data set of 167 firms. They resulted that there is a negative relationship between working capital and return on assets. Similar research studies done by Öz and Güngör (2007), Şamiloğlu and Demirgüneş (2008), Coşkun and Kök (2011), Karaduman et al (2011), İltaş (2016) and Öner (2016) found empirical evidence on the negative relationship between working capital and profitability for Turkish firms. Dinçergök (2019) found nonlinear and concave relationship between working capital and profitability.

According to the results, there is a significant and nonlinear relationship between components of working capital and profitability. Accordingly, increasing inventory conversion period decreases profitability to a specific point and then, increases.

The results of Dinçergök (2019) suggest that there is an optimal collection period and inventory turnover period for businesses, and support the findings of Banos-Caballero et al (2012).

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Çakır and Küçükkaplan (2012) investigated the effect of working capital components on the profitability and the market value of Turkish listed manufacturing companies. They did not find any support for the effect of working capital components such as inventory turnover and receivables turnover ratios on profitability and market value of a company. Çelik and Boyacıoğlu (2013) examined the effect of fixed asset investments to working capital and found negative relationship.

The common result of studies on Turkish listed firms is that increasing working capital decreases profitability of a company. Accordingly, the research studies on Turkish listed firms provide evidence for the assertion that there is a negative relationship between working capital and profitability.

5. The Literature on the Performance of Turkish Logistics Companies

In the recent literature, researchers often use the multi-criteria decision (MCDM) techniques such as TOPSIS and VIKOR, and the data is obtained from the popular journals to measure the performance of logistics firms. Çakır and Perçin (2013) examined the performance of logistics firms, employing the MCDM methods. They used the data of 10 logistics firms from the Fortune Turkey's 500 best companies. In the study, the companies' financial figures were used to apply integrated methods, and 10 Turkish logistics firms were ranked with respect to their performances. They advocate that the MCDM technique, which they employed, is a very convenient method for performance measurement. Ayaydın, Durmuş and Pala (2017) used the same data, but this time used efficiency, size and profitability ratios by means of grey relationship analysis method (GRA) to measure the performance of logistics firms. The ranking is not similar to the results of the study of Çakır and Perçin (2013). Ayaydın et al assert that the differentiation stems from the financial ratios which they employ. Özbek and Demirkol (2018) used the step-wise weight assessment ratio analysis (SWARA) and GRA methodology with the updated financial figures of nearly the same companies. In their study, four different models are applied in respect to the weights of the criteria. The rankings of the firms are nearly the same according to the results of the four different models. Özbek and Demirkol (2018) suggest that the results show a combined model of SWARA and GRA evaluates the performance of the logistics firms fairly. Tufan and Kılıç (2019) used TOPSIS and VIKOR methodology to evaluate the financial performance of listed logistics firms on Borsa Istanbul. They compared the ranking results of the two techniques.

Deran and Erduru (2018) took a descriptive approach in their study on the financial performance of the transportation sector in Turkey. They analyzed the financial ratios extracted from the sectoral financial statements, which is published by the Central Bank of the Republic of Turkey. They obtained the average profitability and efficiency ratios for three years, and compared the sea freight and land transport sectors.

The literature review shows that MCDM techniques are common methodology used to evaluate the financial performance of logistics firms in Turkey.

The results of different research studies reveal that the performance ranking may change in accordance with the weighting of the criteria employed.

The performance evaluation of firms may depart from objectivity and reliability in case of misapplication of weighting. Therefore, selecting and employing a convenient criteria-weighting MCDM method is the key process for achieving a reliable performance evaluation.

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Furthermore, we assess that the lack of nonfinancial criteria is a critical shortcoming of the existing literature on performance evaluation. However, considering that the reported aim of the researchers is only limited to evaluate the financial performance of the companies, this shortcoming may be tolerated to some degree.

6. Data And Methodology

We use panel data regression techniques to estimate the relation between working capital management and firm performance. A panel data set of Turkish listed logistics companies for 10 years is employed in this research study. The full data set covers 57 firm-years of eight logistics firms for the period 2009 to 2018. In some years, some firms' data is missing since they are not listed for the related years. Thus, we obtain unbalanced panel data. The data is obtained from the web sites of the companies and the Public Disclosure Platform (www.kap.gov.tr), which is administrated by the Capital Markets Board of Turkey and the Borsa Istanbul.

7. Variables and Summary Statistics

Table 1 provides the definitions of the variables used in the analysis. We define and measure NWC as follows (Afrifa, 2016; Aktas et al, 2014; Hill et al, 2010).

NWC = (receivables / sales) + (inventory / sales) – (payables / sales) (1)

In this formula, NWC is a function of sales. The less the NWC, the shorter the CCC. It measures the efficiency of working capital management. We use ROA for measuring corporate profitability and it shows operational performance. MB is a measure for market valuation and it shows stock performance. Cash holdings are actually one of the components of working capital. However, they are not considered as a component of operational working capital. Thus, NWC is independent variable, ROA and MB are dependent variables, and the others are control variables.

Table 2 presents the summary statistics of the data used in the study. Figure 1 depicts some selected variables' means including MB, ROA and NWC in the period 2009 to 2018. Through the ten years, market to book value of logistics companies ranges between 1.75 and 3.35, and is averagely over 2.0. Returns are positive except two years (2011 and 2012). If we ignore these two years, net earnings as a percentage of total assets range between 0.6 and 9.2. Considering the negative return years, the mean ROA is 2.2 percent. NWC values, as percentage of sales, range between 1.0 and 5.7, and the mean value is 3.0 in the period from 2010 to 2018. NWC is negative only in one year, most probably due to the great financial crisis in 2009. The average returns reported here should be compared to the other sectors' averages to assess the overall return of the logistics industry. This type of financial analysis is beyond the scope of our research study. Yet, in order to provide a benchmark, we note that Aktas et al (2015) reported 5.1 % for 2011 for the US transportation companies.

The variables in the model should be stationary because presence of a unit root may cause problems and invalidate the results of regression models.

We run Fisher-ADF and Fisher-PP tests to test for the stationarity of the variables. The null hypothesis for the Fisher tests is that all the panels contain unit roots. The alternative hypothesis is that at least one panel is stationary.

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Table 3 shows the panel unit root results. According to the results, we reject the null hypothesis for the variables other than CRAT and TANG. Thus, we derive the first differences of the mentioned variables to provide stationarity before constructing an estimation model.

Table 1. Variables

Variables	Codes	Definition	Expected Sign
Market to book value	MB	Market price over equity book value	Dependent Var.
Return on assets	ROA	Net profit over total assets	Dependent Var.
Net working capital	NWC	Account receivables plus inventory minus accounts payable over sales	-
Cash holdings	CASH	Cash over total assets	-,+
Current Ratio	CRAT	Current assets over short term liabilities	-,+
Tangible Assets	TANG	Tangible assets over total assets	-,+
Financial leverage	LEVR	Short term and long term liabilities over total assets	-,+
Size	SIZE	Natural logarithm of total sales	-,+

Table 2. Summary Statistics

Variables	N	Mean	St. Dev.	Min.	Max.
MB	53	2.18	2.07	0.21	9.15
ROA	53	0.03	0.11	-0.54	0.30
NWC	53	0.03	0.07	-0.16	0.23
CASH	53	0.10	0.08	0.00	0.29
CRAT	53	1.08	0.50	0.18	2.55
TANG	53	0.51	0.22	0.04	0.93
LEVR	53	0.69	0.14	0.32	0.96
SIZE (sales in million TL)	53	5,371	11,706	8	62,853

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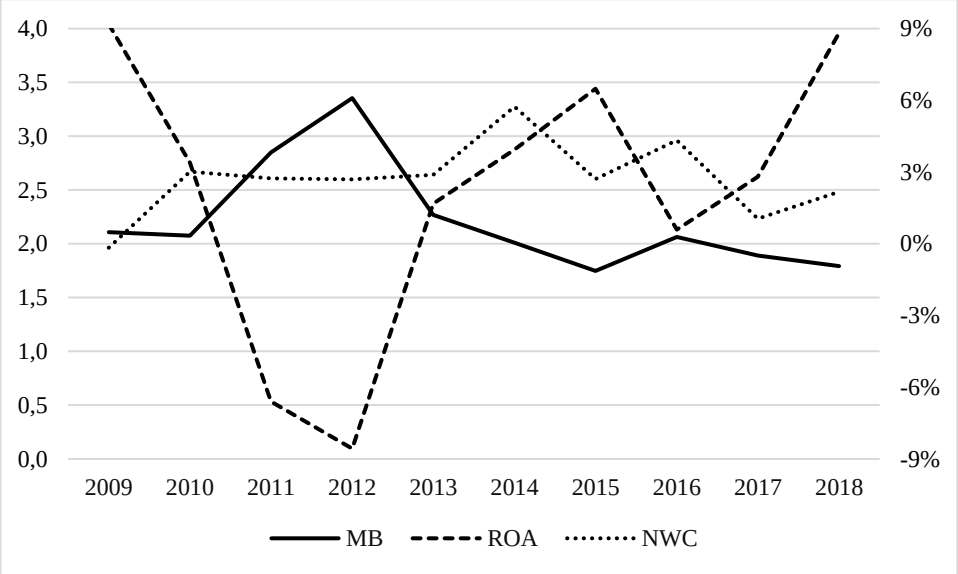

Figure 1. Average MB, ROA and NWC of the Logistics Industry by Years

Table 3. Panel Unit Root Test Results

Variables	Fisher-PP chi-squared	p-value	Fisher-ADF chi-squared	p-value
MB	27.4752	0.0167	83.4769	0.0000
ROA	28.2000	0.0299	16.4775	0.0285
NWC	62.1866	0.0000	8.4640	0.0863
CASH	147.0385	0.0000	25.3971	0.0308
CRAT	18.3022	0.3065	35.4132	0.0035
LEVR	57.9554	0.0000	94.3349	0.0000
SIZE	15.7998	0.0325	0.4452	0.0041
TANG	29.1750	0.0099	8.1504	0.8813

8. Constructing the Hypotheses and the Model

We aim to examine the relationship between working capital and financial performance of the logistics firms. Financial performance refers to both corporate profitability and stock performance as we explained earlier. In our model, corporate profitability is proxied by ROA, and stock performance is proxied by MB. Thus, considering the most of the previous research studies, we construct the hypotheses as follows.

H1. Working capital and profitability of a logistics firm relate negatively.

H2. Working capital and market valuation of a logistics firm relate negatively.

Accordingly, we expect a negative association between NWC and ROA, and again a negative association between NWC and MB. Following the literature, we consider cash holdings, firm size and financial leverage as control variables (Aktas et al, 2015).

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Moreover, we use another control variable, tangible assets (TANG), which assesses the investments in tangible assets to see the impact of investing in tangible assets rather than working capital, as some researchers did (Afrifa, 2016; Deloof, 2003; Garcia-Teruel and Martinez-Solano, 2007; Hill et al, 2010). The variables are defined and coded as presented in Table 1. The expected signs are from the common literature. The impacts of cash holdings, current ratio, investing in tangible assets, leverage and firm size on performance are controversial in the literature. The estimation models are as follows.

Model 1a: $ROA_{i,t} = \alpha + \beta NWC_{i,t} + \gamma Controls_{i,t} + \varepsilon_{i,t}$, (2)

Model 2a: $MB_{i,t} = \alpha + \beta NWC_{i,t} + \gamma Controls_{i,t} + \varepsilon_{i,t}$, (3)

Moreover, we construct the models in which some variables are lagged by one period in order to determine whether those variables are associated with the dependent variables with a time lag.

Model 1b: $ROA_{i,t} = \alpha + \beta NWC_{i,t-1} + \gamma Controls_{i,t-1} + \varepsilon_{i,t}$, (4)

Model 2b: $MB_{i,t} = \alpha + \beta NWC_{i,t-1} + \gamma Controls_{i,t-1} + \varepsilon_{i,t}$, (5)

9. Empirical Tests and Analysis

We perform Pearson's correlation test for a preliminary view on the relations between the variables. Table 4 presents the correlation results. NWC is not correlated with any variables in contrary to our expectations. ROA is significantly correlated with cash holdings, current ratio and leverage. MB is significantly correlated with leverage and tangible assets at 1% percent level. According to the correlation coefficients and significance levels, the strongest correlations are between LEVR and CRAT; and TANG and MB at 1% percent level. These results suggest that higher levels of debts cause firm's current ratio to decrease. Increasing tangible assets investments are associated with decreasing market valuation.

We try to estimate the performance of logistics firms with a longitudinal study. In such studies, initially researchers should determine whether the model suits to the fixed effects or random effects model (Greene, 2012). For this purpose, we perform Hausman tests. The results of the tests demonstrate that fixed effects regression model explains the estimations better than random effects model.

A good estimation model should be robust to heteroscedasticity and autocorrelation problems (Greene, 2012). After regressing the model, we tested for the presence of heteroscedasticity with Modified Wald test; and autocorrelation with modified Bhargava et al and DW test. Since we detected the mentioned problems, we employed robust standard errors in the four models.

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Table 4. Pearson Correlation Coefficients

	MB	ROA	NWC	CASH	CRAT	LEVR	SIZE	TANG
MB	1							
ROA	0,0826	1						
NWC	0,1413	0,2093	1					
CASH	0,1961	0.2362*	-0,1577	1				
CRAT	0,0125	0.2870**	-0,0319	0.3512***	1			
LEVR	0.4271***	-0.2902**	-0,0829	0,0482	-0.6288***	1		
SIZE	-0,0535	0,2241	-0,2145	0.2489*	-0,0368	0.2290*	1	
TANG	-0.6088***	-0,1453	-0,0226	-0,0925	-0.2977**	0,0025	0,1091	1

*, **, *** indicates statistical significance at the 10%, 5% and 1% respectively.

10. Empirical Results

Table 5 shows the robust regression results for the effect of NWC on profitability and market valuation. In Model 1a and 1b, we found that NWC does not have a statistically significant relationship with ROA. In Model 1a, the only significant variable is leverage and it has a negative relationship with profitability. Interestingly, lagged NWC and lagged cash reserves relate to profitability positively in Model 1b. NWC and lagged NWC is also found statistically significant and negative in the model (Model 2a and 2b), in which market valuation is dependent variable. These results suggest that lagged NWC has an impact both on profitability and on market valuation. More interestingly, leverage relates to market valuation positively (in Model 2a) while it relates to profitability negatively. Furthermore, size has a negative impact on market valuation. The results of Model 1 may seem not very consistent with the regression results of Model 2. The correlation coefficients presented in Table 4 are substantially consistent with the regression results. According to the correlation coefficients, leverage is positively correlated to MB, but negatively related to ROA.

The regression results support the hypothesis H2. Both NWC and lagged NWC have negative effect on market valuation. H1 is not supported. NWC is not associated with profitability; however lagged NWC has a positive effect on profitability in contrary to the expectation. We try to explain these results and present a justification in the conclusion.

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Table 5. Regression Results

	Model 1a		Model 1b			Model 2a		Model 2b	
Variables	Coef.	t-stat	Coef.	t-stat	Variables	Coef.	t-stat	Coef.	t-stat
ROA	*Dependent Variable*				MB	*Dependent Variable*			
NWC	0,3743	1,28			NWC	-6,6291***	-5,86		
L.NWC			0,5251**	2,62	L.NWC			-9,4432*	-2,27
CASH	0,1625	0,63	0,5884**	2,95	CASH	-1,8638	-0,81	0,4931	0,11
CRAT	-0,0337	-0,75	0,0407	1,57	CRAT	-0,1372	-0,24	-0,7429	-1,12
LEVR	-0,4748**	-3,43			LEVR	3,2112**	3,53		
L.LEVR			-0,2223	-1,92	L.LEVR			1,7306	1,25
SIZE	0,0572	1,83			SIZE	-0,7560*	-2,39		
L.SIZE			0,0564	1,38	L.SIZE			-0,8527	-0,96
TANG	-0,1033	-0,7		0,69	TANG	-2,3283	-0,81		
L.TANG			0,0892		L.TANG			-1,2912	-0,7
Constant	-0,8515	-1,23	-1,0583	-1,29	Constant	15,7399	2,58	18,7382	1,01
No of obs.	44		37		No of obs.	44		37	
R-sq. within	0,6960		0,4186		R-sq. within	0,4134		0,2518	
R-sq. btw	0,1847		0,1796		R-sq. btw	0,0089		0,0093	
R-sq. overall	0,2423		0,1485		R-sq. overall	0,0380		0,0273	

Note: *, **, and *** indicate significance at 10 percent, 5 percent, and 1 percent, respectively.

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11. Conclusion

In this study, we investigated the impact of working capital management on the performance of logistics companies with Turkish listed logistics companies' data. The impact of NWC on performance of a company is generally found negative in the literature while some research finds the inverse or no relation.

The results of this study shows that there is no significant relationship between NWC and profitability of logistics firms; however, lagged NWC has a positive relation with profitability. The results show that logistics firms may increase profitability by increasing the average collection period and that less profitable logistics firms wait longer to pay their bills. Paying the bills on time or before due date for getting discounts may increase profitability. On the other side, logistics firms increase their fees, hence, earnings through extending trade credits to customers. Yet, the positive relation between working capital, liquidity and profitability is not very clear.

Another finding is that an increase in working capital and size is associated with a decrease in market valuation of a company. That means investors percept smaller companies and less working capital more value driver. Investors' perception is towards negative relation between working capital and performance of a company. In other words, investors believe that high performance firms wait longer to pay their bills. Another contradictory result is related to the impact of leverage. According to the regression results, leverage has a negative impact on profitability, but a positive impact on market valuation of a company. We explain these results similarly. Companies with higher leverage ratios make less returns probably due to the finance costs. In the viewpoints of investors, the companies that can easily access to debt markets and borrow are more valuable. The results suggest that leveraged companies are more likely to obtain less return or to suffer from losses; however, leverage enhances market value of logistics companies.

We interpret that these paradoxical results between ROA and MB models show the gap between the facts and the perceptions of the investors. However, considering the limitations related to the research period and the number of listed logistics firms, the results should be interpreted with some caution.

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GIS-BASED MAXIMUM COVERING LOCATION MODEL IN TIMES OF DISASTERS: THE CASE OF TUNCELI

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Abstract

In times of disasters, accessing to shelters by the victims is a vital task in humanitarian logistics. One of the humanitarian logistics challenges is the difficulty involved in effectively coordinating large numbers of victims. Especially, the lack of spatial information involved in the rescue and recovery region is an obstacle for efficient planning. In this paper, a geographic information system (GIS)-based solution approach is developed to manage the assignments of victims to the shelters in times of disasters. To do so, the capacitated maximize coverage tool of ArcGIS is used and tested on the case of Tunceli city. As a result, different scenario analyses are generated under the distance and time restrictions between victims and shelters. Case results demonstrate the proposed approach's ability to support efficient and effective disaster management.

Keywords: Capacitated location-allocation, case study, disaster management, geographic information system, maximum covering.

Jel Classification: R53, C61, Q54.

DOĞAL AFET DURUMU İÇİN CBS TABANLI MAKSİMUM KAPSAMA YERLEŞİM MODELİ: TUNCELİ ÖRNEĞİ

Öz

Afet zamanlarında insani lojistik açısından afetzedelerin barınma yerlerine erişimi önemli bir problemdir. İnsani lojistik yönetiminin önündeki en büyük zorluklardan biri de fazla sayıdaki afetzedelerin koordinasyonudur. Özellikle, olay mahallindeki mekânsal verinin eksikliği etkin bir planlamanın önündeki en büyük engellerden biridir. Bu çalışmada, afet zamanlarında kullanılmak üzere potansiyel afetzedelerin ilgili barınaklara atanması için Coğrafi Bilgi Sistemi (CBS) tabanlı bir çözüm yaklaşımı önerilmiştir. Ulaşılan afetzede sayısını maksimize etmek için ArcGIS'in maksimum kapsama yerleşim modeli kullanılmış ve Tunceli ili üzerinde test edilmiştir. Tunceli şehir merkezindeki 2.121 adet binaya 31.076 kişi, nüfus olarak atanmış ve 5 barınma merkezi ile model çalıştırılmıştır. Daha sonra farklı sayıda barınma merkezi ve kapsama alanları altında senaryo analizleri gerçekleştirilmiş ve sonuçlar yorumlanmıştır. Elde edilen sonuçlar, önerilen modelin afetzedelerin barınma merkezlerine atanmasında etkin bir araç olduğunu göstermiştir.

Anahtar Kelimeler: Kapasiteli yer tesisi, gerçek uygulama, afet yönetimi, coğrafi bilgi sistemi, maksimum kapsama.

Jel Sınıflama: R53, C61, Q54.

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1. Introduction

Most of the world's population lives in areas prone to natural disasters (Saeidian et al. 2018). Turkey is located in a seismically active region with relatively high records of earthquakes. Earthquakes often result in severe living loss and intensive economic and social problems. In disaster situations such as earthquakes, emergency services are faced with a large number of injured people, most of them with critical injuries, in which normal facilities and planning cannot respond (Tavakkoli-Moghaddam et al. 2018). To decrease the potential loss and manage efficient rescue plans are essentials.

In the literature, there are a lot of location-allocation model applications for the case of disasters or humanitarian logistics problems. A brief review is presented in Table 1. For a comprehensive review of facility location models for emergency humanitarian logistics, the reader is referred to Boonmee et al. (2017).

Table 1. Location –Allocation Models for Disaster Management

Author(s)	Model	Disaster or Problem	Solution Tool
Pan (2011)	P-median model	Typhoon	Integer programming Genetic algorithm
Fetter and Rakes (2012)	Obnoxious facility location model	Debris disposal	Mixed integer programing
Ye et al. (2015)	P-center model	Emergency rescue	Variable neighborhood search
Hashim et al. (2017)	Capacitated maximal covering location model	Flood	Integer programming
Doungpan et al. (2018)	Maximal covering location model	Emergency rescue	Integer programming
Zhang et al. (2019)	Set covering model	Air-ground medical rescue	Integer programming
This paper	Capacitated maximal covering location model	Emergency rescue	Geographic information system

This study applies a GIS tool namely capacitated maximum covering location model to provide an emergency plan in times of a disaster. The tool is tested on the case of Tunceli province. The aim of the study is to maximize the number of potential victims who can be allocated to the shelters within a safe fixed distance. Under the shelter capacity constraint, maximum number of people who may be affected by a disaster is assigned to a shelter. While people who are living in the residential area are considered as demand, the shelters which are located in different districts are considered as source nodes. The problem is solved using ArcGIS software.

The paper is organized as follows. Next section presents the related tool of ArcGIS. The third part describes the case study with data and presents the solutions. Finally the last part presents conclusions and directions for future research.

2. Application Of GIS Tool

In this paper, the capacitated maximum covering location model developed by Haghani (1996) is applied. Due to the size of the problem, the location tool of ArcGIS is used to run the model. To apply the model for the case of Tunceli, first of all, the locations of residential buildings and road data are gathered from *www.openstreetmap.com*

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While the data of buildings are based on polygon, roads are recorded as vectors. Unnecessary locations like bus stations, electricity lines, cafeterias and etc. are removed using Global Mapper 18 software. The map which includes the residential buildings and roads is finalized using ArcGIS 10.4 (Figure 1).

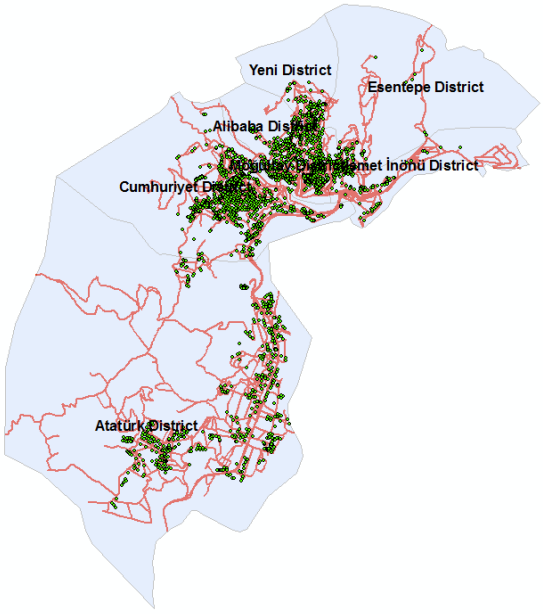

Figure 1. Road Network and Residential Area in Tunceli.

After locating the residential buildings, population data which is collected from Turkish Statistical Institute is assigned to each building. Figure 2 shows an interface of population assignment to 2121 different buildings.

Table

Structure

FID	Shape *	OBJECTID_1	OBJECTID	fclass	name	type	Shape_Leng	mahalle	Nufus	ORIG_FID	ID
0	Point	1	2	building	Paşa Cami		0,000563	Cumhuriyet Mahallesi	6	0	C1
1	Point	2	3	building	Paşalar Cami		0,000703	Mogultay Mahallesi	9	1	G1
2	Point	3	4	building	Merkez Cami		0,000473	Atatürk Mahallesi	38	2	B1
3	Point	4	5	building			0,000736	Atatürk Mahallesi	38	3	B2
4	Point	5	6	building			0,001367	Atatürk Mahallesi	38	4	B3
5	Point	6	7	building			0,001193	Mogultay Mahallesi	9	5	G2
6	Point	7	8	building	Kültür Merkezi	public	0,001671	Atatürk Mahallesi	38	6	B4
7	Point	8	9	building			0,000734	Atatürk Mahallesi	38	7	B5
8	Point	9	10	building		house	0,000548	Ismet Inonu Mahallesi	8	8	F1
9	Point	10	11	building			0,00073	Ismet Inonu Mahallesi	8	9	F2
10	Point	11	12	building		house	0,000387	Ismet Inonu Mahallesi	8	10	F3
11	Point	12	13	building		house	0,000334	Ismet Inonu Mahallesi	8	11	F4
12	Point	13	14	building			0,00067	Ismet Inonu Mahallesi	8	12	F5
13	Point	14	15	building		house	0,000634	Alibaba Mahallesi	10	13	A1
14	Point	15	16	building		house	0,000634	Alibaba Mahallesi	10	14	A2
15	Point	16	17	building		house	0,000634	Alibaba Mahallesi	10	15	A3
16	Point	17	18	building		house	0,000633	Alibaba Mahallesi	10	16	A4

1 (0 out of 2121 Selected)

Structure

Figure 2. Population Assignment to the Buildings.

After the population assignment to the buildings, 5 different locations are selected for shelters randomly and the capacities of those shelters are determined to cover the population (Figure 3).

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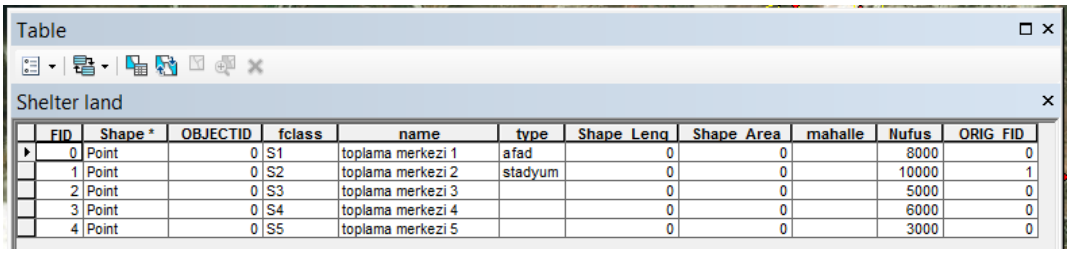

Table

Shelter land

FID	Shape *	OBJECTID	fclass	name	type	Shape_Leng	Shape_Area	mahalle	Nufus	ORIG_FID
0	Point	0	S1	toplama merkezi 1	afad	0	0		8000	0
1	Point	0	S2	toplama merkezi 2	stadyum	0	0		10000	1
2	Point	0	S3	toplama merkezi 3		0	0		5000	0
3	Point	0	S4	toplama merkezi 4		0	0		6000	0
4	Point	0	S5	toplama merkezi 5		0	0		3000	0

Figure 3. Data of the Five Shelters.

To make a network analysis within ArcGIS, a network dataset is needed to be created. While the type of network dataset is shape file-based network dataset, the elements are 1396 junctions and 3312 edges. After the creating the network, Network Analyst section of ArcGIS is used. In the Network Analyst section, there are different types of location-allocation models. In our problem, Maximize Capacitated Coverage tool is used (Figure 4).

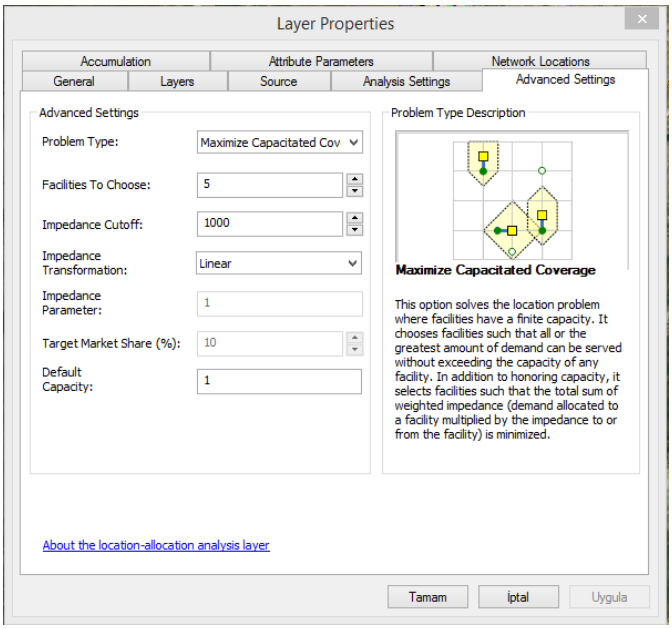

Figure 4. Maximize Capacitated Coverage Tool in GIS.

In Figure 4, there are mainly two parameters which are facilities to choose and impedance cutoff. The first one is used to determine the number of shelters to be opened. The second one is used to determine the distance limit to be covered by a shelter. It must be noted that the applied maximize capacitated coverage tool belongs to ArcGIS software. In the computational analysis section, a combination of these two parameters is used in the case study and the results are demonstrated.

3. Case Study

In this paper, the capacitated maximum covering location model is applied to the case of Tunceli province (Figure 5). Tunceli province is located in the middle of Eastern Anatolia Region and its population was 88,198 in 2018.

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According to the Informatics Inventory of Spatial and Statistical Distribution of Disasters in Turkey, Tunceli is ranked 5th among the other provinces, which are affected most from disasters, on the basis of incidents (Erzurum, Trabzon, Bingöl, Rize, Tunceli) (Dal et al. 2017).

Many natural disasters have occurred including the ones reported as landslide, rock fall, avalanche, fire and flood with earthquake since 1958 in Tunceli province. There have been several earthquakes of magnitude 5 or higher in Tunceli province, a tectonically active and the surrounding territory through its history (Onat and Yön, 2018).

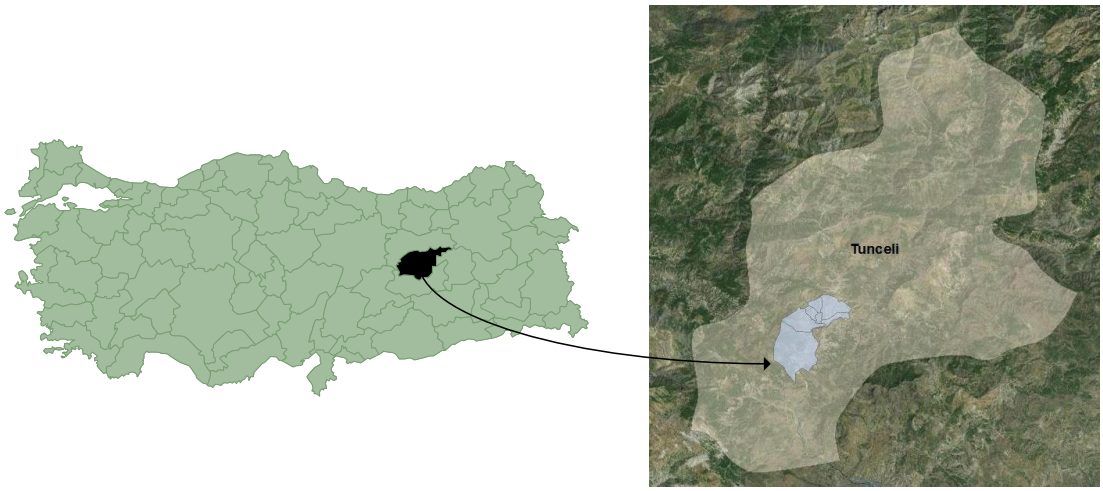

Figure 5. Study Area.

Our focus is the city center of Tunceli rather than the rural area. Therefore, 7 main districts of Tunceli which cover 35% of total population are considered as the study area. The buildings and residential area are located in 7 main districts of Tunceli. Rest of Tunceli is rural area. The number of buildings, the average population per buildings and the population of each district are given in Table 2.

Table 2. Data Related with the Districts

No	Name of District	Number of building	Ave. population per building	Total population
D1	Alibaba District	252	10	2520
D2	Atatürk District	484	38	18392
D3	Cumhuriyet District	738	6	4428
D4	Esentepe District	115	10	1150
D5	İsmet İnönü District	72	8	576
D6	Moğultay District	330	9	2970
D7	Yeni District	130	8	1040
	Total	**2121**		**31076**

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While the districts with the located buildings are shown in Figure 6, the locations of 5 shelters are shown in Figure 7.

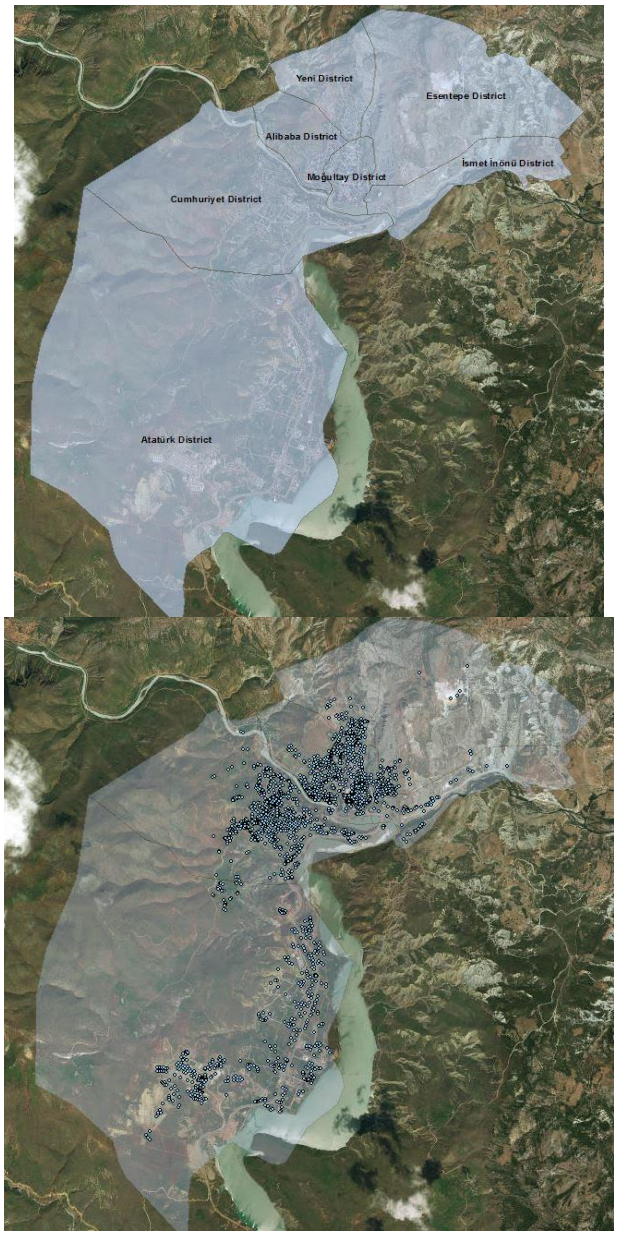

Figure 6. The Borders of Districts (left) and Covered Buildings (right).

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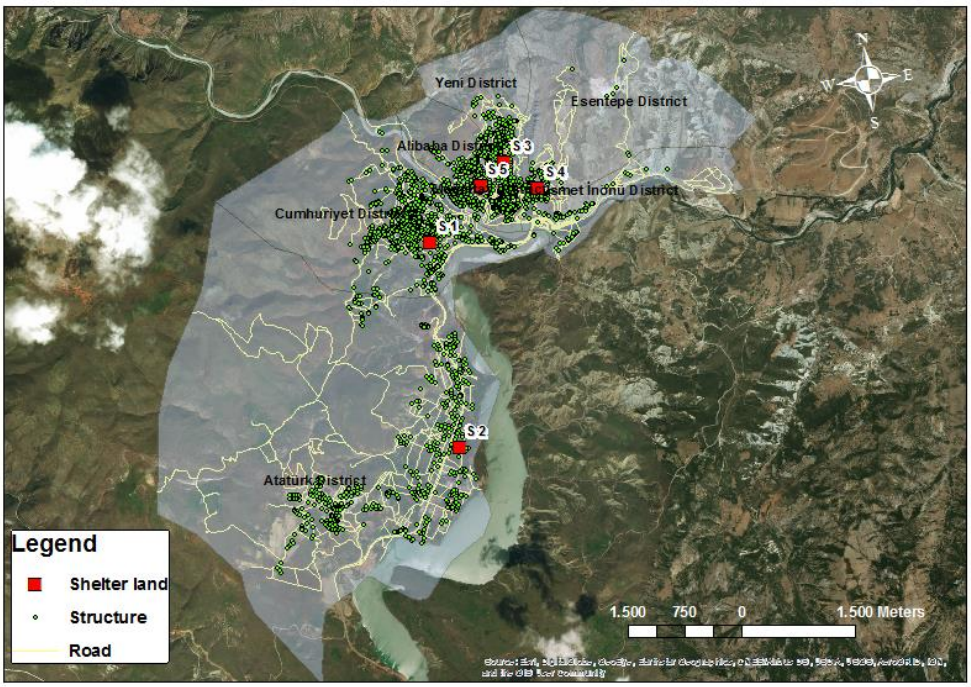

Figure 7. Locations of the Shelters.

Using the number of shelters and distance limit, 25 different problems are solved in ArcGIS tool. The detailed results of each problem are given in Table 3. All problems are run using a PC with Intel Core7 3.06 GHz and 8 GB RAM. The computation time for each problem is less than 5 seconds.

According to the results and input data, maximum percentage of covered people is 47.4%. This percentage is obtained when the number of opened shelters is 5 and distance limit is 1000 meters. When the number of shelters and the distance limit is increased, it is an expected situation that the coverage percentage also increases. The assignments of 5^{th}, 10^{th}, 15^{th}, 20^{th} and 25^{th} problems are illustrated in Figure 8. It must be noted that the obtained results are not tested optimally. It means that the results may be optimal or not.

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Table 3. Results of the Model

Problem	Number of shelter	Distance limit (m)	Opened shelter	Covered buildings		Covered people	
				Unit	%	Number	%
1	1	100	S4	13	0.006	130	0.004
2	1	250	S4	45	0.021	446	0.014
3	1	500	S3	223	0.105	2034	0.065
4	1	750	S3	498	0.235	4494	0.145
5	1	1000	S3	552	0.260	5000	0.161
6	2	100	S3-S4	22	0.010	211	0.007
7	2	250	S2-S4	55	0.026	826	0.027
8	2	500	S1-S3	421	0.199	3222	0.104
9	2	750	S1-S3	924	0.436	7050	0.227
10	2	1000	S2-S3	664	0.313	9256	0.298
11	3	100	S2-S3-S4	24	0.011	287	0.009
12	3	250	S2-S3-S4	96	0.045	1202	0.039
13	3	500	S1-S2-S3	449	0.212	4286	0.138
14	3	750	S1-S2-S3	987	0.465	9444	0.304
15	3	1000	S1-S2-S3	1183	0.558	12370	0.398
16	4	100	S1-S2-S3-S4	33	0.016	341	0.011
17	4	250	S1-S2-S3-S4	141	0.067	1472	0.048
18	4	500	S1-S2-S3-S4	552	0.260	5289	0.170
19	4	750	S1-S2-S3-S4	1109	0.523	10609	0.341
20	4	1000	S1-S2-S3-S4	1329	0.627	13788	0.444
21	5	100	S1-S2-S3-S4-S5	37	0.017	377	0.012
22	5	250	S1-S2-S3-S4-S5	149	0.070	1547	0.050
23	5	500	S1-S2-S3-S4-S5	578	0.273	5533	0.178
24	5	750	S1-S2-S3-S4-S5	1208	0.570	11574	0.372
25	5	1000	S1-S2-S3-S4-S5	1429	0.674	14716	0.474

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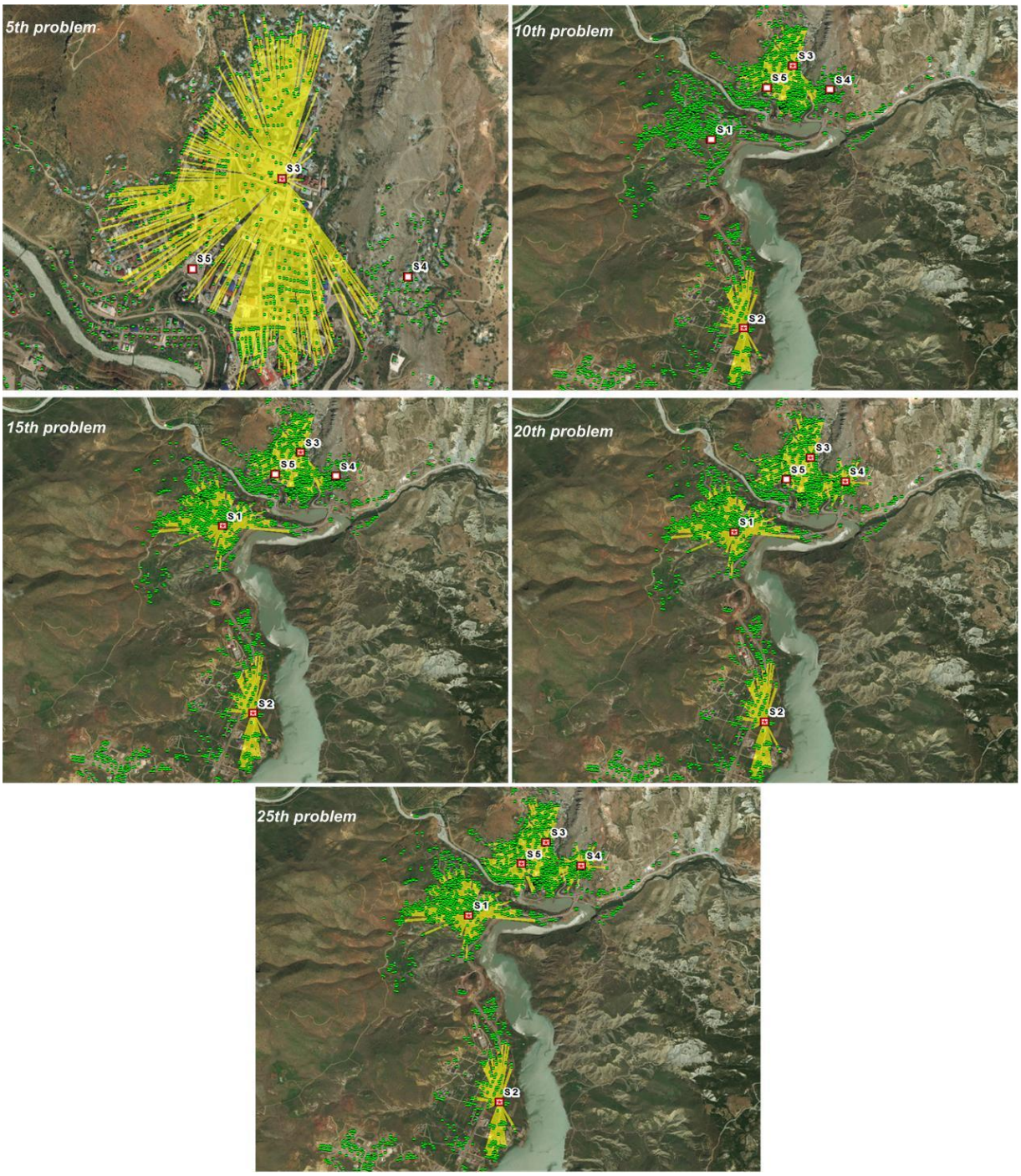

Figure 8. The Assignments of the Cases with 1000 meters Distance Limit.

To increase the coverage percentage and see when 100% coverage is achieved, the distance limit is maximized. Under the capacity constraints, all the potential victims are fully covered when the distance limit is 9200m. The illustration of the case with 9200m distance limit is given in Figure 9.

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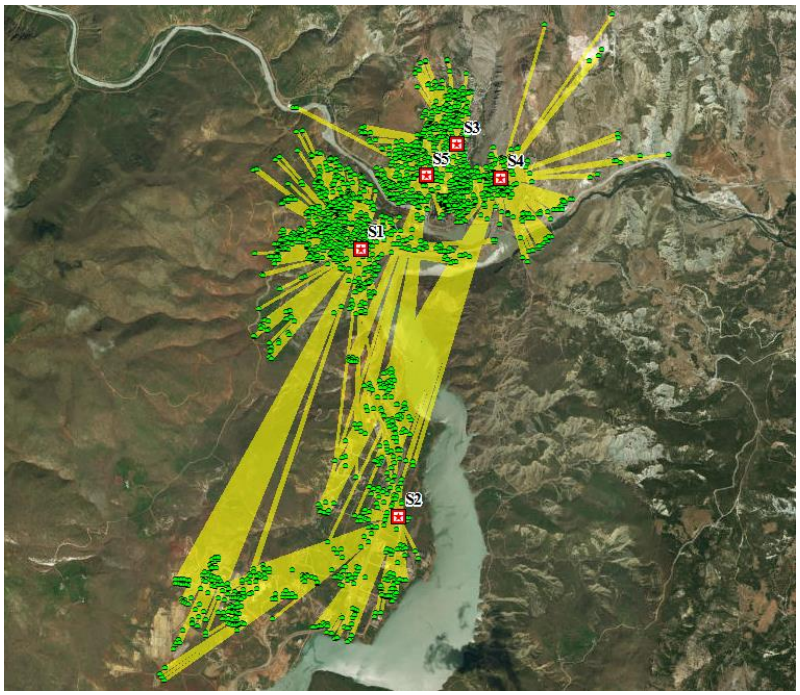

Figure 9. 100% Coverage with 9200m Distance Limit

It is a known fact that capacity consideration forces these kinds of models negatively. To overcome this issue, a new solution is also generated by ignoring the capacities of shelters. In this case, 100% coverage is also achieved when the distance limit is 4700m. It means that ignoring the capacities decreases the distance limit from 9200m to 4700m by almost 50%. Figure 10 shows the assignments of all potential victims to the un-capacitated shelters under 4700m distance limit.

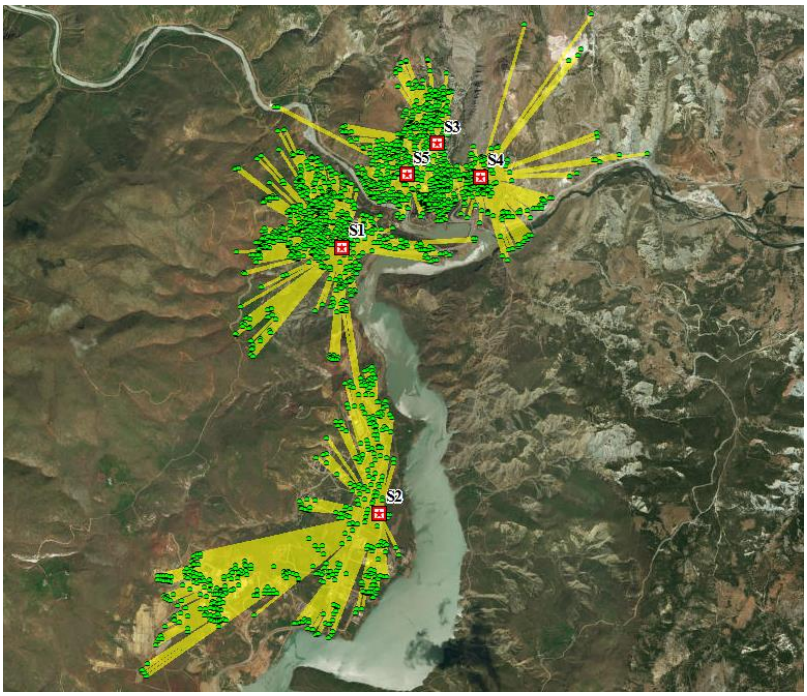

Figure 10. 100% Coverage with 4700m Distance Limit with un-capacitated Shelters

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4. Conclusion

In this paper, a rescue plan in times of a disaster is investigated for Tunceli province. Our aim is to analyze the access of potential victims to the shelters by maximizing the covered potential victims. To do so, the problem is considered as a capacitated maximum covering location model. To solve the model, the location-allocation tool of ArcGIS is used. In the case study, 5 shelters are considered as source nodes while 31,076 people are considered as potential victims (demand nodes). In the analysis part, 25 problems are generated and solved to provide managerial insights for the decision makers. As a result, different what-if scenario analyses demonstrate that half of the population can be covered with 5 shelters in 1km distance. Finally, two extra analyses are conducted to see at which distance limit 100% coverage is achieved. When the capacities are not ignored, all potential victims are served less than 9200m distance limit. Conversely, 4700m distance limit is enough to cover all people by ignoring the capacities. For the future studies, (*i*) other location-allocation models such as p-median, set covering and etc. should be applied and (*ii*) a web-based decision support system should be developed.

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INVESTIGATION OF THE ATTITUDES AND PURCHASING BEHAVIOR OF THE STUDENTS TAKING GREEN AND REVERSE LOGISTICS COURSE TOWARDS GREEN PRODUCTS: THE CASE OF NECMETTIN ERBAKAN UNIVERSITY

Selda BAŞARAN ALAGÖZ[1], Abdullah Oktay DÜNDAR[2], Aygen SEV[3]

Abstract

In this study, it is investigated whether there is a significant difference between the attitudes and purchasing behavior of the students taking and not taking green and reverse logistics course. The sample of the study consists of students studying at the Department of Transportation and Logistics, Faculty of Applied Sciences, Necmettin Erbakan University in 2018-2019 academic year. In the study, a questionnaire consisting of 25 questions was applied to the students who took Green and Reverse Logistics courses. It was investigated whether there was a significant difference between the attitudes and the purchasing behavior of the students taking and not taking this course towards green products. As a result of the research, a significant difference was found in the attitudes of the students who took the green and reverse logistics course and the students who did not take the course towards the recycled products. Students who take the green and reverse logistics course are more moderate about recycled products and are interested in purchasing. One of the factors of this is the recycling issue in the course content and the contribution of recycled products to the environment. As a result of the research questions on green purchasing behavior which is another dimension of the research, no significant difference was observed between the students taking and not taking the course. Green purchasing behavior comes to the forefront with more material elements than environmental awareness. With the expression among the questionnaire questions "I take into account the price factor", it was seen that the majority of the participants are looking at the price rather than the environmental impact of the products.

Keywords: Reverse Logistics, Recovery, Green Product, Consumer Purchasing Behavior

Jel Classification: I21, L91, M31

YEŞİL ve TERSİNE LOJİSTİK DERSİ ALAN ÖĞRENCİLERİN YEŞİL ÜRÜNE YÖNELİK TUTUMLARININ ve SATIN ALMA DAVRANIŞLARININ İNCELENMESİ: NECMETTİN ERBAKAN ÜNİVERSİTESİ ÖRNEĞİ

Öz

Bu çalışmada tersine ve yeşil lojistik ile ilgili eğitim alan ve almayan öğrencilerin yeşil ürüne yönelik tutumları ve satın alma davranışları arasında anlamlı bir farklılığın olup olmadığı araştırılmaktadır. Çalışmanın örneklem kütlesi Necmettin Erbakan Üniversitesi Uygulamalı Bilimler Fakültesi Ulaştırma ve Lojistik Bölümünde 2018-2019 eğitim öğretim yılında okuyan öğrencilerden oluşmaktadır. Çalışmada Yeşil ve Tersine Lojistik dersi alan ve almayan öğrencilere 25 sorudan oluşan anket uygulanmıştır. Bu dersi alan ve almayan öğrencilerin yeşil ürünlere yönelik tutumları ve yeşil ürüne yönelik satın alma davranışları arasında anlamlı bir farklılığın olup olmadığı araştırılmıştır.

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Yapılan araştırma sonucunda yeşil ve tersine lojistik dersini alan öğrenciler ile dersi almayan öğrencilerin geri dönüştürülmüş ürünlere yönelik tutumlarında anlamlı bir farklılığa rastlanılmıştır. Yeşil ve tersine lojistik dersi alan öğrenciler geri dönüştürülmüş ürünlere yönelik daha ılımlı yaklaşmaktadır ve satın alma düşüncesi içerisine girmektedir. Bunun etkenlerinden birisi ise ders içeriğinde yer alan geri dönüşüm konusu ve geri dönüştürülmüş ürünler ile çevreye sağlanacak katkıdır. Dersi alan ve almayan öğrenciler arasında yapılan araştırmanın bir diğer boyutu olan yeşil satın alma davranışıyla ilgili inceleme sorularından varılan sonuçta ise dersi alan ve almayan öğrenciler arasında anlamlı bir farklılık gözlenmemiştir. Yeşil satın alma davranışında çevre bilincinden daha fazla maddi unsurlar ön plana çıkmaktadır. Anket soruları arasında yer alan fiyat faktörünü dikkate alırım ifadesi ile katılımcıların büyük çoğunluğunun ürünlerin çevrede yarattığı etkiden çok fiyatına baktığı ön plana çıkmıştır.

Anahtar Kelimeler: Tersine Lojistik, Geri Kazanım, Yeşil Ürün, Tüketici Satın Alma Davranışı

Jel Kodları: I21, L91, M31

1. Introductıon

Human beings will continue to consume as long as they exist. In parallel with the rapid rise of the world's population, the needs of people are increasing and consumption is also increasing with these needs. The increase in consumption brings about environmental pollution. After each product is consumed, its packaging, residues or eventually itself becomes waste. Non-recyclable productions made unconsciously and wastes continue to become a problem every day. Although environmental policies sometimes contradict the cost reduction policies of the companies, it is inevitable to make the necessary arrangements in line with the expectations of the customers.

With the adoption of the concept of environmental awareness, human beings tend to consume green products (environmentally friendly products). Demand for green products continues to increase every day with the improvement of people's environmental awareness. As a result of this improvement, companies start to design recyclable and reusable products while they are in the design stage before they start production. Among the reasons why producers turn to green products are less environmental damage, recycling of products and lowering costs with the efficient use of scarce resources.

In this study, basic information on reverse logistics and green product purchase has been given and, as a result of the questionnaire applied to the students of Konya Necmettin Erbakan University Faculty of Applied Sciences Department of Transportation and Logistics in the 2018-2019 academic year, it has been investigated whether there is a significant difference between the attitudes and purchasing behavior of the students taking and not taking Green and Reverse Logistics course towards green product.

2. Green Product, Green Logistics, Reverse Logistics

In this section, conceptual information about green product, green logistics and reverse logistics will be given.

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2.1. Green Product

Green marketing is defined as the efforts of enterprises to design, promote, price and distribute products that will not harm the environment (Jain and Kaur, 2004). Today, with the increasing sensitivity towards the environment, it is seen that consumers tend to convert their purchasing behavior into green purchasing behavior. Green purchasing behavior can be defined as the consumer behavior that protects the environment, minimizes pollution, introduces rules on the use of resources and protects other species. It is also possible to name consumers who care about the environmental impacts of purchasing activities and make rational purchasing decisions in this direction as green consumers.

Green products are defined as products that do not pollute the environment, do not harm living things as much as possible, minimize the consumption of natural resources, and can be recycled or protected. Some important principles are mentioned in order to be successful in green product development strategies (Erbaşlar, 2012). The first is to adopt a direct and serious approach to greening the product and continuously assess the environmental impact of the product throughout its life cycle. The second is to identify a production system that will make recycling maximum, resource waste and waste quantity minimum. The third is to produce high quality, always accessible and safe products in continuous cooperation with consumers. Another is to carry out studies to make consumers prefer these products even though the costs are high.

Pettit and Sheppard (1992) pointed out that consumers need to bear some costs in the transition from non-green behavior to green behavior and stated that abandoned habits, along with benefits, involve costs such as stress and time to learn different behavior. Green consumption requires certain sacrifices, such as paying more for green, accepting defective substitutes for a product, reducing product consumption, and making efforts for some behavioral changes (washing bottles, sorting plastics, binding newspapers, storage, etc.).

2.2 Green Logistics

Green logistics aims to reduce environmental pollution and resource use by using advanced logistics technologies that plan and implement transportation, packaging, storage, loading and unloading, circulation operations and other logistics activities. Green logistics can be defined as planning the logistics operations in a way that minimizes the effects on the ecological environment (Boztepe, 2018).

Green logistics management reduces the environmental damages caused by the production and distribution activities of the products. Apart from the internal activities of the company such as product development and production processes, it is also regarded as managing the physical product flows by protecting the environment in the international arena. Supply, distribution, packaging and reverse logistics are among the main elements of green logistics activities (Lai et al., 2012).

2.3. Reverse Logistics

Reverse logistics is the reverse movement of the supply chain to manage the flow of completed products or parts to reproduce, recycle, dispose or use resources efficiently (Dowlatshai Shad, 2000).

Reverse logistics is the role of logistics in recycling, waste disposal and management of hazardous materials.

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It includes resource reduction, recycling, material substitution, reuse and disposal of materials (Temur et al., 2015). Reverse logistics involves the distribution of used products through different processes such as collection, separation and recycling.

Reverse supply chain includes the collection, inspection and return of the products to the economy by adding value to the products that are not used due to completing their lifespan or returned for reasons such as poor quality, product recall, warranty and after-sales service (Erol, 2006).

2.3.1.Recycling

It is the reuse of wastes under a production procedure for the original purpose or for other purposes, including organic conversion, except for energy recovery. Evaulable materials in solid waste are reintroduced to the economy by recycling (Kaçtıoğlu and Şengül, 2010). Recycling is the whole of the activities involved in the process of converting wastes into secondary raw materials through specific processes. The recycling process involves the recovery of used products or returned products due to various reasons. The purpose of recycling is to meet some of the raw material requirement from recycled wastes and to provide an economic advantage to enterprises (Öktem, 2016).

2.3.2.Recovery

Recovery, which includes the concepts of reuse and recycling, is the conversion of the components contained in the wastes to other products or energy by physical chemical or biochemical methods. Today, products return to the supply chain for reasons such as completing life expectancy, being out of warranty and losing quality features. When the product is returned to the supply chain, reintroducing it to the economy is included in the scope of recovery (Demirel and Gökçen, 2008).

By recovery, the products used as secondary raw materials can be re-used by converting them into the same product or different products. Thus, sustainable and efficient use of resources is possible (Ergülen and Büyükkeklik, 2008).

3. Literature Review

Previous studies in the literature are included in this part of the study.

According to the research conducted by Onurlubaş on the families living in Istanbul, gender is the first reason that affects consumers' green product purchasing behavior. Environmental awareness varies according to gender. It was revealed that the environmental awareness of women consumers is more developed and they are more likely to buy green products (Onurlubaş, 2016).

Yılmaz and Arslan (2011) 's study on university students is based on students' environmental attitudes and behavior and their willingness to protect the environment. In the study, the effects of gender differences and parental education level on environmental attitudes and behavior were examined and it was seen that the places where the students live, the gender and the education level of the mother were effective in environmental sensitivity.

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In the study named “green human in education, green product in consumption” conducted by Doğan et al. (2013) on Nazilli FEAS and Nazilli Vocational School students, it was aimed to measure the sensitivity of the students to green products. As in previous studies, it was observed that gender, income and education levels of students had an effect on green purchasing behavior. It was found that female students had higher environmental sensitivity than male students. It was concluded that the green product and environmental awareness should be emphasized in the education of the students.

A study was conducted by Çakıroğlu et al. (2019) to determine the attitudes of young consumers towards green products. According to the study on young university students, young consumers are sensitive to environmental problems but do not demonstrate this in their purchasing behavior. The main reason why green product purchasing behavior is low is that green products are expensive compared to other products. Consumers do not agree to pay extra money because the product is green.

A research named “consumer's view on reverse logistics in line with social responsibility” was conducted by Yalci et al. (2017) on consumers living in Edirne province, and a significant relationship was found between social responsibility awareness and green product purchase. As consumers' awareness of social responsibility towards the environment increases, their interest in recycled products also increases. As a result of the study, a significant relationship between social responsibility, green purchasing and recycling activities was revealed.

The studies on green purchasing were examined by Kaufmann et al. (2012) and the factors assumed to affect green purchasing were brought together in their study.

In the study conducted by Aslan and Çınar (2007), the tendency of university students to use environmentally sensitive products on green marketing activities was examined. University students tend to buy products that do not harm the environment. However, in order to raise awareness of all students, organizations such as training, seminars and meetings should be organized and their tendencies towards green product should be increased.

In their study conducted under the name of green marketing as a means of environmental protection, Thapa and Verma (2014) did not find any difference between the demographic characteristics of Dehradun consumers and green product purchasing behavior.

In his research on Romanian consumers, Sima (2014) showed that consumers are willing to buy green products, but the price is very important for them.

As a result of the research carried out by Karaca (2013) on the attitudes of consumers towards green products, it was concluded that with environmental education and various legal regulations, positive behavior changes should be brought to all segments of the society on environmental sensitivity and that environmental awareness can be raised or at least an awareness can be created by keeping environmental problems on the agenda.

Nakiboğlu (2007) presented a comprehensive literature review on reverse logistics and contributed to fill the lack of domestic resources due to the fact that it is a new field in our country. It was stated in the study that reverse logistics is developing due to profitability, social responsibility and ecological reasons.

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Hazen et al. (2012) showed that the satisfaction of consumers with the businesses doing green and reverse logistics activities increases their loyalty levels to these businesses and they are ready to pay more for their products.

In their study in which the green supply chain management practices and internal factors in automobile, electrical / electronic and thermal power plant area in China were analyzed with ANOVA using survey technique, Zhu and Sarkis (2006) stated that designing a product to be sustainable in all stages can minimize ecological damage.

Straughan and Roberts (1999) examined demographic characteristics in defining green consumer behavior in their study with 235 university students in the United States, and concluded that it has an important role. In this study, it is concluded that young people have higher environmental sensitivity than others, that there is a positive relationship between education level and environmental attitudes and behavior, and that women show more sensitive consumption behavior than men.

4. Research Method and Data Analysis

In this part of the study, the importance, aim, method and results of the analysis will be given.

4.1 Importance and Purpose of the Research

The consequences of environmental damages are appreciable today. Consumers are beginning to realize that purchasing behavior is a direct impact of this loss. Environmental awareness is tried to be increased through trainings on consumers and different campaigns. In Green and Reverse Logistics course prepared for university students, it is aimed to raise awareness about the subject by explaining the current and future applications in detail.

The aim of this study is to investigate whether there is a significant difference between the students taking and not taking the Green and Reverse Logistics course in the Transportation and Logistics Department of Necmettin Erbakan University in 2018-2019 academic year.

4.2.Research Method

In this part of the study, the hypothesis and models on which the research is based, the preparation of the questionaire, the sampling method and data collection will be included.

4.2.1.Research Model and Hypothesis

The research hypotheses are shared below.

H1: There is a significant average difference between the attitudes of students taking and not taking Green and Reverse Logistics course towards green product.

H2: There is a significant average difference between the green product purchasing behavior of the students taking and not taking Green and Reverse Logistics course.

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4.2.2.Preparation of the Questionnaire

The questions in the questionnaire were compiled from the literature and from the Yalci et al. (2017)'s study, which was previously validated. The questionnaire was prepared on the basis of a 25-point Likert scale with 25 questions about consumer attitudes towards recycled products and statements on green purchasing behavior.

In order to measure the difference in perception between the two groups, the criterion for taking or not taking the green and reverse logistics course was added to the questionnaire.

4.2.3.Sampling Method and Data Collection

The main population of the study is undergraduate students of Department of Transportation and Logistics, who are studying at Necmettin Erbakan University in 2018-2019 academic year. The curriculum of the Green and Reverse Logistics course determined within the framework of Logistics Training Standards carried out by the Logistics Association (LODER) was applied in the course mentioned in the study. Data were collected by face to face questionnaire method. The questionnaire was conducted in June 2019 during the final exam week when all students were at school. It was conducted before the start of the exam in which all students took their places in the exam hall. The completion time of a questionnaire was 5 minutes.

4.2.4 Research Limitations

This study was limited to the students of Necmettin Erbakan University, Department of Transportation and Logistics.

4.3.Analysis and Interpretation of Data

Cronbach's alpha coefficient was used to test the reliability of the revised questionnaire. According to the results of the analysis, Cronbach's alpha coefficient was found to be 0.863 and the questionnaire was understood to be reliable.

The number of participants and their distribution by gender are shown in Table 1.

Table 1: Gender Distribution of Participants

Gender	Number of students (n)	Rate (%)
Female	103	42.4
Male	140	57.6
Total	243	100

As can be seen in Table 1, 243 students participated in the study, 42.4% of them were female and 57.6% were male.

The income level of the students participating in the study is given in Table 2.

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Table 2: Income Status of Participants

Total Household Income	Number of students(n)	Rate(%)
Less than 400 TL	11	4,5
400-999	44	18,1
1000-1999	30	12,3
2000-2999	80	32,9
3000-3999	38	15,6
4000-4999	18	7,4
5000 TL and above	22	9,1
Total	243	100

As shown in Table 2, 4.5% of the students have income less than 400 TL, 18.1% have income between 400 and 999 TL, 12.3% have income between 1000 and 1999 TL, 32.9% have income 2000 and TL 2999, 15.6% have income between 3000 and 3999 TL, 7.4% have income between 4000 and 4999 TL, 9.1% have income 5000 and above.

Table 3 shows the attendance of the participants to the course.

Table 3: Participants' Status of taking the course

Status of taking the course	Number of students(n)	Rate(%)
Took	92	37.9
Didn't take	151	62.1
Total	243	100

As can be seen in Table 3, a total of 243 students, including 92 students taking green and Reverse Logistics courses and 151 students not taking the course, participated in the study.

Table 4 shows the mean and p values of the participants' responses to the questions measuring their attitudes towards green products.

Table 4: Participants' Attitudes Towards Green Products

Taking the course	N	X	SS	t	p
Took	92	3,6891	0,59123	3,337	0,001*
Didn't take	151	3,4079	0,66328		

*$p<0.005$

When the answers of the participants to the questions that measured their attitudes towards green products were examined, it was found that the average scores of the students taking the course were statistically higher than the students who did not take the course ($p <0.005$).

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Table 5 shows the mean and p values of the participants' responses to the questions that measure their green product purchasing behavior.

Table 5: Participants' Green Product Purchasing Behavior

Taking the course	N	X	SS	t	p
Took	92	3,4761	0,59123	1,138	0,256
Didn't take	151	3,3912	0,66328		

When the answers given by the participants to the questions about green product purchase behavior were examined, no statistically significant difference was found between the average scores of the students who took the course and who did not take the course (p = 0.256).

5. Discussion and Conclusion

The increase in environmental problems and the sensitivity of individuals to the environment in relation to this have brought about the businesses a social responsibility. Consumers expect businesses to act environmentally sensitive in their production and service activities. In this case, businesses should attach importance to sustainability in order to maintain their long-term profitability. The use of renewable energy and natural energy, the protection of nature and natural resources contribute to the development of the national economy and are important for public health.

The aim of this study is to determine whether there is a meaningful relationship between consumers' taking green and reverse logistics courses and the increase in their sensitivity to the environment. As a result of the survey and analysis, the students who take the green and reverse logistics course understand both the course contents and the importance of environmental damage caused by recycling and logistics processes and their perspectives on environmental issues change. Attitudes of students who took the course towards green products increased significantly compared to the students who did not. They agree to pay more and buy environmentally friendly products compared to non-environmental products, even though the prices of the products obtained from recycling increase. This finding of the study comlies with the studies of Yalçı et al. (2017), Aslan and Çınar (2007) and Karaca (2013) and it is seen that the trainings provided have an effect on increasing environmental awareness of consumers and positively changing their attitudes towards green products. Therefore, consumer attitudes towards green products can be changed positively by increasing training on recycling, recovery and green purchasing.

The public service announcements that encourages the purchase of green products and social awareness can reduce the extent of environmental damage. According to the findings of our study, no significant difference was found between green product purchasing behaviour of the students who took reverse and green logistics courses and the students who did not take the course. According to Doğan et al. (2013) and Sima (2014), there is a dominant relationship between purchasing behavior and income level.

Therefore, the findings in the literature comply with the findings in the study.

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However, it is seen that the average values of the students taking the course (3,4761) are higher than the average values of the students not taking the course (3,3912). Although education cannot directly change purchasing behavior, it can be said to have a positive effect.

This study was conducted only on the students studying at Necmettin Erbakan University Faculty of Applied Sciences, within the scope of time and financial means. Future studies can be performed more extensively on all the students taking the green and reverse logistics course in Turkey. The survey will be applied to all consumers at provincial level and will enable to gain more information about green product purchasing behavior and the perspectives of consumers from different age and occupational groups on recycled products.

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THE EFFECTS OF STRATEGIC PURCHASING PRACTICES ON PERFORMANCE: AN ANALYSIS IN THE TURKISH HOSPITALITY SECTOR*

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Abstract

In this study, we examine the impact of strategic purchasing practices on hotel performance. In order to test our hypotheses, we use survey data from 71 hotels in Turkey. First, we perform a cluster analysis and identify two types of purchasing strategies based on supplier selection criteria: traditional vs. strategic. Then, via partial least squares (PLS) method, we test the effect of long-term relationships, supplier development and environmental supplier development on hotel performance. Our results show that long-term relationships have a negative effect on both market and financial performance. Additionally, we find that supplier development has a positive effect on performance, but only for hotels with a traditional purchasing strategy. Interestingly, we find that environmental supplier development has a positive effect on financial performance in hotels with a traditional purchasing strategy, but a positive effect on market performance in hotels with a strategic purchasing strategy.

Keywords: Hospitality Sector, Supplier Development, Supplier Relationship, Supplier Selection, Survey

JEL classification: C30, L83, M10

STRATEJİK SATIN ALMA UYGULAMALARININ PERFORMANSA OLAN ETKİSİ: TÜRK KONAKLAMA SEKTÖRÜNDE BİR ANALİZ

Öz

Bu çalışmada stratejik satın alma uygulamalarının otel performansına olan etkileri incelenmektedir. Hipotezleri test etmek için Türkiye'deki 71 otelden anket yolu ile veri toplanmıştır. İlk olarak, tedarikçi seçim ölçütlerinin kümeleme analizi ile incelenmesi ile "geleneksel" ve "stratejik" olarak adlandırılan iki farklı satın alma stratejisi bulunmuştur. Daha sonra, kısmi en küçük kareler yöntemi kullanılarak tedarikçilerle uzun vadeli ilişkilerin, tedarikçi geliştirmenin ve çevresel tedarikçi geliştirmenin otel performansına etkisi test edilmiştir. Bulgular göstermektedir ki, tedarikçilerle uzun vadeli ilişkiler otellerin pazar performansını ve finansal performansını olumsuz yönde etkilemektedir. Öte yandan, tedarikçi geliştirmenin pazar performansına ve finansal performansa olan olumlu etkisi sadece geleneksel satın alma stratejilerine sahip olan otellerde görülmüştür. Son olarak, çevresel tedarikçi geliştirme uygulamalarının geleneksel satın alma stratejisine sahip otellerde finansal performansa, stratejik satın alma stratejilerine sahip otellerde ise pazar performansına olumlu yönde etkisi olduğu gözlemlenmiştir.

Anahtar kelimeler: Anket, Tedarikçi Geliştirme, Tedarikçi İlişkileri Yönetimi, Tedarikçi Seçimi, Turizm Sektörü

JEL sınıflaması: C30, L83, M10

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1. Introduction

Traditionally, purchasing was seen as a complementary operational activity with minor importance on firm's performance, where the main objective was to acquire the products and services with the lowest cost. (Apostolova et al., 2015; Gadde and Håkansson, 1994). However, especially in the past two decades, purchasing has transformed into a strategic function, focusing on value-adding activities such as obtaining the best quality from suppliers and involving them in joint innovation projects (Carr and Pearson, 2002; Lawson et al., 2014). While previous research illustrate that strategic purchasing practices have a positive effect on firm performance (Carr and Pearson, 2002), majority of these studies examine the manufacturing industry.

In this research, we specifically focus on the hospitality industry in Turkey. Although there have been a few studies examining strategic purchasing practices in hospitality industry (Fantazy et al., 2010; Kim, 2006), there is almost no research in the Turkish context. Being among those few studies, Önder and Kabadayı (2015) examined supplier selection criteria. In this research, we adopt a more comprehensive approach, and examine multiple strategic purchasing practices - namely, supplier selection, collaborative relationships with suppliers, supplier development, and environmental supplier development practices. Furthermore, we adopt a contingency approach, and classify hotels based on their supplier selection criteria, before testing performance effects of other strategic purchasing practices. Therefore, our main research questions are: What is the impact of strategic purchasing practices on hotel performance? Does supplier selection strategy moderate the effect of strategic purchasing practices on hotel performance?

2. Literature Review

Supplier Selection: Supplier selection is a strategic evaluation process that affects firm performance through supplier's performance (Luthra et al., 2017). Hence, firms try to have correct supplier selection approaches enabling them to achieve low cost, consistent high quality, and flexibility (Vonderembse and Tracey, 1999), and maintain competitive in the market and deliver products to customers on time (Kusi-Sarpong et al., 2019). Dickson (1966) has gathered the list of 23 factors to determine the ranking of supplier selection criteria, and found that the most important factor is quality followed by delivery, performance history, warranties, capacity and price. The review of Cheraghi et al. (2004) showed that new criteria have entered to supplier selection such as reliability, flexibility, consistency and long-term relationship (Cheraghi, et al. 2004). Huang and Keskar (2007) have used environmental and safety aspects in addition to traditional criteria.

Although the majority of studies about supplier selection focus on manufacturing industry, the importance of this phenomenon has also been discussed in the context of service industry. Göçen et al. (2017) have interviewed hotel managers in Antalya and determined that product quality, cost, price and delivery are the most important factors to select suppliers in tourism industry.

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Davras and Karaatlı (2014) reliability and references to this list. Önder and Kabadayı (2015) argued that environmental policies of a supplier also need to be considered. As a result, supplier selection criteria for tourism industry were determined as quality, cost, delivery, flexibility, innovation, proximity, references and environmental sustainability. We propose that hotels do not emphasize these supplier selection criteria to the same extent, and hypothesize that:

H1: Hotels can be classified based on their emphasis on supplier selection criteria.

Collaborative Relationships: Although supplier relationships can be examined on a spectrum, two distinctive approaches are often discussed in the literature: arm's length/traditional relationships and cooperative/long-term relationships (Hoyt and Huq, 2000; Landeros and Monczka, 1989). Arm's length relationship aims to achieve competitive supply with short term orientation (Parker and Hartley, 1997). It relies on the selection of the goods or services from multiple suppliers to achieve best price where buyer firm tries to have "win-lose" situation (Lamming and Cox, 1995). This approach is argued to enable buyers to have uninterrupted flow of materials from various suppliers by using price-oriented approaches such as competitive bidding and cost-reduction analysis (Landeros and Monczka, 1989). Short-term oriented arm's length buyer-supplier relationship based on prices can prevent supply management capabilities, create distrust, and force companies to control opportunistic behavior of the partner in a complex structure (Ghoshal and Moran, 1996). Cooperative relationship aims to have fewer suppliers with the intention of continuing business and not switching supplier in the short term (Landeros and Monczka, 1989). Petersen et al. (2005) argue that close buyer-supplier relationship has many advantages such as more motivated suppliers for new product development, reduction of product costs, improvement in product quality and refined customer service issues. Building close relationships with key suppliers enables firms to eliminate many obstacles that cause delays in obtaining materials and services from suppliers (Carr and Pearson, 2002). Being among the few studies examining collaborative relationships in hospitality industry, Fantazy et al. (2010) find that the relationship with suppliers also affects customer satisfaction in the context of hotels. Therefore, we formulae the following hypothesis:

H2: Hotels that have collaborative relationship with their suppliers have better financial performance.

H3: Hotels that have collaborative relationship with their suppliers have better market performance.

Supplier Development and Environmental Supplier Development: Efforts of firms to concentrate on core competencies and increased outsourcing mostly result in increased dependence on suppliers for products and services (Krause et al., 1998). This dependence on suppliers directs buyer firms to effectively manage and develop their suppliers. Krause et al. (1998) define supplier development as efforts of buying firm to increase its supplier's performance in order to meet buying firm's objectives.

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Supplier development practices include supplier monitoring, assistance and training, provision of incentives for continuous improvement, and supplier organizational integration (De Toni and Nassimbeni, 2000).

Existing literature suggests that one advantage of performing supplier development activities is helping suppliers to increase their performance in terms of quality, delivery, cost etc. (Humphreys et al., 2004). Despite these advantages, Krause and Scannell (2002) found that firms in service industry use supplier development activities less than firms in manufacturing industry. The fact that hospitality firms' ability to provide defect-free products to their customers depends on the suppliers make hotels to rely heavily on their suppliers (Kim, 2006). As the majority of the literature argues for a positive effect (Lawson et al, 2014), we formulate the following hypothesis:

H4: Hotels that use supplier development practices have better financial performance.

H5: Hotels that use supplier development practices have better market performance.

A specific type of supplier development that is increasingly adopted is environmental supplier development. Environmental sustainability has become an important aspect for hotels since they consume vast amount of resources (Aboelmaged, 2018). Tourism industry has been blamed because of its activities that use significant amount of water resources and materials that is harmful to the nature such as plastics, non-recyclable containers, cleaning agents (Rodriguez-Anton et al., 2011). As a result, hotels try to handle environmental pressures from both internal and external stakeholders (Aboelmaged, 2018). One of the means to respond to the increasing pressure is to engage in environmental supplier development practices. Environmental supplier development is defined as "all activities that buyer firm helps its suppliers to reduce their negative environmental impact" (Ehrgott et al., 2013, p.131). Environmental supplier development practices include assessment and monitoring of the environmental performance of the suppliers, collaboration of buyer and supplier to achieve improvements together, and knowledge and resource transfer (Bai and Sarkis, 2010). Ağan et al. (2016) state that environmental supplier development can improve hotel performance. Thus, we propose that:

H6: Hotels that use environmental supplier development practices have better financial performance.

H7: Hotels that use environmental supplier development practices have better market performance.

3. Research Method

Data Collection and Sample: The unit of analysis of this study is hotels and the respondents are purchasing managers/staff, who are knowledgeable about their organization's policies. The research sample was obtained via two sources. First, we jointly worked with Hotel Purchasing Managers Education Association (OSMED).

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Executives of this association sent an online questionnaire to its members and 38 responses were collected. Additionally, a member of this association administered printed questionnaires during a meeting of the organization. As a result, 11 completed questionnaires were collected as hardcopy.

With the help of OSMED, a total of 49 responses were gathered. As the majority of the OSMED sample was from Antalya region, as a second approach we also identified a sample that includes hotels from Istanbul, Izmir, and Ankara taking into account the percentages of those in population. With that approach, an additional 22 responses were collected, resulting in a final sample of 71 4-star and 5-star hotels. Table 1 illustrates the main descriptive statistics of the sample.

Table 1. Sample Descriptives

City	**Frequency**	**%**	**# of Rooms**	**Frequency**	**%**
Antalya	22	31.0%	0-100	8	11.3%
İstanbul	21	29.6%	101-250	34	47.9%
Ankara	9	12.7%	251-500	25	35.2%
Muğla	6	8.5%	500+	4	5.6%
İzmir	4	5.6%	**Total**	**71**	**100%**
Aydın	2	2.8%			
Bursa	2	2.8%	**# of Employees**	**Frequency**	**%**
Afyon	2	2.8%	0-100	22	31.0%
Gaziantep	1	1.4%	101-250	30	42.2%
Samsun	1	1.4%	251-500	13	18.3%
Trabzon	1	1.4%	500+	6	8.5%
Total	**71**	**100%**	**Total**	**71**	**100%**

Measurement: Survey questions were prepared based on an extensive literature search. Questions were formulated with a five-point Likert scale, with answer options ranging from "1-Strongly disagree" to "5-Strongly agree". Accordingly, policies of hotels in terms of Supplier Selection (SS), Supplier Relationship (SR), Supplier Development (SD), Environmental Supplier Development (ESD), Market Performance (MP) and Financial Performance (FP) were measured. Due to space constraints, list of questions is not provided; instead, a brief description of the items and the sources are discussed below.

All constructs had multi-item measures. Seven supplier selection criteria were determined after reviewing studies regarding hospitality industry reviewed: quality, cost, delivery, flexibility, proximity, references, and environmental sustainability. Studies by Zeller and Drescher (2017) and Önder and Kabadayı (2015) were used for cost, delivery, proximity, references and sustainability criteria, and items by Krause et al. (2001) were used for quality and flexibility criteria. Collaborative relationships were assessed by adopting the items of Fantazy et al. (2010) focusing on long-term orientation of hotels on managing their relationships with their suppliers. Supplier development items included aspects such as monitoring, assessment, and guidelines related to performance improvement and training of suppliers (Kim (2006).

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Items related to environmental supplier development were developed based on Ağan et al. (2016), who emphasized the above supplier development items focusing specifically on environmental performance improvements. Hotel performance was assessed in two dimensions: financial performance and market performance.

Financial performance was measured with market share, profitability, net profit, and annual growth, whereas market performance was measured with customer satisfaction, customer loyalty, product/service quality and sustainability.

4. Results

Cluster Analysis: The first hypothesis of the study predicts that hotels can be grouped in terms of their supplier selection criteria. In order to do so, two-step cluster analysis (hierarchical clustering and k-means clustering) was used, with the objective of finding groups that exhibit high internal homogeneity (within-cluster) and high external (between-cluster) heterogeneity (Hair et al., 2010). Pseudo-F statistics suggested a two-cluster solution (Wilkinson et al., 2000). The means of the cluster variables are presented in Table 2. Cluster 1 is labeled as "Strategic". This cluster represents a group of hotels that emphasize all supplier selection criteria. Hotels in this group choose their suppliers not only by requiring qualified products with lower prices, but also adaptive suppliers with flexible, environmentally friendly products. Also regional proximity and coverage is an important aspect for the hotels in that cluster. This cluster can be associated with strategic sourcing as well since strategic purchasing includes not only cost, quality, delivery but also many other criteria such as innovativeness and supplier's capabilities. Cluster 2 is labeled as "Traditional". Hotels in this group emphasize cost and quality as much as those in Cluster 1. Moreover, the third most important dimension in selection of suppliers is delivery performance. References and flexibility of suppliers have only moderate score, and environmental qualifications and regional proximity of suppliers are of minor importanc. In this group, hotels adopt traditional purchasing practices by focusing on having high quality with lowest cost in a fast-paced manner (Das et al., 2006). We predict that in these two groups, strategic purchasing practices will have different effects on hotel performance.

Table 2. Cluster Analysis Results

	C1. Strategic (n=38)	C2. Traditional (n=33)	F-Statistics	Significance
Cost	4.76	4.71	0.62	0.435
Quality	4.91	4.86	0.36	0.548
Delivery	4.87	4.56	13.35	0.000
Flexibility	4.66	4.19	13.15	0.001
References	4.82	4.21	28.24	0.000
Proximity	4.12	2.95	55.21	0.000
Environmental	4.57	3.67	42.06	0.000

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Partial Least Squares (PLS) Method: In order to test our hypotheses, partial least squares (PLS) method is used. PLS enables conducting analyses when data is not normally distributed and sample size is low (Chin, 1998). The review by Ali et al. (2017) showed that PLS is very popular in the hospitality literature. SmartPLS 3. software was used and results were obtained via two sequential steps: i) evaluation of the reliability and validity of the measurement model, and ii) evaluation of the structural model.

Reliability and validity. Reliability was assessed by Cronbach alpha values, which ranged between 0.692 and 0.920, assuring high levels of reliability. Validity was assessed by convergent validity and discriminant validity. In order to ensure convergent validity, item loadings should be higher than 0.7 for corresponding construct. In our case, item loadings ranged between 0.685 and 0.953. Furthermore, Average Variance Extracted (AVE) is used to determine the amount of variance captured by a construct and whether there is a measurement error. Values above 0.7 are considered very well and level of 0.5 is acceptable (Fornell & Larcker, 1981). AVE for our constructs ranged between 0.602 and 0.867. Finally, to ensure discriminant validity, square root of AVEs should be higher than inter-construct correlations (Chin, 1998). As Table 3 illustrates, this was the case for all our constructs, suggesting that we can proceed with the structural model.

Table 3. Discriminant Validity

	(1)	(2)	(3)	(4)	(5)
(1) Collaborative Relationship	0.776				
(2) Supplier Development	0.511	0.865			
(3) Environmental Supplier Development	0.253	0.148	0.929		
(4) Financial Performance	-0.058	0.196	0.287	0.876	
(5) Market Performance	-0.168	0.069	0.247	0.432	0.846

Structural model. In order to test the significance of the relationships in the structural model, we used a bootstrapping procedure with 1000 re-samples (Tenenhaus et al. 2005) to calculate the t-statistics for the hypothesized relationships. The results of this analysis are shown in Table 4.

Table 4. PLS Results

Path	Path Coef.	T Statistics	P Values
H2: Collaborative Relationship » Financial Performance	-0.290	1.626	0.099
H3: Collaborative Relationship » Market Performance	-0.349	1.866	0.062
H4: Supplier Development » Financial Performance	0.297	1.578	0.115
H5: Supplier Development » Market Performance	0.202	1.024	0.306
H6: Env. Supplier Development » Financial Performance	0.316	2.862	0.004
H7: Env. Supplier Development » Market Performance	0.305	3.079	0.002

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Accordingly, Collaborative Relationship was expected to be positively effective; however, it was found that it has a significant negative effect on both Financial Performance (ϒ=-0.290, p=0.099) and Market Performance (ϒ=-0.349, p=0.062). Therefore, H_2 and H_3 are not supported. Supplier Development was found to have a positive effect on both Financial Performance (ϒ=0.297, p=0.115) and Market Performance (ϒ=0.202, p=0.306); however, effects were not statistically significant. Therefore, H_4 and H_5 are not supported.

As it was expected, Environmental Supplier Development had a significantly positive effect on both Financial Performance (ϒ=0.316, p=0.004) and Market Performance (ϒ=0.305, p=0.002), thus supporting H_6 and H_7. The independent variables explained 16.6% and 14.8% of the variance in Financial Performance and Market Performance, respectively.

By using the outputs of cluster analysis, two groups of hotels - Strategic and Traditional – are analyzed by multi-group analysis in PLS. The results for each group are presented in Table 5.

Table 5. Multi-group Analysis

		Cluster 1 (Strategic)				Cluster 2 (Traditional)		
Path	H	Path C.	T	P	H	Path C.	T	P
Collaborative Relationship » Financial Perf.	H_{2a}	-0.060	0.265	0.791	H_{2b}	-0.345	1.372	0.170
Collaborative Relationship » Market Perf.	H_{3a}	-0.233	1.240	0.215	H_{3b}	-0.410	1.248	0.212
Supplier Development » Financial Perf.	H_{4a}	-0.323	1.010	0.312	H_{4b}	0.491	2.619	0.009
Supplier Development » Market Perf.	H_{5a}	-0.231	1.181	0.238	H_{5b}	0.461	1.675	0.094
Env. Supp. Development » Financial Perf.	H_{6a}	0.180	0.908	0.364	H_{6b}	0.368	2.361	0.018
Env. Supp. Development » Market Perf.	H_{7a}	0.476	2.917	0.004	H_{7b}	0.174	0.674	0.501

For Cluster 1 (Strategic group), we found that Collaborative Relationships had no effect on Financial performance (ϒ=-0.060, p=0.791) and Market Performance (ϒ=-0.233, p=0.215). Similarly, For Cluster 2 (Traditional group), Collaborative Relationships had a negative effect on both Financial Performance (ϒ=-0.345, p=0.170) and Market Performance (ϒ=-0.410, p=0.212), but the effects were not statistically significant.

Surprisingly, we found that Supplier Development had a positive effect on Financial Performance (ϒ=0.491, p=0.009) and Market Performance (ϒ=0.461, p=0.094) only in Cluster 2 (Traditional group). These relationships were negative for Cluster 1 (Strategic group) for both Financial Performance (ϒ=-0.323, p=0.312) and Market Performance (ϒ=-0.231, p=0.238), but the effects were not statistically significant.

Finally, we found that while Environmental Supplier Development had a positive effect on Market Performance (ϒ=0.476, p=0.004) in Cluster 1 (Strategic group), it had no effect on Financial Performance (ϒ=0.180, p=0.364). In contrast, in Cluster 2 (Traditional group), Environmental Supplier Development had a positive effect on Financial Performance (ϒ=0.368, p=0.018), whereas it had no effect on Market Performance (ϒ=0.174, p=0.501).

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5. Discussion

This study has examined the key strategic purchasing practices highly discussed in the literature – supplier selection, supplier relationship management, supplier development – in a less conventional setting, namely hospitality sector in service industry. Therefore, findings of this study may provide an important guidance for both academicians and practitioners in hospitality industry.

First of all, hotels are divided into two significant groups – *Strategic* and *Traditional* – in terms of their supplier selection processes. We found that the two groups do not have significant difference in terms of *cost* and *quality.* This finding is similar to the study of Önder and Kabadayı (2015) and Davras and Karaatli (2014), where these criteria were found to be the most important supplier selection criteria. The two groups are significantly different in terms of *delivery, proximity, references, flexibility* and *environmental sustainability. Strategic* group has significantly higher scores in all of those criteria than *Traditional* group. Hotels in *Strategic* group want to have geographically close and flexible suppliers to meet changes in demands and have suppliers that can respond their organization quicker. Moreover, they seek reputable and well-known suppliers that can also offer environmentally products and services enabling them to gain competitive advantage.

Second, creating collaborative relationship with suppliers is found to have significantly negative effects on financial and market performance. This is an unexpected and interesting finding since Fantazy et al. (2010) found that creating collaborative relationships with suppliers positively affects financial and non-financial performance of buyer hotels. Similarly, many studies advocate that collaborative or long-term oriented relationships with suppliers have positive effects on both suppliers' and buyers' performance (Kähkönen et al., 2017). The fact that most of these studies were conducted in developed countries such Canada, Finland makes us to consider origin of this study, a developing country, might be one of the explanations behind this finding. Öztüren and Sevil (2009) studied collaborative relationships of hotels in North Cyprus which has a similar environment to Turkey. Accordingly, they found that hotels tend to have collaborative relationships with their customers, but not with their suppliers. Furthermore, they also found that collaborative relationship with suppliers was not associated with higher net profits, customer satisfaction and annual growth. Another explanation might relate to the dark-side of close relationships; Villena et al. (2011) noted that collaborative or long-term oriented relationships enables one side of partnership to abuse relationship and negatively affect performance of both sides. Finally, as one of the hotel managers stated during the survey pretesting stage, in Turkey, long-term oriented relationships with suppliers may be perceived as fraud or corruption. Therefore, purchasing managers in Turkey may want to avoid such accusations.

Many studies argued that supplier development activities increases performance of both suppliers (Modi and Mabert, 2007; Lawson et al., 2014) and buyers (Kim, 2006; Humphreys et al., 2004).

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In the overall model, we found that supplier development had no effect on performance. However, multi-group analysis revealed that supplier development had a positive effect on only in the Traditional group. At first glance, this finding seems controversial as supplier development is an advanced strategic purchasing practice. Supplier development activities in this study include evaluating, visiting and helping suppliers to increase their performance. In other words, there should be room for improvement to have solid outputs after performing development activities. Therefore, positive effects of supplier development on performance of *Traditional* group may be associated with the suppliers' capability and availability for improvement. As *Strategic* group focus on all selection criteria, it can be concluded that the suppliers in this group already have higher capability and capacity. It could also be the case that hotels in *Strategic* group use supplier development activities not to develop, but to maintain the current performance of suppliers.

Finally, as it is expected, environmental supplier development has significantly positive effects on financial and market performance of hotels. Aboelmaged (2018) stated that competitive advantage can be achieved by adopting green practices and environmental strategies and practices provide competitive advantage over rivals in terms of cost, delivery and service quality. Interestingly, multi-group analysis showed that *Strategic* group benefits from environmental supplier development in terms of market performance while *Traditional* group benefits in terms of financial performance. This finding might be related to the type of environmental development. In the context of hotels, the outsourced products/services in terms of environmental management have a great mix. These products may be used to preserve water (e.g. sewage treatment plant, reuse of treated water for cooling), energy (e.g. low temperature systems in laundry, use of sensors in lightning, solar panels), waste (e.g. waste management, waste separation, and recovery of oils from waste food) or may be related to other resources (Menezes and da Cunha, 2016). Therefore, customers may not even see or interact with all of these products since they are used at the back stage. Hotels in *Traditional* group may use and encourage their suppliers to produce or supply environmental friendly products/services related to cost saving. Therefore, the only outcome would be effective on financial performance while customers do not even realize. However, hotels in *Strategic* group use significantly more environmental supplier development practices than *Traditional.* Consequently, one can argue that cost-saving product/services used by *Traditional* group have already been adopted to a high extent by *Strategic* group. Instead, the main goal might be attracting customers by promoting environment-friendly products. Since the literature suggests that customers are willing to pay more and revisit environmental friendly hotels (Lee et al., 2010), hotels in *Strategic* group strategically focus on products/services that customers interact, use or consume, and therefore gain better market performance.

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6. Conclusion

This study contributes to the literature by adopting a comprehensive approach to investigate strategic purchasing practices in a less examined context; hospitality industry in a developing country. Our results illustrate the need to first differentiate between hotels' purchasing strategies based on their supplier selection criteria, as we find different effects of strategic purchasing practices in each group. Furthermore, some controversial findings such as negative effects of collaborative relationships provide support for the more recently advocated arguments such as dark side of close relationships (Villena et al., 2011).

Our study also has some managerial implications. Turkish hospitality industry hosted over 46 million visitors in 2018 (Ministry of Culture and Tourism, 2019). This study presents contributions to managers of hotels, suppliers and also regulatory bodies. Unlike the literature, this study showed that better performing hotels do not create collaborative relationships with their suppliers. In light of this information, hotel managers can approach creating collaborative relationship cautiously to have better financial and market performance. Additionally, supplier development practices are significantly associated with business performance for hotels that have *Traditional* purchasing strategy. Hence, managers in this group should take advantage of adopting supplier development activities. Moreover, environmental supplier development activities are positively related to hotel performance. Tourism industry has been blamed because of its activities that use significant amount of resources. This study shows the potential improvement areas regarding environmental management to break down the prejudices. Manager should allocate required resources to shift firm strategy towards environmental integration (Aboelmaged, 2018) and invest in environmental supplier development activities to increase financial and market performance.

As with any other research, this study is not without limitations. First of all, we have a limited sample size. To counteract this issue, we paid special attention that the sample demographics are proportional to those of the population of hotels in those cities. Second, data has been collected from single respondents and there might be issues regarding subjectivity. However, in many hotels purchasing activities are managed by a single person; therefore, it was not feasible in many cases to identify multiple respondents. Third, data has been collected in a cross-sectional way. Future research can aim for assessing performance in a longitudinal way. Notwithstanding these limitations, we hope that this study fills an important gap in the literature with several interesting findings illustrating performance implications of strategic purchasing practices in the hospitality industry.

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EVALUATION OF SUPPLY CHAIN ANALYTICS WITH AN INTEGRATED FUZZY MCDM APPROACH

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Abstract

Recently, the popularity of big data and business analytics has increased with advanced technological developments. Supply chain analytics (SCA) notion was born with the implementation of these technologies in supply chains that become more global, more complex, more extended, and more connected each day. SCA aims to find meaningful patterns in supply chain processes with the application of statistics, mathematics, machine-learning techniques, and predictive modeling. In this context, companies try to find ways to create business value for their supply chains by leveraging SCA. However, the selection of the most appropriate SCA tool is a complicated process that contains many influencing factors. For instance, the graphical and intuitive features, the data extraction method and real-time operability can be the influencing factors for such a selection. Therefore, in this study, it is aimed to provide an integrated technique for prioritizing SCA success factors and for evaluating SCA tools. For addressing these problems, fuzzy logic and multi-criteria decision making (MCDM) techniques are used. An integrated fuzzy simple additive weighting (SAW) - a technique for order preference by similarity to ideal solution (TOPSIS) approach is applied. The weights of the success factors are calculated by using fuzzy SAW technique, and the SCA tools are evaluated by using fuzzy TOPSIS technique. The success factors and the SCA tool alternatives are determined by reviewing the literature and industry reports, and by collecting experts' opinions. An application is given to illustrate the potential of the proposed approach. At the end of the study, the suggestions for future studies are presented.

Keywords: fuzzy logic, MCDM, SAW, success factors, supply chain analytics, TOPSIS

JEL Codes: L86, O14, O33

ENTEGRE BULANIK ÇKKV YAKLAŞIMIYLA TEDARİK ZİNCİRİ ANALİTİĞİNİN DEĞERLENDİRİLMESİ

Öz

Son zamanlarda, teknolojideki hızlı ve çarpıcı gelişmelerle birlikte büyük veri ve iş analitiğinin popülerliği artmıştır. Tedarik zinciri analitiği (TZA) kavramı, dijital teknolojilerin her geçen gün daha küresel, daha karmaşık, daha kapsamlı ve daha bağlantılı hale gelen tedarik zincirlerinde uygulanması ile ortaya çıkmıştır. TZA, istatistik, matematik, makine öğrenme teknikleri ve öngörücü modelleme uygulamasıyla tedarik zinciri süreçlerinde çıkarım yapmayı amaçlamaktadır. Bu bağlamda, şirketler tedarik zincirleri için TZA'yı kullanarak işlerine değer yaratmanın yollarını bulmaya çalışmaktadır.

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Ancak, en uygun TZA aracının seçimi, kararı etkileyen birçok faktör içeren karmaşık bir süreçtir. Örneğin, grafiksel ve sezgisel özellikler, veri çıkarma yöntemi ve gerçek zamanlı çalışabilirlik, bu seçimi etkileyen faktörler olabilir. Bu nedenle, bu çalışmada, TZA başarı faktörlerini belirlemek ve TZA araçlarını değerlendirmek için entegre bir teknik sunmak amaçlanmıştır. Bu problemin çözümü için bulanık mantık ve çok kriterli karar verme (ÇKKV) teknikleri kullanılmıştır. Entegre bulanık basit toplamlı ağırlıklandırma (SAW) - TOPSIS yaklaşımı uygulanmıştır. Başarı faktörlerinin ağırlıkları bulanık SAW tekniği kullanılarak hesaplanmış ve TZA araçları bulanık TOPSIS tekniği ile değerlendirilerek sıralanmıştır. Başarı faktörleri ve TZA aracı alternatifleri akademik yazın ve endüstri raporları gözden geçirilerek belirlenmiş ve uzmanların görüşleri ile finalize edilmiştir. Önerilen yaklaşımın potansiyelini göstermek için bir uygulama gerçekleştirilmiş; çalışmanın sonunda ise gelecek çalışmalar için öneriler sunulmuştur.

Anahtar Kelimeler: Bulanık mantık, ÇKKV, SAW, tedarik zinciri analitiği, tedarik zinciri analitiği başarı faktörleri, TOPSIS.

JEL Kodları: L86, O14, O33

1. Introduction

The complex, extended, connected, and global supply chains produce a considerable amount of data over various phases. Companies have to manage this data for executing their daily works. Big data and business analytics have emerged as a critical business capability with the widespread use of digital technologies (Wang et al., 2016). Big data analytics give promise in business transformation by capturing both practitioners and researchers' attention, especially in the marketing and finance sectors. On the other hand, there is an expectation about the benefits of big data analytics utilization in supply chain management (Rozados and Tiahjano, 2014).

The utilization of big data analytics in supply chain management is defined as supply chain analytics (SCA) (Wang et al., 2016). It allows informed decision-making to companies by giving insight from their data. SCA can be defined as the utilization of quantitative methods for deriving insights from data in order to obtain a more profound comprehension. It aims to increase the visibility, collaboration and integration in supply chains to solve the supply chain problems (e.g., inefficiencies and wastages in the chains, delayed shipments, rising fuel costs, inconsistent suppliers) (Arya et al. ,2017; Barnaghi et al., 2013).

Companies gain a competitive advantage with the utilization of SCA. Moreover, many profits can be provided as the integration of global supply chains and logistics processes, the improvement of the visibility, flexibility, the management of demand volatility, and the handling of cost fluctuations. In the strategic decisions on supply chain management, SCA can help companies to make strategic decisions on sourcing, network design, product design, and product development. In the operational decisions on supply chain management, SCA can assist management in making decisions about supply chain operations (i.e., demand planning, procurement, production, inventory, and logistics) (Wang et al., 2016).

Various types of SCA tool exist in the market. The selection of the most appropriate SCA tool is crucial for companies. Therefore, in this study, the aim is to present a research methodology that employs MCDM methods for selecting the most appropriate SCA tool.

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The literature and industry reports are reviewed, and experts' opinions are collected to construct the selection model. The research methodology is based on the integration of fuzzy multi-criteria decision-making (MCDM) techniques. To overcome the uncertainty in the decision-making, fuzzy logic proposed by Zadeh (1965) is utilized. The importance degrees of the success factors are calculated using the Simple Additive Weighting (SAW) method. The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) approach is applied to evaluate SCA.

This study is organized as follows. In the following section, the literature review is provided. Then, the research methodology is presented in detail. An application is given to illustrate the potential of the proposed approach. At the end of the study, the suggestions for future studies are provided.

2. Literature Review

Recently, several papers have been dedicated to investigating the SCA subject. These papers are examined in detail in Table 1. According to Wang et al. (2016), current papers on SCA have mainly focused on analyzing definitions and different perspectives or identifying opportunities, however, the SCA subject is still in its infancy.

Table 1. The literature review for papers about SCA subject

Year	Author(s)	Aim of the Paper	Type of the Paper
2010	Trkman et al.	To investigate the relationship between analytical capabilities in the supply chain and its performance	Research Paper
2014	Chae et al.	To define the architecture of SCA	Review Paper
2014	Rozados and Tjahjono	To investigate the fundamentals of big data analytics and its taxonomy in supply chain management	Review Paper
2014	Souza	To describe the application of advanced analytics techniques to supply chain management	Research Paper
2016	Biswas et al.	To propose a Big Data-centric architecture for supply chain management exploiting the current state	Research Paper
2016	Wang et al.	To review the SCA literature and to propose an SCA maturity framework	Review Paper
2017	Arya et al.	To explore the use of big data analytics in the supply chain of the army	Review Paper
2017	Barbosa et al.	To identify the most central actors of SCA in terms of supply chain management research streams	Review Paper

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Year	Author(s)	Aim of the Paper	Type of the Paper
2017	Engel et al.	To investigate the challenges, benefits, and factors for the introduction of SCA	Research Paper
2017	Vidgen et al.	To present a business analytics ecosystem for companies	Research Paper
2017	Taghikhah	To review and illuminate the role of business analytics in supply chains	Review Paper
2018	Arunachalam et al.	To review the papers examining big data analytics capabilities in the context of supply chain	Review Paper
2018	Barbosa et al.	To investigate how big data analytics has been studied on supply chain management studies	Review Paper
2018	Hoehle et al.	To examine the use of mobile technologies facilitating customers' shopping	Research Paper
2018	Lamba and Singh	To identify the enablers of big data analytics in the context of supply chain management	Research Paper
2018	Tiwari et al.	To investigate significant data analytics research and application in supply chain management	Research Paper
2019	Gupta et al.	To examine the relationship between the smart supply chain and information system flexibility	Research Paper
2019	Ivanov et al.	To investigate the effects of digital technology on supply chain risk analytics	Research Paper
2019	Kamble et al.	To review the data-driven agriculture supply chain	Review Paper

Some of the review papers listed in Table 1 target defining the architecture of the subject and describing the SCA taxonomy (Chae et al., 2014; Rozados and Tjahjono, 2014). It is also seen from Table 1 that the utilization of big data analytics in SCM is investigated in some of the papers (Rozados and Tjahjono, 2014; Arya et al. 2017; Arunachalam et al., 2018; Barbosa et al., 2018). Moreover, the papers about business analytics utilization in SCM and about the data-driven supply chains are examined by several authors (Taghikhah, 2017; Kamble et al., 2019).

In general, the research papers listed in Table 1 aim to define the different parts of the SCA subject (Trkman et al., 2010; Souza, 2014; Biswas et al., 2016; Vidgen et al., 2017) while some of the papers investigates the challenges, the benefits and the enablers of the SCA (Engel et al, 2017; Lamba and Singh, 2018). On the other hand, the customer size is taken into consideration in one of the papers (Hoehle et al., 2018).

It is important to note that, just one of the papers in Table 1 integrated SCA subject with MCDM methods (Lamba and Singh, 2018). Lamba and Singh (2018) used DEMATEL method to analyze and to identify the interactions between the enablers of big data analytics in the SCM context.

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In fact, for solving some problems on SCA subject, MCDM tool integration is appropriate. Therefore, in this study, we aim to fill this research gap by employing MCDM methods for the most appropriate SCA tool selection.

3. Proposed Research Methodology

In this paper, the proposed research methodology consists of three main phases:

Phase 1. Construction of the SCA evaluation model by determining SCA success factors and SCA tool alternatives.

Phase 2. Calculation of the success factors weights with the fuzzy SAW method.

Phase 3. Evaluation of SCA tools by fuzzy TOPSIS method according to the success factors.

4. SCA Evaluation Model

To construct the SCA evaluation model, the academic papers and industry reports are examined. Then, the professional opinions of the experts are collected to obtain the model's final version. The success factors for SCA tool selection are provided in Table 2, and the SCA tool alternatives are illustrated in Figure 1.

Table 2. The SCA success factors

Fj	Success Factors	References
F1	Effective communication	Kumar et al. (2015), Vidgen et al. (2015)
F2	Top management support	Lamba and Singh (2018)
F3	Modern technology utilization	Kumar et al. (2015), Vidgen et al. (2015)
F4	Logistics synchronization	Ngai et al. (2004)
F5	Data security	Ngai et al. (2004), Lamba and Singh (2018)
F6	Supply chain management strategy development	Kumar et al. (2015), Ngai et al. (2004)
F7	Hardware and software reliability	Kumar et al. (2015), Ngai et al. (2004)
F8	Education and training	Kumar et al. (2015), Vidgen et al. (2015)

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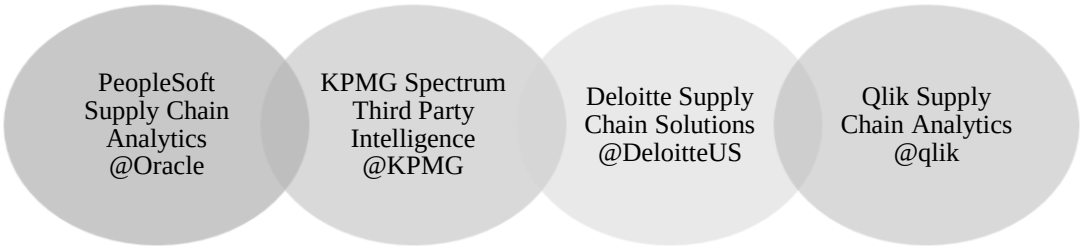

Figure 1. The SCA tool alternatives (Pontius, 2019)

5. Fuzzy SAW Method

In the literature, the fuzzy SAW method is proposed for facility location selection by Chou et al. (2008). The consecutive steps of this technique are explained next (Chou et al., 2008):

Step 1. DMs assess the evaluation criteria by utilizing the linguistic terms provided in Table 3.

Table 3. Linguistic terms sets used in fuzzy SAW technique (Chou et al., 2008)

Linguistic term	Abb.	Fuzzy Numbers
Very High	VH	(7, 10, 10, 10)
High	H	(5, 7, 7, 10)
Medium	M	(2, 5, 5, 8)
Low	L	(0, 3, 3, 5)
Very Low	VL	(0, 0, 0, 3)

Step 2. The matrix that consists of linguistic assessments of criteria is changed into fuzzy numbers provided in Table 3.

Step 3. The weights of DMs are not equal, and I_t denotes importance degrees of each DM, with $0 \leq I_t \leq 1,\ t = 1, 2, \ldots, k$, and $\sum_{t=1}^{k} I_t = 1$. The DMs' fuzzy weights are denoted as $\widetilde{\omega_t}$. The importance degrees of DMs (I_t) is calculated as:

$$I_t = \frac{d(\widetilde{w_t})}{\sum_{t=1}^{k} d(\widetilde{w_t})}, t = 1,2, \ldots, k \quad (1)$$

Here, $d(\widetilde{w_t})$ denotes the defuzzified value of the fuzzy weight.

Step 4. Aggregated fuzzy weights of C_j, $\widetilde{W_j} = (a_j, b_j, c_j, d_j)$, are computed as:

$$\widetilde{W_j} = (I_1 \otimes \widetilde{W_{j1}}) \oplus (I_2 \otimes \widetilde{W_{j2}}) \oplus \ldots \oplus (I_k \otimes \widetilde{W_{k1}}) \quad (2)$$

Here, $a_j = \sum_{t=1}^{k} I_t a_{jt}$, $b_j = \sum_{t=1}^{k} I_t b_{jt}$, $c_j = \sum_{t=1}^{k} I_t c_{jt}$, $d_j = \sum_{t=1}^{k} I_t d_{jt}$.

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Step 5. The fuzzy weights are defuzzified. The defuzzified $\widetilde{W_j}$, shown as $d(\widetilde{W_j})$, is calculated as:

$$d(\widetilde{W_j}) = \frac{1}{4}\left(a_j + b_j + c_j + d_j\right),\ j = 1, 2, \dots, n \quad (3)$$

Step 6. Normalized weights of C_j, shown as W_j, is computed as:

$$W_j = \frac{d(\widetilde{w_j})}{\sum_{j=1}^{n} d(\widetilde{w_j})}, j = 1,2, \dots, n \quad (4)$$

. $\sum_{j=1}^{n} W_j = 1$. Finally, the weight vector $W=(W_1, W_2, \dots, W_n)$ is established.

6. Fuzzy TOPSIS Method

Fuzzy TOPSIS method used in this paper is adapted from Chen and Chen (2010). The consecutive steps of this technique are explained next (Büyüközkan and Çifçi, 2012):

Step 1. DMs assess alternatives by utilizing the linguistic terms provided in Table 4 to construct the decision matrix. In Table 4, the linguistic terms are associated with trapezoidal fuzzy numbers. For example, an assessment as "Very Good" is transformed to "(7, 10, 10, 10)" as fuzzy number. Then, these numbers are used in the computational steps of the methodology.

Table 4. Linguistic terms sets used in fuzzy TOPSIS technique (Chou et al., 2008)

Linguistic term	Abb.	Fuzzy Numbers
Very Good	VG	(7, 10, 10, 10)
Good	G	(5, 7, 7, 10)
Fair	F	(2, 5, 5, 8)
Poor	P	(0, 3, 3, 5)
Very Poor	VP	(0, 0, 0, 3)

Step 2. The decision matrix is normalized as:

$$\tilde{R} = [\tilde{r}_{ij}]_{m.n}, i = 1,2, \dots, m; j = 1,2, \dots n \quad (5)$$

$$\tilde{r}_{ij} = \left(\frac{a_{ij}}{c_j^+}, \frac{b_{ij}}{c_j^+}, \frac{c_{ij}}{c_j^+}\right) \quad (6)$$

where $C_j^+ = max_i C_{ij}$.

Step 3. The weighted normalized matrix is calculated as:

$$\tilde{v}_{ij} = \tilde{r}_{ij} \otimes \tilde{w}_j \quad (7)$$

Step 4. The distances from the positive and the negative ideal solutions are calculated as:

$$d_i^* = \sum_{j=1}^{n} d(\tilde{v}_{ij,}, \tilde{v}_j^*), i = 1, 2, \dots m; \text{ j=1,2,…n} \quad (8)$$

$$d_i^- = \sum_{j=1}^{n} d(\tilde{v}_{ij,} \tilde{v}_j^-), i = 1, 2, \dots m; j = 1,2, \dots n \quad (9)$$

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where

$$A^* = \{v_1^*, v_2^*, \ldots, v_n^*\} \quad (10)$$

$$A^- = \{v_1^-, v_2^-, \ldots, v_n^-\} \quad (11)$$

$$d(\tilde{A}, \tilde{B}) = \sqrt{\frac{1}{4}\sum_{i=1}^{n}|x_i - y_i|^2} \quad (12)$$

Step 5. The relative distance to the ideal solution is calculated as:

$$C_i = \frac{d_i^-}{d_i^* + d_i^-} \quad (13)$$

Step 6. Alternatives are ranked based on their relative closeness indices in increasing order.

7. Application Of The Proposed Methodology

The proposed research methodology will be applied to a logistics company. For privacy concerns, the name of the company is denoted as "XYZ." The company wants to implement SCA for various reasons (e.g., replenishment planning, real-time information, cost optimization, improved responsiveness).

XYZ conducts research where the managers of the company suggested to use analytical techniques. In this context, an integrated fuzzy SAW- fuzzy TOPSIS methodology is used to select the most appropriate SCA tool for the benefit of the company.

Phase 1. Sca Evaluation Model Construction

SCA success factors are:

- F1 Effective communication
- F2 Top management support
- F3 Modern technology utilization
- F4 Logistics synchronization
- F5 Data security
- F6 Supply chain management strategy development
- F7 Hardware and software reliability
- F8 Education and training

SCA tool alternatives are:

- A1 PeopleSoft Supply Chain Analytics @Oracle
- A2 KPMG Spectrum Third Party Intelligence @KPMG
- A3 Deloitte Supply Chain Solutions @DeloitteUS
- A4 Qlik Supply Chain Analytics @qlik

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Phase 2. Calculation of the Success Factors' Weights by using Fuzzy SAW

Experts evaluated the success factors by using the linguistic expressions provided in Table 2. The experts are the finance general manager, logistics manager, technology manager and technology expert of the company. They have insights about analytics projects and they have experience in supply logistics processes and logistics operations. Table 5 shows the experts' evaluations for the success factors.

(1) - (4) are employed to calculate the criteria weights. Table 6 shows the criteria weights. At the end of the fuzzy SAW method, the most critical success factor is found as effective communication with the second important one as the hardware and software reliability.

Table 5. Experts' evaluations for the success factors

Fj	DM1	DM2	DM3	DM4
F1	VH	VH	VH	M
F2	H	H	H	H
F3	M	VH	M	L
F4	VH	H	M	M
F5	H	M	H	VH
F6	M	M	L	H
F7	VH	H	VH	M
F8	M	L	L	H

Table 6. Success factors' weights

Fj	F1	F2	F3	F4	F5	F6	F7	F8
Weights	0.158	0.140	0.106	0.128	0.139	0.096	0.148	0.086
Ranking	1	3	6	5	4	7	2	8

Phase 3. Ranking of the Alternatives by using Fuzzy TOPSIS

Experts evaluated the alternatives regarding the success factors by using the linguistic expressions provided in Table 3. Table 7 shows the experts' evaluations for the alternatives.

Table 7. DM1's evaluations for the alternatives

	F1	F2	F3	F4	F5	F6	F7	F8
A1	VG	G	F	VG	G	G	VG	G
A2	G	VG	P	G	F	VG	G	VG
A3	F	G	G	F	P	G	F	VG
A4	G	F	G	G	G	F	G	F

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(5) - (13) are employed to rank the alternatives. Table 8 provides the result of the fuzzy TOPSIS method.

Table 8. The ranking of the alternatives

Ai	A1	A2	A3	A4
C_i	0.084	0.102	0.092	0.082
Ranking	3	1	2	4

At the end of fuzzy TOPSIS method, the most appropriate SCA tool for XYZ is found as KPMG Spectrum Third Party Intelligence (A2).

8. Conclusion and Perspectives

SCA has been raised as a solution for many companies in terms of visibility, collaboration, and integration in the supply chains. In this context, SCA tool selection is one of those issues that need to be addressed. The purpose of this study was to present a research methodology for selecting the most appropriate SCA tool.

In this context, firstly, a new SCA evaluation model, is proposed. Eight success factors and four alternatives are determined with the help of literature, industry reports, and experts. Then, fuzzy SAW- fuzzy TOPSIS methodology is employed. The fuzzy SAW method is used for the weight calculation while the fuzzy TOPSIS method is used for the ranking of the alternatives. Fuzzy logic is preferred to represent the evaluations of the experts in decision-making better. Finally, an application for a company in the logistics sector is realized to illustrate the applicability of the research methodology.

In future research, it would be interesting to construct a more comprehensive evaluation model by increasing the number of factors and alternatives. For instance, a hierarchical model can be constructed for the success factors. Moreover, the robustness of the research methodology can be tested by applying other fuzzy MCDM techniques.

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STRATEGIC ANALYSIS OF INTELLIGENT TRANSPORTATION SYSTEMS

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Abstract

Transportation is one of the most critical factors affecting the economic development and welfare of a country. Effective transport systems create socio-economic opportunities and benefits by facilitating access to markets, jobs, and investments. Moreover, transportation shows a rapid change in today's world of globalization and economic growth. With the rapid development of information and technology, the demand for higher, faster, safer, and more comfortable transportation is emphasized. On the other hand, with the development of the automotive industry, increased vehicle traffic volumes cause congestion, delays, travel time, resource consumption, environmental problems, and accidents. Systems need to be designed to be more efficient, effective, safe, and economical to reduce these adverse outcomes of transportation systems and meet user demands. For this reason, the concept of "Intelligent Transportation Systems (ITS)" has emerged. ITS provide economic, environmental, and socially sustainable solutions, in particular by ensuring that information is accessed quickly and efficiently. The analysis of ITS are very complicated since it has many conflicting objectives and many different criteria. Multi-criteria decision-making (MCDM) is a powerful tool widely used for solving this type of problems. Therefore, in this study, we aim to propose a strategic analysis of ITS by using MCDM methods. In the proposed methodology, ITS criteria are weighted with fuzzy Analytic Hierarchy Process (AHP) and fuzzy Evaluation Based on Distance from Average Solution (EDAS) is used to select the most appropriate ITS strategy. Finally, an application is provided to demonstrate the potential use of the proposed methodology.

Keywords: Fuzzy logic, intelligent transportation systems, MCDM methods, strategic analysis

Jel Classification: L10, L21, L91

AKILLI ULAŞIM SİSTEMLERİNİN STRATEJİK ANALİZİ

Öz

Ulaşım, bir ülkenin ekonomik kalkınmasını ve refahını etkileyen en kritik faktörlerden biridir. Etkili ulaştırma sistemleri pazarlara, işlere ve yatırımlara erişimi kolaylaştırarak sosyoekonomik fırsatlar ve faydalar yaratmaktadır. Küreselleşme ve ekonomik büyüme ile beraber ulaşım sektörü de hızlı bir değişim göstermektedir. Bilgi ve teknolojinin hızla gelişmesiyle birlikte, daha kaliteli, daha hızlı, daha güvenli ve daha rahat ulaşım talepleri ön plana çıkmaktadır. Öte yandan, otomotiv endüstrisinin gelişmesiyle birlikte artan araç trafiği yoğunluğu; tıkanıklığa, gecikmelere, seyahat süresinin uzamasına, kaynak tüketiminin artmasına, çevresel sorunlara ve kazalara neden olmaktadır. Ulaşım sistemlerinin bu olumsuz sonuçlarını azaltmak ve kullanıcı taleplerini karşılamak için sistemlerin daha verimli, etkili, güvenli ve ekonomik olacak şekilde tasarlanması gerekmektedir.

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Bu sorunların giderilmesi ve taşımacılık hizmetlerinde artan talebin etkin, güvenli ve çevreci bir şekilde karşılanması amacıyla bilgi ve iletişim teknolojileri kullanılarak geliştirilen Akıllı Ulaşım Sistemleri (AUS) özellikle bilgiye daha hızlı ve etkin bir şekilde erişmeyi sağlayarak, ekonomik, çevresel ve toplumsal açıdan sürdürülebilir çözümler sunmaktadır. Çok sayıda çelişkili amacı ve birçok farklı kriteri bünyesinde barındırdığı için AUS'un analizi oldukça karmaşıktır. Çok kriterli karar verme (ÇKKV) bu tür problemleri çözmek için yaygın olarak kullanılan güçlü bir araçtır. Bu çalışmanın amacı, ÇKKV yöntemleri kullanarak AUS'un stratejik analizini yapmaktır. Önerilen metodolojide, AUS değerlendirme kriterleri bulanık Analitik Hiyerarşi Süreci (AHP) metodu ile ağırlıklandırılmakta ve bulanık EDAS (Evaluation Based on Distance from Average Solution) metodu ile en uygun AUS stratejisi seçilmektedir. Son bölümde, önerilen metodolojinin kullanım potansiyelini göstermek için bir uygulama sunulmaktadır.

Anahtar Kelimeler: Akıllı ulaşım sistemleri, bulanık mantık, ÇKKV yöntemleri, stratejik analiz

Jel Sınıflama: L10, L21, L91

1. Introduction

Transportation is one of the most critical factors affecting the economic development and welfare of a country. Effective transport systems create socio-economic opportunities and benefits by facilitating access to markets, jobs, and investments. Transportation shows a rapid change in today's world, with globalization and economic growth. With the rapid development of information and technology, the demand for higher, faster, safer, and more comfortable transportation is emphasized (Zhang et al., 2011). On the other hand, with the development of the automotive industry, increased vehicle traffic volumes cause congestion, delays, travel time, resource consumption, environmental problems and accidents (Yardım and Akyıldız, 2005). Systems need to be designed to be more efficient, effective, safe, and economical to reduce these adverse outcomes of transportation systems and meet user demands. For this reason, the concept of "Intelligent Transportation Systems (ITS)" has emerged (Wang, 2010).

ITS provide economic, environmental, and socially sustainable solutions, in particular by ensuring that information is accessed quickly and efficiently. The objectives of ITS are

to provide multidimensional data exchange between human-vehicle-infrastructure-center,

to use in accordance with the capacities of roads,

to increase the safety and mobility of traffic,

to reduce energy loss

to the environment by providing energy efficiency.

Within the context of ITS, solutions to significant transportation problems can be produced by using advanced information and communication technologies. With ITS applications, coordination between different types of transportation can be provided to create ideal traffic conditions, and the efficiency and speed of services related to passenger and freight movements can be increased (UHDB, 2014).

Choosing the right strategy provides access to integrated, secure, efficient, innovative, human, and environmentally friendly, sustainable, and smart transportation networks using that are well integrated with information and communication technologies.

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ITS strategy selection problem has many conflicting objectives, where different criteria need to be taken into account for deciding on the right strategy.

Transportation networks are exposed to uncertainty environments. Therefore, the need for robustness, flexibility, and agility has become a focal point for future logistics system designs. ITS solutions such as strategies have developed to reduce the harmful effects of increased transport in urban areas (Kirch et al.,2017). In this study, ITS strategy selection problem is considered as a fuzzy multi-criteria decision-making (MCDM) problem.

MCDM is a powerful tool, which is widely used for evaluating problems containing multiple, usually conflicting criteria. It refers to find the best opinion from all of the feasible alternatives. Priority-based, outranking, distance-based, and mixed methods could be considered as the primary classes of the current methods (Pomerol and Romero, 2000).

The mixed structure of the ITS strategies evaluation involves many various and contradictory criteria. However, it is challenging to decide on, and rank alternatives when information is in an uncertain nature. Sometimes decision-makers (DMs) have difficulties in expressing their thoughts by crisp numbers. Furthermore, DMs can express their opinions more comfortably with fuzzy numbers. It overcomes the uncertainty of this MCDM problem.

In this study, firstly ITS criteria are determined with literature review and expert opinions. These criteria are weighted by using fuzzy Analytic Hierarchy Process (AHP). After that, according to ITS concept, ITS strategies are identified with literature review and expert opinions and the most appropriate ITS strategy is selected by using fuzzy Evaluation Based on Distance from Average Solution (EDAS). The study aims to propose a new analytic methodology for strategic analysis of ITS and present fuzzy EDAS method combined fuzzy AHP.

The structure of the paper is as follows: The related studies about ITS are summarized in the next section. Section 3 presents the proposed model and methodology. Application is given in Section 4, and finally, the last section concludes the study.

2. Intelligent Transportation Systems

ITS can be defined as transportation solutions designed to alleviate the thinking or decision-making burden on people. From this point of view, the first ITS application is traffic lights with electric that were first used in 1928. With the traffic lights, problems such as the priorities of the vehicles and the pedestrians of the highways, passing times, etc. have been resolved. Thus, traffic lights take on the task of thinking and deciding of the pedestrians and drivers. Today, ITS refers to systems based on the use of electronic and computer technology in transportation regulation and management (Civitas, 2015).

Today, ITS are built on advanced technologies such as computers, communications, and electronics. They are systems that use real-time and up-to-date databases and services to improve efficiency, security, and service quality in transportation. On the other hand, the integration of all transport systems on technological and institutional basis enables people and goods to move from one place to another, is also considered within the concept of ITS (Yardım and Akyıldız, 2005).

With ITS, timesaving and more environmentally friendly transportation are provided, and at the same time, the quality of the journeys is enhanced.

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ITS improves the performance of modern transport systems by optimizing travel times and reducing the risk of crashes and injuries. ITS applications increase the efficiency of road infrastructure by reducing the costs of infrastructure. They increase travel options and mobility by combining travel information and effective demand management (Zanelli, 2016).

In the literature, Bask et al. (2008) proposed the conceptual model of the ITS management and analyzed how the included factors change the performance of distribution activities and what management issues are at stake. Kim et al. (2010) proposed a reservation-based scheduling scheme for the ITS charging station to decide the service order of multiple requests. Synergizing electrified vehicles and mobile information systems in ITS are presented bySchewel and Kammen (2010). Kumbhar (2012) developed Wireless sensor networks for ITS solution. Wang and Kexin (2013) discussed the benefits and problems of the three solutions of transportation, based on the Transit Priority Strategy in China, including the transportation policy research, smart transportation research, as well as planning and design research. Kolosz et al. (2013) made a model of ITS for highways using probabilistic data fusion. Bacciu et al. (2017) analyzed the feasibility of these services in using machine learning for short-term predictions in ITS.

There are many studies about ITS in the literature. In this study, ITS concept is handled with a different perspective, and this concept is combined with MCDM methods for the first time.

3. The Proposed Model And Methodology

The proposed approach in this study consists of four basic steps:

Step 1. Determination of proposed ITS model with literature review and expert opinions.

Step 2. Calculation of the weights of ITS criteria with fuzzy AHP.

Step 3. Determination of ITS strategies with literature review and expert opinions.

Step 4. Evaluation of ITS strategies and selection of the most appropriate ITS strategy with fuzzy EDAS.

4. The Proposed ITS Model

As a result of the literature review and expert opinions, the ITS structure (UHDB, 2014; Dia and Panwai, 2014; Catapult, 2014; Civitas, 2015; Bacciu et al., 2017) is shown as in Figure 1.

In this model, there are four main criteria: cost, capacity congestion and connection. These main criteria are determined by taking into the essential components of ITS. Besides, there exist twenty sub-criteria of these main criteria.

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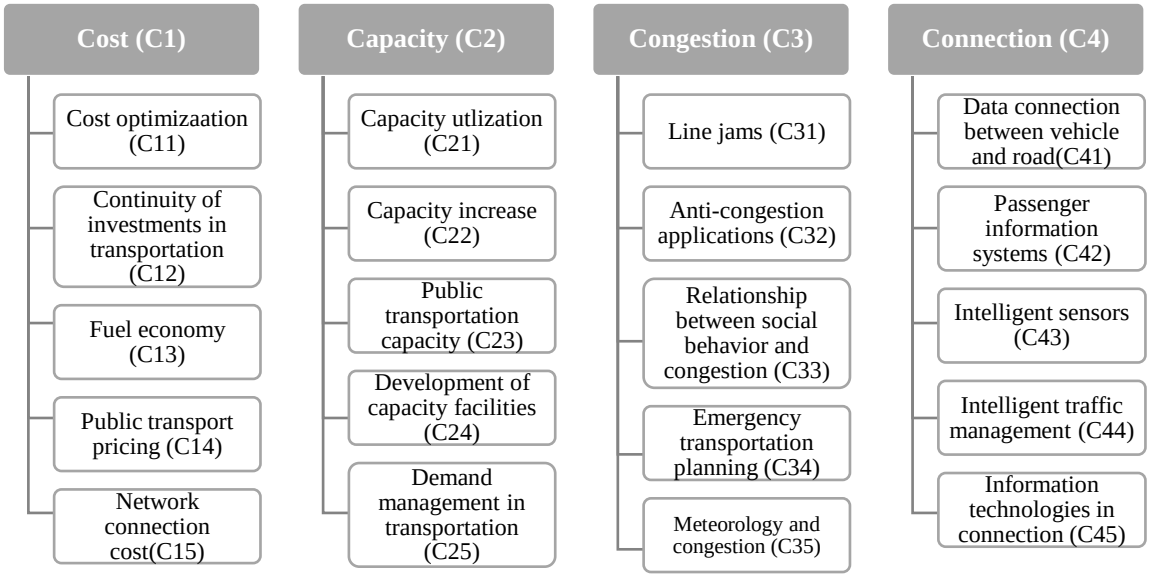

Figure 1. The Proposed ITS Model.

5. The Fuzzy AHP Method for Calculation of Criteria Weights

AHP is developed by Saaty (1980) probably the best-known and most widely used model in decision-making. AHP is a robust decision-making methodology in order to determine the priorities among different criteria.

Fuzzy AHP is a method that will allow decision-makers to make decisions in an MCDM process and facilitate decision-making in uncertain situations (Ayağ, 2005). When the literature is examined, it is seen that different authors present many different fuzzy AHP methods.

Fuzzy AHP used in this study includes the following steps (Büyüközkan and Çifçi, 2012):

Step 1: Construct the fuzzy comparison matrices by using triangular fuzzy numbers in Table 1.

Table 1. The Fuzzy Scale

Linguistic expression	**Fuzzy Scale**
Extremely more importance	(8, 9, 10)
Very strong importance	(6, 7, 8)
Strong importance	(4, 5, 6)
Moderate importance	(2, 3, 4)
Equal importance	(1, 1, 2)

*Step 2:*α-cut matrices are constructed. The α-cut is known to incorporate decision-makers' confidence over his/her preferences. The index of optimism μ estimates the degree of satisfaction for the judgment matrix. A larger value of the index μ indicates a higher degree of optimism.

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The index of optimism is a linear convex combination defined as

$$\tilde{a}_{ij}^{\alpha} = \mu\tilde{a}_{ijl}^{\alpha} + (1-\mu)\tilde{a}_{ijl}^{\alpha} \forall\alpha \in [0,1] \quad (1)$$

Step 3: Matrices are normalized using (2) and the consistency ratio (CR) for each matrix are calculated.

$$\tilde{r}_{ij} = \frac{\tilde{a}_{ij}^{\alpha}}{\sum_i^k \tilde{a}_{ij}^{\alpha}} \quad (2)$$

$$CI = \frac{\lambda_{max}-n}{n-1} \quad (3)$$

$$CR = \frac{CI}{RI} \quad (4)$$

where CI refers to consistency index, λ_{max} is the largest eigenvector of the matrix, n is the number of criteria, and RI is the random index.

Step 4: The weights of main criteria ($\widetilde{w}_i^{CR}$) are obtained using arithmetic mean. And, these steps are applied for each sub-criteria and global weights ($\widetilde{w}_{ij}^{G}$) are calculated by multiplying the weight of main criteria.

$$\widetilde{w}_{ij}^{G} = \widetilde{w}_i^{CR} \times \widetilde{w}_j^{CR} \quad (5)$$

6. ITS Strategies

Many strategies can be used to realize the integration of ITS. In this case, it is vital to choose the strategy that will be most successful and the most appropriate for the system. These strategies are as follows:

Intelligent public transport systems (A1): The system that enables the most convenient use of the public transportation needs that arise with the increasing population. Passenger information systems and electronic payment systems are the most common methods used in public transport. These systems include smart stops and contactless smart cards (UNECE, 2012).

Network communication systems (A2): It provides communication between the area and central equipment of ITS. This connection can be reached with wired and wireless networks. The communication systems solutions offered by İSBAK are fiber optic solutions, 4G / LTE, 3G, Wi-Fi, and WIMAX (Ilıcalı et al., 2016). In many countries, metropolitan areas have mobile and web applications that provide instant information about the traffic situation. Along with these applications, users can be informed and easily use ITS.

Security and emergency systems (A3): It detects and prevents emergency intervention events such as traffic accidents. Security systems consisting of cruise control systems and anti-lock braking systems have developed. New generation systems such as emergency brake-force distribution, electronic stability control, and advanced speed control systems have designed (UHDB, 2014).

Full adaptive traffic management systems (A4): It is a working system in which the parameters have optimized for minimizing average vehicle delay times and average stop numbers.

It accelerates traffic flow by intervening in real-time on blocked roads and reduces delay times. It reduces travel time and emissions on the road network (Khan, 2012; Catapult, 2014).

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7. The Fuzzy EDAS Method for Evaluation of Strategies

EDAS method is introduced by Ghorabaee et al. (2015) tested the validity of this method. This method considers the average solution for the evaluation of alternatives. It is also a distance-based method.

In literature, the EDAS method with fuzzy logic is proposed by Ghorabaee et al. for supplier selection (2016). The EDAS method was also combined with the advanced methods in the literature. In addition, hesitant fuzzy EDAS is proposed with different aggregation operators with defuzzification and without-defuzzification processes for hospital selection (2018).

The steps of the fuzzy EDAS method are presented as follows (Ghorabaee et al., 2016):

Step 1: The matrix between criteria and alternatives are constructed by using a fuzzy scale in Table 1.

Step 2: The matrices of positive distance from average (PDA) and negative distance from average (NDA) are calculated. *B* is the set of beneficial criteria, and *N* is the set of non-beneficial criteria.

$$\widetilde{pda}_{ij} = \begin{cases} \frac{\psi(\tilde{x}_{ij} \ominus \widetilde{av}_j)}{\kappa(\widetilde{av}_j)} & if\ j \in B \\ \frac{\psi(\widetilde{av}_j \ominus \tilde{x}_{ij})}{\kappa(\widetilde{av}_j)} & if\ j \in N \end{cases} \quad (6)$$

$$\widetilde{nda}_{ij} = \begin{cases} \frac{\psi(\widetilde{av}_j \ominus \tilde{x}_{ij})}{\kappa(\widetilde{av}_j)} & if\ j \in B \\ \frac{\psi(\tilde{x}_{ij} \ominus \widetilde{av}_j)}{\kappa(\widetilde{av}_j)} & if\ j \in N \end{cases} \quad (7)$$

where $\widetilde{av}_j$ represents the average solutions matrix and $\kappa(\widetilde{av}_j)$ represents the defuzzified number.

Step 3: Calculate the weighted sum of positive and negative distances.

$$\widetilde{sp}_i = \oplus_{j=1}^{m}(\tilde{w}_j \otimes \widetilde{pda}_{ij}) \quad (8)$$

$$\widetilde{sn}_i = \oplus_{j=1}^{m}(\tilde{w}_j \otimes \widetilde{nda}_{ij}) \quad (9)$$

Step 4: Normalize the values for all alternatives.

$$\widetilde{nsp}_i = \frac{\widetilde{sp}_i}{max_i(\kappa(\widetilde{sp}_i))} \quad (10)$$

$$\widetilde{nsn}_i = 1 - \frac{\widetilde{sn}_i}{max_i(\kappa(\widetilde{sn}_i))} \quad (11)$$

Step 5: Calculate the appraisal score ($\widetilde{as}_i$) for all alternatives.

$$\widetilde{as}_i = \frac{1}{2}(\widetilde{nsp}_i \oplus \widetilde{nsn}_i) \quad (12)$$

Step 6: Rank the alternatives according to the appraisal values.

Application

The proposed methodology is applied to verify its usability. There is a company named as 'ABC' plans to invest in the field of ITS in Istanbul. They want to see the ITS of Istanbul with all environmental factors and to select the best strategy for ITS. There are five possible alternatives in which to select the strategy: A1 intelligent public transport systems.

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A2 is a network communication system. A3 is security and emergency systems, and A4 is full adaptive traffic management systems.

Fuzzy AHP-Step 1: As a starting point, ITS model is constructed with literature review and expert opinions as Figure 1. Then, the fuzzy comparison matrix between these criteria is structured by using triangular fuzzy numbers in Table 1. The comparison matrix for the main criteria is shown in Table 2.

Table 2. The Comparison Matrix for Main Criteria

	C1			**C2**			**C3**			**C4**		
C1	1.00	1.00	1.00	0.50	1.00	1.00	0.5	0.33	0.50	0.13	0.14	0.17
C2	1.00	1.00	2.00	1.00	1.00	1.00	0.17	0.20	0.25	0.17	0.20	0.25
C3	2.00	3.00	4.00	4.00	5.00	6.00	1.00	1.00	1.00	1.00	1.00	2.00
C4	6.00	7.00	8.00	4.00	5.00	6.00	0.50	1.00	1.00	1.00	1.00	1.00

*Fuzzy AHP-Step 2:*α-cut matrices (α=0.5; μ=0.5) are constructed by using (1) and these matrices are normalized.

Fuzzy AHP-Step 3: CR is checked.

Fuzzy AHP-Step 4: These steps are applied for all sub-criteria, and final global weights for all criteria are calculated. Final criteria weights are shown in Table 3.

According to final weights, the most appropriate criteria are "emergency transportation planning (C34)", "information technologies in connection (C45)" and "line jams (C31). In particular, the weights of C34 and C45 are considerably higher than the others. These criteria have an essential place for determination of the strategies.

Fuzzy EDAS-Step 1: The matrix between criteria and alternatives are constructed by using a fuzzy scale in Table 1.

Fuzzy EDAS-Step 2-3: The PDA and NDA matrices are constructed by using (6) and (7) and $\widetilde{sp}_i$ and $\widetilde{sn}_i$ values are computed with (8) and (9).

Fuzzy EDAS-Step 4-5-6:$\widetilde{nsp}_i$, $\widetilde{nsn}_i$ and $\widetilde{as}_i$ values are calculated by using (10)-(12). The final ranking is shown in Table 4.

Ultimately, full adaptive traffic management systems (A4) has become the most desirable strategy among four alternatives with the final performance value; while network communication systems (A2), security and emergency systems (A3) and intelligent public transport systems (A1) have positioned at the second, third and fourth ranks with 0.642, 0.584 and 0.551 as the final performance values, respectively.

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Table 3. The Final Criteria Weights

Main Criteria	**Weights**	**Sub-Criteria**	**Weights**	**Global Weights**
C1	0.089	C11	0.286	0.025
		C12	0.128	0.011
		C13	0.078	0.007
		C14	0.114	0.010
		C15	0.394	0.035
C2	0.092	C21	0.275	0.025
		C22	0.054	0.005
		C23	0.138	0.013
		C24	0.358	0.033
		C25	0.176	0.016
C3	0.405	C31	0.219	0.089
		C32	0.077	0.031
		C33	0.052	0.021
		C34	0.591	0.239
		C35	0.060	0.024
C4	0.414	C41	0.192	0.080
		C42	0.068	0.028
		C43	0.042	0.017
		C44	0.173	0.072
		C45	0.526	0.218

Table 4. The Final Ranking

	NSP	NSN	AS	Defuzz. Value	Ranking
A1	(0.527,0.695,0.700)	(0.367,0.456,0.559)	(0.447,0.575,0.630)	0.551	4
A2	(0.818,0.988,1.194)	(0.230,0.305,0.316)	(0.524,0.647,0.755)	0.642	2
A3	(0.691,0.840,0.890)	(0.303,0.385,0.396)	(0.497,0.618,0.637)	0.584	3
A4	(0.273,0.359,0.389)	(0.845,1.020,1.136)	(0.559,0.689,0.762)	0.670	1

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8. Conclusion

The direction of the world in terms of ITS is obvious. Countries with high economic levels will make great strides in this area and use technology at the highest level. It is understood how much the ITS is needed if the material and spiritual losses that are caused by traffic accidents and congestions in our country are taken into account. It is important to choose the right strategy to implement the required system.

In this study, strategic analysis of ITS is proposed with analytic methods. Firstly, the proposed ITS model is structured with literature review and expert opinions. After that, this model is evaluated MCDM methods such as fuzzy AHP and fuzzy EDAS to calculate criteria weights and evaluate alternative strategies, respectively. According to results, the most appropriate strategy is "Full adaptive traffic management systems (A4)".

The subject of ITS strategy selection can be advanced in future studies by increasing the number of criteria and the decision-makers or using different decision-making methods. Another perspective can be to consider uncertainty using advanced fuzzy approach or use aggregation methods for group decision making.

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THE EVALUATION OF GREEN SUPPLY CHAIN MANAGEMENT EFFORTS OF TURKISH FIRMS

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Abstract

Environmental threats like the devastating impacts of climate change and scarcity of resources require companies to operate in a more eco-friendly way and to take the necessary precautions to preserve the environment. In this context, achieving the profit and market share targets and eliminating their environmental risks and negative effects simultaneously pave the way for the effective management of the supply chains. Green supply chain management (GSCM) aiming at the integration of environmental thinking into supply chain management processes like product design, material procurement and selection, production process, delivery of the final product to the consumer, as well as the management of end-of-life is crucial to increase their environmental efficiency. In this regard, The Carbon Disclosure Project (CDP) emerges as one of the most important efforts to accelerate viable solutions for companies and their supply chains against climate change. Within the scope of the project, the progress of Turkish firms' actions against climate change has been surveyed. Thus, the objective of the current study is to determine the level of the green supply chain activities, and evaluate the adequacy of the current efforts of the firms which responded to the CDP 2017 climate change survey in Turkey and are listed in the industrial category in Istanbul Stock Exchange (BIST) 100. Content analysis will be conducted to analyze the sustainability and/or annual reports of the firms based on the GSCM theoretical framework of Islam et al. (2017). It is hoped that this study will serve as a road map for firms in Turkey in both means of obtaining the gaps in their GSCM efforts and the activities and operations needed to close those gaps.

Keywords: Climate Change, Green Supply Chain Management, Supply Chain Management, Sustainability

Jel classification: M10, M11, M19, Q01, Q56

TÜRKİYE'DEKİ FİRMALARIN YEŞİL TEDARİK ZİNCİRİ YÖNETİMİ UYGULAMALARININ DEĞERLENDİRİLMESİ

Öz

İklim değişikliğinin yıkıcı etkileri ve kaynakların azlığı gibi çevresel tehditler, firmaları, çevre dostu faaliyetlerini arttırmak ve çevreyi korumak için gerekli önlemleri almaya zorlamaktadır. Bu çerçevede, kar ve pazar payı hedeflerine ulaşılması aynı zamanda, çevresel riskleri ve bunların olumsuz etkilerinin ortadan kaldırılması, tedarik zinciri yönetiminin etkin bir şekilde gerçekleştirilmesine olanak sağlamaktadır. Yeşil tedarik zinciri yönetimi (YTZY), çevre yanlısı düşünce biçiminin, ürün tasarımı, malzeme temini ve seçimi, üretim süreci, nihai ürünün tüketiciye teslimi gibi tedarik zinciri yönetimi süreçlerine entegre edilmesini amaçlamaktadır. Bu bağlamda, Karbon Saydamlık Projesi (KSP), firmaların ve tedarik zincirlerinin, iklim değişikliğine karşı uygulanabilir çözümlerin arttırılmasına yönelik en önemli çabalardan biri olarak görülmektedir.

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Proje kapsamında, Türk firmalarının iklim değişikliği çerçevesindeki uygulamalarının gelişimi incelenmiştir. Bu kapsamda, bu çalışmanın amacı, Türkiye'deki KSP 2017 iklim değişikliği anketine katılan ve İstanbul Menkul Kıymetler Borsası (BIST) 100 indeksinde sanayi kategorisinde listelenen firmaların, yeşil tedarik zinciri faaliyetlerini ortaya koymaktır. İslam vd. (2017) tarafından oluşturulmuş olan YTZY teorik çerçevesi kapsamında, firmaların, sürdürülebilirlik ve/veya faaliyet raporları, içerik analizi yöntemiyle analiz edilmiş ve Türkiye'deki mevcut çabaların yeterliliği değerlendirilmiştir. Bu çalışmanın, Türkiye'deki firmalara hem YTZY çabalarındaki eksiklikleri hem de bu eksikliklikleri gidermek için gerekli faaliyet ve işlemleri ortaya koyacak bir yol haritası olarak hizmet etmesi beklenmektedir.

Anahtar Kelimeler: İklim Değişikliği, Yeşil Tedarik Zinciri Yönetimi, Tedarik Zinciri Yönetimi, Sürdürülebilirlik

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1. Introduction

As the last decades has been characterized with an upward increase in population growth, industrialization and economic development, an incremental rise in the demand of natural resources results in undesirable consequences for both environmental quality and ecological system of the earth (Riedy, 2005). The concepts such as ‘climate change’, ‘sustainable’ and ‘green’ are interchangeably used in the pertinent literature in order to address the impacts of climate change (Rex, et al, 2015). Since the consumption level of human has been accelerated with the effect of growing population, which has damaging impacts on the natural environment and increases climate change (Dietz et al., 2007; Myers & Kent, 2003), the problem is human induced. In this sense, the human behaviors that contribute to climate change consist of the emissions of three greenhouse gases (GHGs); involving, carbon emissions by the way of the usage of fossil fuels, the emission of methane gases and the release of nitrous oxide (industrial operations and etc.) (van der Linden, 2015).

The problem of scarcity of resources that may arise requires companies to be more conscious about environment and to take precautions in this regard. In this context, firms should manage supply chains effectively by taking into account the fair use of natural resources (Vachon and Klassen, 2006). Green supply chain management (GSCM) emerges as an organization philosophy aiming at increasing the ecological effectiveness of the companies in the chain by minimizing the damage to the environment and at the same time increasing the profit and market share of the firms (van Hoek, 1999; Andiç et al, 2012).

Considering the importance and the urgency of the issue, it is vital to enhance the GSCM practices of the enterprises. Thus, the current study is a pioneer research that aims to identify the practices in terms of GSCM of Turkish firms which responded to the survey of CDP. Furthermore, the adequacy of these efforts are evaluated by identifying the gaps in current practices when compared with the pertinent literature on GSCM.

2. Theoretical Background

GSCM is an emerging body of research of the last decade which attracts the attention of both the companies and the scholars due to the climate change and sustainability issues that endangers the quality of lives of the next generations. Therefore, there is a lack of consensus on GSCM definition and scope.

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Nevertheless, the philosophy behind GSCM is to protect the environment by minimizing waste, by applying energy conservation practices, green logistics, green manufacturing and many other upstream and downstream GSCM operations and practices. These practices enable enterprises to increase their economic-environmental performances by reducing their environmental risks while increasing their ecological effectiveness (van Hock and Erasmus, 2000).

GSCM is defined by Srivastava (2007) as the integration of environmental thinking into supply chain management, which includes the processes of managing the end of product life as well as the delivery of the final product to the consumer. Zsidisin and Hendrick (1998) obtained four dimensions of GSCM in their study conducted on purchasing managers in three different countries. The first of these dimensions is the supply chain relations dimension in which suppliers are evaluated within the scope of environmental issues. Return on investment, another dimension, emerges as one of the most common aspects of green supply chain operations. Product design has been found to be the third dimension, which involves designing products so that they can be recycled or reused using less energy and materials. The final dimension, called hazardous materials, deals with the purchase of hazardous materials, chemicals and equipment. Zhu and Sarkis (2004) examine GSCM under different dimensions: the commitment of senior management, support of mid-level management, cross-functional cooperation for environmental improvements, total quality environmental management, environmental compliance and audit programs. On the other hand, in addition to the aforementioned studies, GSCM is also examined under four main activities; green purchasing, green production/material management, green distribution/packaging and reverse logistics (Hervani et al, 2005; Büyüközkan & Vardaloğlu, 2008). Various other dimensions like senior management and employee participation, green marketing, green supplier, green stock and green environmental design (Van Hoek, 1999; Shang et al, 2010; Chan et al, 2012) have been identified within the efforts of conceptualization of GSCM.

In order to identify the scope of GSCM practices, a structured literature review has been conducted by Islami et al. (2017). The paper analyzes 91 articles published high-quality journals in order to create comprehensive list of aspects and practices of the green supply chain. Based on this study, GSCM has 16 aspects and 58 practices. The aspects are listed as follows:

- Reverse Logistic,
- Industrial Symbiosis,
- Eco-Innovation Practices,
- Green Information Technology and Systems,
- Green Design,
- Carbon Management,
- Supplier Environmental Collaboration,
- Customer Environmental Collaboration,
- ISO 14001 Certification,
- Internal Management,
- Green Purchasing,
- Green Manufacturing,
- Green Packaging,
- Green Logistics,
- Green Outsourcing,
- Green Warehousing.

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As stated in the framework of Islami et al., (2017: 18-23): reverse logistics refers to collecting unused items, sorting and inspecting them, then recycling, reusing, remanufacturing, and disposal whereas industrial symbiosis refers to the association between two or more companies within industries in which the wastes of one partner become the raw materials for another. Green information technology and systems take IT function into green consideration and green design reflects the design of products or services with certain environmental consciousness and be able to trace and manage the retrieval of raw materials out of the environment, the disposal of the product back into the environment. Carbon management aspect focuses on reducing the carbon footprints of the enterprises whereas supplier environmental collaboration and customer environmental collaboration aim to develop cooperative activities to handle environmental activities within the supply chain. Internal management encompasses overall initiatives employed by an organization's top manager to implement green practices in the supply chain. Green purchasing, manufacturing, packaging, logistics, outsourcing and warehousing stand for the basic supply chain processes executed with ecologically consciousness.

3. Methodology

3.1. Sampling and Data Collection

This exploratory research is conducted on the sustainability or activity reports of Turkish firms, which are listed in "industrial" category in Istanbul Stock Exchange (BIST) 100 and participated in CDP 2017 climate change survey. The mission of the CDP is to correctly utilize the joint power of companies, investors and political leaders to accelerate joint action against climate change.

Today, around 4000 organizations from around 60 countries around the world measure and explain greenhouse gas emissions, water resources management and climate change strategies through the CDP in order to set mitigation targets and improve their performance (CDP Türkiye, 2012). Within the scope of this project, Turkish firms have started to share their greenhouse gas emissions, water resources management and climate change strategies to CDP since 2010. Hence, the rationale behind the restriction of the sample to the CDP 2017 climate change survey participation status is that, the firms that are ready to declare their greenhouse gas emissions, water resources management and climate change strategies would be more likely to be engaged in GSCM practices.

As there are limited number of sustainability reports of the firms in the sample, the research is not limited just to the analysis of sustainability reports. Therefore, both the sustainability or annual activity reports of the industrial firms are downloaded from the official websites of the firms.

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Table 1: Sample of the Study

Firm	Report Type
Alarko Holding A.Ş.	Activity Report
Çelebi Hava Servisi A.Ş.	Activity Report
Tekfen Holding A.Ş.	Activity Report
Aselsan Elektronik Sanayi Ve Ticaret A.Ş.	Sustainability Report
Doğan Şirketler Grubu Holding A.Ş.	Activity Report
Trakya Cam Sanayi A.Ş. (T.Şişe ve Cam Fabrikalari A.Ş.)	Sustainability Report
Tav Havalimanlari Holding A.Ş.	Sustainability Report
Pegasus Hava Taşımacılığı A.Ş.	Activity Report
Tümosan Motor Ve Traktör Sanayi A.Ş.	Activity Report

In 2017, 17 firms were listed in industrial category in BIST100; however, seven of them are not included to sample as they did not respond to the CDP 2017 climate change survey. Moreover, Trakya Cam Sanayi A.Ş. and T.Şişe ve Cam Fabrikaları A.Ş. firms merged during the reporting process and published just one report. As a result, the sample of this study consisted of 9 firms. Company names and the type of the reports are depicted in Table 1.

3.2.Data Analysis

The content analysis is conducted by the two authors and data analysis involves several steps. At the outset, open coding process is undertaken by reading through reports several times, taking notes of the GSCM activities practiced by the firms and creating appropriate codes based on the meaning that emerges from the data. A coding sheet is prepared in Excel which is comprised of practices of GSCM proposed by Islami et al. (2017). The codes extracted in the initial analysis are matched with the practices of GSCM and categorized under the appropriate category in the coding sheet. The two authors coded the first two report based on the coding protocol separately. Then they coded the remaining part of data together through making discussions. Discrepancies between codings were discussed and coding protocol is revised until 100% agreement was reached. Using the refined coding protocol, two scholars coded all content with 90% inter-coder agreement.

4. Findings

Findings reveal 11 aspects and 21 practices of GSCM of the sample. The first four aspects with related practices and what the firms in the sample do as a matter of those practices are illustrated in Table 2.

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The only practice referring to green warehousing aspect is found to be "decreasing inventory levels", and the sub-category contains one green supply chain activity of the firms which is minimum inventory usage. Minimum inventory usage is declared two times in the reports (Table 2).

The second GSCM aspect is green logistics, "environmentally friendly transportation" and "using green fuels such as low sulfur content and alternative fuels such as liquid natural gas" are identified as the two practices embraced by firms. Use of electric vehicle and use of non-polluting fuel are the only activities pursued under the related practices respectively, with a frequency of one. Activities of Turkish firms within green manufacturing aspect are categorized into one GSCM practice: "cleaner production". However, it should be noted that "generating minimum waste, and reducing environmental pollution" practice depicted in the framework of Islami et al. (2017) is merged into cleaner production practice because expression of firms are not clear to categorize them under generating minimum waste, and reducing environmental pollution practice. The mostly repeated (f=13) activities of this practice is the efficient usage of natural resources and the usage of renewable energy resources (f=12). Moreover, reduction of waste and increasing the energy efficiency items are repeated 11 times in the reports of the firms.

Table 2. Green Warehousing, Green Logistics Green Manufacturing and Green Purchasing Aspects of GSCM

ASPECTS	PRACTICES	ACTIVITIES OF FIRMS	F
Green Warehousing (f=2)	Decreasing inventory levels (f=2)	Minimum inventory usage	2
Green Logistics (f=4)	Environmentally friendly transportation (f=1)	Use of electric vehicles	1
	Using green fuels such as low sulfur content and alternative fuels such as liquid natural gas (f=1)	Use of non-polluting fuel	1
Green Manufacturing (f=74)	Cleaner production (Generate minimum waste, and reduce environmental pollution during production) (f=74)	Taking precautions to avoid environmental risks in production	2
		Reduction of waste	11
		Usage of components with reduced environmental impact	2
		Production of minimum gas waste	4
		Separation of waste at the source	7
		Sending hazardous wastes to authorized disposal or recovery companies	2

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Green Manufacturing (f=74)		Having an environmentally friendly production facility	4
		Usage of renewable energy resources	12
		Efficient usage of natural resources	**13**
		Increasing production efficiency	6
		Increasing the energy efficiency	11
Green Purchasing (f=12)	Buying environment-friendly raw materials (f=7)	**Purchasing equipment that meets noise and environmental pollution prevention criteria**	**3**
		Purchasing electric vehicles	1
		Purchasing environmentally friendly materials	**3**
	Pressuring supplier(s) to take environmental actions (f=3)	Auditing supplier operations	2
		Asking suppliers to take measures to reduce environmental risks	1
	Choice of suppliers by considering the environmental criteria (f=2)	Considering environmental performances of suppliers in supplier selection	2

Examples related to green purchasing aspect are categorized into three GSCM practices: "buying environment-friendly raw materials", "pressuring supplier(s) to take environmental actions" and "choice of suppliers by considering the environmental criteria". The first practice of green purchasing, "buying environment-friendly raw materials", involves three activities, which are purchasing equipment that meets noise and environmental pollution prevention criteria (f=3), purchasing environmentally friendly materials (f=3) and purchasing electric vehicles (f=1). The second practice of green purchasing is "pressuring supplier(s) to take environmental actions", which comprehends two activities. First activity is auditing supplier operations and is repeated 2 times and the other activity asking suppliers to take measures to reduce environmental risks was repeated 1 time. The last practice is "choice of suppliers by considering the environmental criteria", which contains one activity that is considering environmental performances of suppliers in supplier selection with a frequency of 2.

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Table 3. Internal Management Aspect

PRACTICES	ACTIVITIES OF FIRMS	F
Environmental compliance monitoring and auditing (f=13)	**To follow the requirements of environmental laws, regulations and standards**	**7**
	Taking precautions in every aspects of operations to avoid pollution	1
	To protect the animals and plants	1
	To contribute to the development of environmental policies and systems	1
	To have an environmental management system	3
Managerial commitment (f=11)	To make efficient use of energy as an element of corporate culture	1
	Adoption of sustainability as a corporate culture	**3**
	To develop committees of sustainability	1
	To determine environmental objectives	2
	Monitoring environmental performance regularly	2
	To acquire an environmental management policy	1
	To develop environmentally friendly products and services	1
Employee incentive programs for environmental suggestions (f=1)	To encourage the participation of employees in environmental activities	1

The fifth GSCM aspect identified in the current study is internal management, which are categorized into three practices. "Environmental compliance monitoring and auditing" is the first sub-category, which comprehends 5 activities. To follow the requirements of environmental laws, regulations and standards item is the activity that is mostly repeated (f=7) in the reports. As can be seen in Table 3, the second practices category, which the activities of firms fall under, is "managerial commitment", which contains seven green supply chain activities. The highest frequency of firm activity belongs to adoption of sustainability as a corporate culture item (f=3).

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Table 4. Environmental Certification and Carbon Management Aspects

ASPECTS	PRACTICES	ACTIVITIES OF FIRMS	F
Environmental Certification (f=15)	Participating in environmental certification such as ISO 14001 certificate. (f=15)	**ISO 14001 certificate**	**7**
		ISO 50001 Energy Management System	4
		ISO 14064 Greenhouse Gas Reporting Standard	2
		Carbon Accreditation	1
		Green Company Certificate	1
Carbon Management (f=40)	Steps of carbon reduction (f=39)	To calculate carbon footprint	2
		Controlling carbon emissions resources	2
		Reporting greenhouse gas emission performance	3
		Reduction of carbon dioxide emissions	**27**
		Reporting by participating in the CDP Water Program	1
		To manage greenhouse gas inventory	4
	Training related to carbon management (f=1)	Training personnel on reduction of carbon dioxide emissions	1

The original aspect in the framework of Islami et al. (2017) is named as ISO 14001 Certification. However, in order to expand the comprehensiveness of the concept, the name is changed as Environmental Certification. Firms' activities related to environmental certification are categorized into one practice: "participating in environmental certification". Under this practice category, acquiring ISO 14001 certificate is the mostly repeated activity (f=7) (See Table 4). Activities referring to the carbon management aspect is categorized into two practice categories: "steps of carbon reduction" and "training related to carbon management". Reduction of carbon dioxide emissions has the highest frequency (f=27) in this aspect.

Environmental Collaboration is another aspect of GSCM and found to have three practices and 13 activities of firms. The original framework involves Supplier Environmental Collaboration and Customer Environmental Collaboration aspects. However, firms' reports mainly mention the word "stakeholder" but not "suppliers" or "customers" separately. Therefore, these two aspects are merged and are given the name of Environmental Collaboration.

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Table 5. Environmental Collaboration Aspect

PRACTICES	ACTIVITIES OF FIRMS	F
Share environmental management techniques and knowledge. (f=20)	To promote recycling and environmental awareness within stakeholders	3
	To support stakeholders to be active players in sustainable solutions.	2
	To involve stakeholder expectations in decision-making processes	1
	Determining sustainability priorities with stakeholders	3
	Sharing environmental management understanding with stakeholders	4
	Providing environmental training to stakeholders	**5**
	To reduce environmental impacts with all stakeholders	1
	Conducting bio-diversity studies with stakeholders	1
Monitor environmental compliance status and practices of stakeholders (f=7)	Monitoring the activities of stakeholders through a platform	1
	Monitoring stakeholder compliance with environmental policy	3
	Auditing the environmental operations	3
Communicate goals of sustainability to stakeholders (f=8)	Sharing sustainability understanding with stakeholders	4
	Adopting a common sustainability understanding with stakeholders	4

As illustrated in Table 5, "share environmental management techniques and knowledge" practice has the highest frequency among the other practices and contains eight activities. The most repeated activity is found as providing environmental training to stakeholders (f=5).

The next GSCM aspect found as a result of the analysis is green design. As depicted in Table 6, designing environmental friendly products/services is the most frequently mentioned (f=4) activities of firms which belong to "intend to reduce products' negative effects on the environment during its entire life cycle" practice category.

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Table 6. Green Design, Green Information Technology and Systems Aspects and Eco-Innovation Practices

ASPECTS	PRACTICES	ACTIVITIES OF FIRMS	F
Green Design (f=5)	Design of products for reduced consumption of materials/energy. (f=1)	To design high performance new products for effective thermal insulation and solar control	1
	Intend to reduce products' negative effects on the environment during its entire life cycle (f=4)	**Designing environmental friendly products/services**	**4**
Green Information Technology and Systems (f=14)	Use of energy efficient hardware and data centers (f=8)	Choosing nature-friendly systems for hardware purchases	4
		Lower energy consumption in data center design	4
	Consolidating servers using virtualization software & Collaborative group software. (f=6)	Using Building Management System Automation	1
		Use of integrated enterprise portal	**5**
Eco-Innovation Practices (f=13)	Internal recycling of wastes (f=13)	Recovery of energy from waste	4
		Reuse of waste	**5**
		To ensure the recycling of waste	4

Activities related to Green Information Technology and Systems are categorized into two practice categories: "use of energy efficient hardware and data centers" and "consolidating servers using virtualization software & collaborative group software". Use of integrated enterprise portal has the highest frequency (f=5) among the firms' activities within Green Information Technology and Systems aspect. Finally, the last GSCM aspect found appears to be Eco-Innovation Practices in which reuse of waste is the mostly repeated activity (f=5) among the others in the category.

5. Conclusion And Discussion

This research aims to explore the GSCM practices of Turkish firms which are thought to have an inclination towards pursuing GSCM practices and activities. Hence, to fulfill this purpose, the sample of the study is determined according to the response status of the BIST 100 firms within "industry" category to CDP Climate Change survey 2017 which is accepted as a signal of consciousness towards environmental protection.

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Content analysis is conducted on the sustainability/activity reports of the firms based on the GSCM aspects and practices framework of Islami et al. (2017). Findings reveal that Green Manufacturing is the most frequently mentioned aspect of the sample. Efficient usage of natural resources, usage of renewable energy resources, increasing the energy efficiency and reduction of waste are the mostly repeated activities of the firms within Green Manufacturing. The second GSCM aspect which the sample mostly pursue is Carbon Management. Firms in the sample mainly focus on the reduction of carbon dioxide emissions but it is observed that there are no current targets of carbon reduction of the firms and there is a gap in terms of providing sufficient trainings to their employees related to carbon management.

It is gratifying to observe that the firms in the sample collaborate with their stakeholders in terms of environment. They share environmental management techniques and knowledge, monitor environmental compliance status and practices of their stakeholders and communicate their goals of sustainability to their stakeholders. However, they may be advised to collaborate with their stakeholders to build programs to reduce or eliminate waste and to manage reverse flows of materials and packaging. Internal management support is also vital for firms in order to sustain the GSCM practices. Firms claim to perform environmental compliance monitoring and auditing within their firms and claim managerial commitment with the activities of adopting sustainability as a corporate culture, determining environmental objectives and monitoring environmental performance regularly. Nevertheless, they have a lack of employee incentive programs for environmental suggestions.

Findings reveal only 11 aspects of the 16 aspects of GSCM provided in the aforementioned framework. No practices of Reverse Logistics, Green Packaging, Green Outsourcing and Industrial Symbiosis aspects of GSCM are mentioned in the reports of the firms in the sample. However, it should be noted that each GSCM practices may differ according to the sector that the firm operates in. Moreover, the legal requirements and obligations may differ from country to the other. Beyond that, each firm's corporate culture and values may be different which may also affect the way they practice GSCM activities.

Natural resource depletion, the spread of environmental pollution on a global scale and climate change generate deep concern about the sustainability of nature and natural resources. Therefore, it is obvious that firms should be willing to take more responsibility to minimize their negative impacts on the environment. Besides, the pressure from the international environmental bodies and the possible environmental policy and regulation adaptations in line with the combat with the climate change like the possible carbon taxation or limitations on greenhouse gas emissions, may force the firms to realize GSCM practices in all aspects. Therefore, it is recommended that the firms in Turkey integrate green initiatives to their supply chains successfully in the near future.

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THE EFFECTS OF THE LAW ON THE PROTECTION OF PERSONAL DATA ON HUMAN RESOURCES APPLICATIONS OF LOGISTICS COMPANIES

Ayşe İLAGA ÇAKIR[1]

Abstract

Today, private and government agencies collect many personal data about individuals every day. Personal data; means any kind of information about the person whose identity is specific or identifiable. Technology has evolved to allow individuals and institutions to share and disseminate information worldwide. Personal Data Protection is a right of individuals that need to be protected against unauthorized use of their data by other individuals or organizations. This right has been taken under protection by amendment of Article 20 of the Constitution. In addition, amendments were made to some other laws and finally, on 24 March 2016, the Law No. 6698 on the Protection of Personal Data was adopted in the Turkish Grand National Assembly. The law, regulates the procedures and principles to be followed by the obligations of natural and legal persons, and imposes important provisions on all companies that process, carry or store personal data. One of the sectors affected by the law is logistics. In this study, the national and international legal regulations and the Law No. 6698 which are related to the protection of personal data were examined. In the logistics sector, the effects of this law on human resources practices, difficulties, causes and consequences were investigated with a screening approach and in-depth interview methods. In the sector, a study on this subject has not been found, in this respect it is thought that it will contribute to the literature and the sector.

Keywords: Logistics Human Resources, Personal Data, Processing of Personal Data, Right to Protection of Personal Data,

JEL Classification: K10, K31, L91, O15

KİŞİSEL VERİLERİN KORUNMASI YASASININ LOJİSTİK ŞİRKETLERİN İNSAN KAYNAKLARI UYGULAMALARINA ETKİLERİ

Öz

Günümüzde, özel ve devlet kurumları, hergün bireyler hakkında birçok kişisel veri toplamaktadır. Kişisel veri, kimliği belirli veya belirlenebilir gerçek kişiye ilişkin her türlü bilgiyi ifade etmektedir. Teknoloji, kişi ve kurumların bilgiyi paylaşması ve dünya çapında yaymasına izin verecek şekilde gelişmiştir. Kişisel verilerin korunması, bireylerin verilerinin başka kişi veya kuruluşlar tarafından yetkisiz kullanımına karşı sahip oldukları bir haktır. Bu hak, başta Anayasamızın 20. Maddesinde değişiklik yapılarak koruma altına alınmıştır. Ayrıca diğer bazı yasalarda değişiklikler yapılmış ve son olarak 24 Mart 2016 tarihinde, Kişisel Verilerin Korunması Kanunu TBMM Genel Kurulu'nda kabul edilmiştir. Kanun, kişisel verileri işleyen gerçek ve tüzel kişilerin yükümlülükleri ile uyacakları usul ve esasları düzenlemekte, kişisel veri işleyen, taşıyan veya saklayan firmalar için önemli hükümler getirmektedir. Yasadan etkilenen sektörlerden birisi de lojistiktir. Bu çalışmada, kişisel verilerin korunması hakkındaki ulusal ve uluslararası yasal düzenlemeler ve 6698 sayılı yasa incelenmiştir. Yasanın, lojistik şirketlerin insan kaynakları uygulamalarına etkileri, zorlukları, sebep ve sonuçları tarama yaklaşımı ve derinlemesine görüşme yöntemleri ile araştırılmıştır. Sektörde bu konuda yapılan bir çalışmaya rastlanmamıştır, bu açıdan literatüre ve sektöre katkı sağlayacağı düşünülmektedir.

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Anahtar Kelimeler: Lojistik İnsan Kaynakları, Kişisel Veri, Kişisel Verilerin İşlenmesi, Kişisel Verilerin Korunması Hakkı.

JEL Sınıflaması: K10, K31, L91, O15

1. Introduction

The logistics sector in the world and in our country is growing with each passing day, and its importance is understood better. Logistics, which has been perceived only as "transportation" until recently, has emerged as an integrated sector with the basic stages such as procurement, production, storage, transport, and packaging, and many components such as business development processes, customer service, and information technologies.

Developments in the logistics sector have also affected the labor force of the sector. It has supported the increase in the competitive environment, the development of companies, and innovations. Human resources and technology are very important for the sector. Numerous companies operate in the Turkish logistics sector. A large number of people are employed together with the sub-sectors. Due to the size of the operational dimension of logistics activities, the number of field workers is considerably higher than the number of office workers, and there is a high labor turnover (Jobnak Human Resources, 2010).

In today's rapidly developing and competitive world, human resources departments are very important for businesses. Activities such as providing human resources, organization, and supervision are carried out by human resources. Human resources are also very important in the labor-intensive logistics sector, where personnel circulation is high and there are different business areas. Therefore, these departments are required to have the knowledge and preparation to adapt to dynamic, technical, social, and legal changes (Gelincik, n.d.).

Human resources departments interview many candidates and receive job applications. Each interview and application is data sharing, and these data are also stored after recruitment. As the worker starts to work, data sharing continues with workplace rules and practices. Personal data recording is often carried out in different areas of our lives. It is possible that these data can be obtained, used, and misused by unauthorized persons, so it is important to protect the data. It is a right granted to individuals to demand the protection of data.

This right is protected by international conventions to which we are a party, the Constitution, and laws. In this context, Law No. 6698 on the Protection of Personal Data was adopted in the Turkish Grand National Assembly on 24 March 2016. The law regulates the obligations and procedures and principles of the natural and legal persons who process, carry, or store personal data. The imposition of hefty fines and imprisonment is regulated for individuals and institutions that violate the rules. The law is also closely related to logistics companies, where the human factor is very important, which employ workers in different fields, have a high labor turnover, and process a large amount of personal data.

The study consists of 7 sections. After the introduction section, in the second section, the concept of personal data and its brief history and legal regulations are explained, and in the third section, literature research is explained. In the fourth section, the method of study is explained, and in the fifth section, the human resources applications of the companies operating in the logistics sector are explained.

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In the sixth section, the requirements for human resources within the scope of the Law on the Protection of Personal Data, responsibilities of employers, sanctions, board decisions, and regulations are explained, and in the last section, conclusions and suggestions are stated.

2. Concept Of Personal Data, Its History, And Legal Regulations

Personal data is defined in Law No. 6698 on the Protection of Personal Data (LPPD) as "All the information relating to an identified or identifiable natural person" (Law No 6698 , 2016). In this case, the information that defines the identity of persons such as name, surname, date of birth, place of birth, as well as the data that identifies the cultural, physical, economic, social or psychological identity of persons and the data that will make persons identifiable such as identity, social security number, and telephone number are all personal data. Furthermore, CV, picture, image and audio recordings, fingerprint, genetic information of persons are also personal data. Some of your personal data is further protected. This group is defined as sensitive (private) data (Carey, 2009, p. 81).

The legal regulations on the protection of personal data have taken their current form by passing through various stages.

Table 1. Historical Process of The Protection of Personal Data (Kaya & Taştan, 2018)

Institution	Document	Year
United Nations	Universal Declaration of Human Rights	1948
EU Council	European Convention on Human Rights	1950
United Nations	International Covenant on Civil and Political Rights	1966
Organization for Economic Cooperation and Development (OECD)	OECD Guidelines on the Protection of Privacy and Transborder Flows of Personal Data	1980
EU Council	Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (Council of Europe Convention No. 108)	1981
United Nations	Guidelines for the Regulation of Computerized Personal Data Files	1990
EU Commission	Data Protection Directive (95/46/EC)	1995
EU Council	Additional Protocol to the Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data regarding supervisory authorities and transborder data flows (Additional Protocol No. 181)	2001
EU Commission	Directive on the Processing of Personal Data and the Protection of Privacy in the Electronic Communications Sector (2002/58/EC)	2002

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Institution	Document	Year
EU	European Union General Data Protection Regulation 2016/679 (GDPR)	2016
EU Council	Protocol Amending the Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (Convention No. 108+)	2018

Developments in information technologies from the second half of the 20th century to the present day have become more evident nowadays, affecting not only business processes but also all areas of life. The logistics sector is also an area where these developments are felt strongly.

Rapid digitalization has brought about the need for new regulations in the legal field. The digitalization of information with increasing speed and the need to re-establish the impaired imbalance against the individual have made it necessary to determine the rules of law to which data processing processes will be subject. In this respect, the law on the protection of personal data is closely related to digitalization.

As a matter of fact, the first regulations for the protection of personal data were adopted in the years when computers and databases began to process information about individuals on a large scale. Nowadays, more than one hundred and twenty states have legal regulations in this field.

International conventions, constitutions, and laws form the basis of the regulations for the protection of personal data. Furthermore, secondary regulations such as bylaws, regulations, and communiqués issued in order to demonstrate the application of laws are located in the legislation.

2.1. International Regulations

A. One of the international regulations on the protection of personal data to which our country is a party is the Council of Europe Convention No. 108. This Convention introduces regulations within the framework of the EU standards for the protection of personal data. The Convention entered into force in 2016 in our country.

B. In addition to this convention, "Additional Protocol No. 181 regarding supervisory authorities and transborder data flows" was prepared and entered into force in 2016 in our country.

C. Convention no. 108 was amended in 2018 and entered into force in the EU as 108+.

D. The European Union General Data Protection Regulation was published in 2016. Although it is a regulation that has entered into force in EU countries, under certain conditions, it also includes sanctions for companies operating in non-EU countries. This is an important regulation that logistics companies that have business relations with the EU member states should take into consideration.

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E. The International Labor Organization was established as a United Nations specialized organization. It is working to improve social justice and workers' rights internationally.
At the 1996 Committee of Experts meeting, the Code of Practice on the Protection of Personal Data of Workers and recommendations on this matter were adopted.

F. The Council of Europe adopted recommendations on the protection of personal data, setting out principles to be applied in various sectors such as employment, medical data banks, scientific research and statistics, direct marketing, social security, insurance, police records, electronic payment, telecommunications, and the internet. It is observed that the subject of "Employment" is included in the recommendations. In our country, these recommendations were taken into consideration during the preparation stage of LPPD no. 6698. It is stated that these principles will be included in the regulations to be made regarding different sectors. In the meantime, the decisions of the Personal Data Protection Board on various sectors and matters started to be formed.

2.2. National Regulations

A. The Constitution of the Republic of Turkey is one of the leading national regulations on the protection of personal data. In Article 20 of the Constitution titled the right of privacy (Additional paragraph: 7/5/2010-5982/2 art.), it is stated that "Everyone has the right to request the protection of his/her personal data. This right includes being informed of, having access to and requesting the correction and deletion of his/her personal data, and to be informed whether these are used in consistency with envisaged objectives. Personal data can be processed only in cases envisaged by law or by the person's explicit consent. The principles and procedures regarding the protection of personal data shall be laid down in law." (Constitution of the Republic of Turkey , 1982, p. art.20). This article accepts the protection of the personal data of all citizens as a right and forms the basis of all other legal regulations.

B. The important legal regulation that forms the basis of the study is Law No. 6698 on the Protection of Personal Data. Article 1 of the Law is as follows: "The purpose of this Law is to protect fundamental rights and freedoms of people, particularly the right to privacy, with respect to processing of personal data and to set forth obligations, principles and procedures which shall be binding upon natural or legal persons who process personal data. "

Paragraph 5/1 of the Law stipulates that "personal data cannot be processed without the explicit consent of the data subject," and the following paragraph 2 provides exceptions. The processing of personal data of special nature is regulated in paragraphs 6/1-2 of the Law, which state that "(1) Personal data relating to the race, ethnic origin, political opinion, philosophical belief, religion, sect or other belief, clothing, membership to associations, foundations or trade-unions, health, sexual life, convictions and security measures, and the biometric and genetic data are deemed to be personal data of special nature." "(2) It is prohibited to process the personal data of special nature without explicit consent of the data subject." Exceptions in some cases concerning explicit consent are also provided in paragraph 3 of the same article.

There are basic principles that must be followed in all cases in which personal data is processed. These principles are regulated in Article 4/2 of the law: "a- Lawfulness and conformity with rules of bona fides, b- Accuracy and being up to date, where necessary, c-

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Being processed for specific, explicit and legitimate purposes, ç- Being relevant with, limited to and proportionate to the purposes for which they are processed and d- Being retained for the period of time stipulated by relevant legislation or the purpose for which they are processed." It is compulsory to comply with these principles under all conditions and circumstances. This means that, All transactions that process the personal data must comply with these principles. Example: Digital filing, big data, etc.

In Article 3 of the law, it is stated that "d) Personal data: all the information relating to an identified or identifiable natural person, e) Processing of personal data: any operation performed upon personal data such as collection, recording, storage, retention, alteration, re-organization, disclosure, transferring, taking over, making retrievable, classification or preventing the use thereof, fully or partially through automatic means or provided that the process is a part of any data registry system, through non-automatic means." For example, it is an obligation to act in accordance with the principles set forth in the law, not only when a particular person's address is recorded, but also erased.

In Article 7 of the law, it is stated that "(1) Despite being processed under the provisions of this Law and other related laws, personal data shall be erased, destructed or anonymized by the controller, ex officio or upon demand by the data subject, upon disappearance of reasons which require the process." "(3) Procedures and principles for the erasure, destruction or anonymizing of personal data shall be laid down through a by-law." The regulations concerning the application procedure are included in the ongoing articles of the law. The regulation mentioned in the article entered into force by being published in the Official Gazette on 28 October 2017. Furthermore, the Communiqué on Procedures and Principles for Data Controller Applications was published in the Official Gazette on 10 March 2018 (Law No 6698 , 2016).

C. As can be seen, in the law, data protection provisions are regulated in detail. The regulations of protection of personal data are also included in Articles 135-140 of Turkish Criminal Code No. 5237, and penal sanctions are indicated in case of non-compliance. In addition, people whose rights have been violated have the right to compensation.

3. Literature Review

The protection of personal data is an important issue that has been taken under protection by legal regulations in many countries in recent years. For this reason, studies in the literature have increased. The studies conducted in various fields and subjects related to the protection of personal data are given in Table 2.

Table 2. Literature Review (Kartal, 2018, pp. 1-18)

Author	Year	Country	Content
Ketizmen and Ülküderner	2007	Turkey	Protection of Personal Data in E-Government Applications
Kaya	2011	Turkey	Sensitive (Personal) Data and Its Processing in the Context of the European Union Data Protection Directive

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Author	Year	Country	Content
Saadet	2012	Turkey	Regulations for restricting the confidentiality of communication
Barnard-Wills et al.	2016	EU Countries	An effect of data protection reforms on cooperation between EU institutions
Turan	2016	Turkey	Duties and responsibilities of data controller institutions, compliance with legislation, attention and care
Chua et al.	2017	Malaysia	Compliance of public and private institutions with personal data protection principles.
Hoel and Chen	2017	Norway	Data protection and privacy.
Tikkinen-Piri et al.	2017	EU countries	EU General Data Protection Regulation: changes and their effects on personal data collection companies
Erbaş	2017	Turkey	Observation of Workers in the Electronic Environment within the Scope of Law No. 6698 on Protection of Personal Data
Dülger	2016	Turkey	Operability of systems for the protection of personal data.
Kartal	2018	Turkey	Protection of Personal Data: A Conceptual Assessment on the Turkish Banking Sector
Avcıoğlu	2018	Turkey	Right to protection of personal data in Turkish law
Oğuz	2018	Turkey	General principles of the law on the protection of personal data

According to the literature review, it is observed that various studies have been carried out on the protection of personal data. However, in the field of the logistics sector, no studies have been found on the protection of personal data in human resources applications. In this respect, it is thought that the study will contribute to the literature and the sector.

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4. Method

The methodological orientation of the study is qualitative. Data on the subject to be examined were collected from a homogeneous group (logistics companies) using the screening approach and exploratory method. Screening research is one of the most appropriate methods for social scientists to collect and describe natural information. Screening research can be used for exploration, description, and explanation purposes. First of all, official, statistical, sectoral and case resources, Personal Data Protection Board decisions, and administrative arrangements were used. During the in-depth interviews conducted with the human resources authorities of the logistics companies operating in Istanbul, information was collected about the applications of the protection of personal data, difficulties encountered, reasons, effects and suggestions, and information was collected about other logistics company applications by examining examples from official resources. Finally, all this information was evaluated, and suggestions were made.

5. Logistics Company Human Resources Applications

Since the Law on Protection of Personal Data is a law covering all fields of public and private sectors, it is important that all workers and employers learn, implement, and adapt the law to business processes. The law has determined the period of registration of businesses in the system. Administrative sanctions of the legal regulations awaiting the owners of the enterprises have been regulated if Registry of Data Controllers registration is not done. Compensation and criminal cases may also be subject according to the nature of the concrete event.

The provisions of the law are of a general nature and apply to all personal data described in the law. Since the subject of the study is the protection of personal data in human resources applications in the logistics sector, in this section of the study, the applications in the doctrine and the effects of the law on the enforcement bodies are explained. Human resources interviews of the companies were also conducted within this scope.

In-depth interviews were conducted face-to-face with the human resources officers of the logistics companies where the appointment was made. Information was collected about the applications of the law in the sector, the difficulties, and demands. Moreover, official websites of many logistics companies were examined, and information and documents on the implementation of the law were obtained. The companies interviewed are based in Istanbul and have been operating in the logistics field for nearly 30 years in different business lines (automotive, textile, etc.) nationally and internationally. As can be understood from the history of companies and the extensiveness of their fields of activity, many workers are employed in the field and office environment. Therefore, there are numerous regulations and applications on the subject. Since the companies demand to keep their names confidential, the name of the company cannot be shared. Prior to the appointment, resources were reviewed on the protection of personal data, doctrine applications, legal regulations were investigated, the data collected were analyzed, and then the companies were interviewed with the questions determined. During the meeting, information was obtained not only on the questions determined but also about the new questions and the practices and the effects of the law according to the course of the applications.

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5.1. Personal Data Collection, Information, Consent, and Application

The processing of personal data starts from the application to the job advertisements of the businesses as candidates. With the forms created by the employer (company's human resources department), candidates are asked to answer various questions. In addition, apart from the form information, candidates are required to submit (by hand or on a digital platform) exam documents, tests, diplomas, certificates, health reports, etc., and the processing of personal data is continued through applications such as obtaining information about the candidate from third parties, application of tests, monitoring with cameras and tracking devices.

This process continues with the recruitment of the selected candidates, the continuation of the employment and even the termination of the employment contracts, or the storage of the information of the applicants who have not been recruited. Therefore, even if the contract is terminated and the candidate is not selected; the obligation to protect, store, erase, destroy, anonymize and not to transfer all personal data collected by the employer, continues. However, there may still be situations in which the personal data of the worker may be at risk. In fact, applications such as recording the time that the worker goes to the toilet monitoring how much he/she moves with the device placed in his/her chair, and prohibiting the use of special-purpose phones and/or computers even during breaks can be applied in many workplaces (Uncular, 2018). Likewise, during the study, the statements of workers working in logistics warehouses, *"450 workers work in the warehouse part of our workplace. We work with a four-shift system... We go to toilets with a card."*, were reached in an interview on the working conditions. This is an example of the recording of the times of workers' visits to the toilet (Doğan, 2017).

As mentioned, the first meeting of human resources with candidates starts with applications to the job advertisements. The interviewed companies were asked primarily about the content of the questions asked to candidates in the applications to the job advertisements, the method by which the information is received (via the internet, during the interview, etc.). The companies stated that they started an archive review with the enactment of the law and that resumes and attached documents from job/worker search websites and those protected within the company are reviewed, but the processes will take a long time to complete. Within the scope of the studies, they stated that application forms were renewed and the questions asked to candidates were revised and brought into compliance with the law. Furthermore, one of the companies stated that they have given information regarding to the LPPD to the workers who had started to work before the law unpublished and they had signed information documents containing consent texts and that the application would continue in this way for those to be recruited.

All of the companies stated that, according to the law, they put general information text on their official websites under the title of "Protection of personal data and privacy policy." They also stated that for recruitment human resources applications, they would add a section to the job applications section of the web pages that they allowed the processing of data with the information text so that candidates could read and be informed before the application. As explained in the statutory section of the study, data processors do not return personal data they receive and will need to obtain the explicit consent of the candidate if they wish to store it. In accordance with the mandatory provision of the law, it is important that candidates are provided with clear information and their explicit consent is received when obtaining personal data (exceptions are specified in the law).

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Nowadays, with the development of science and technology, applications such as monitoring of workers with electronic and biometric access control systems, listening to their phones, monitoring of their e-mails, internet accesses, social media accounts, tracking of their vehicles with GPS, observation of their behaviors in the workplace have become widespread and easier. In accordance with Article 3/3 of the International Labor Organization (ILO) personal data application code, such applications are governed by the rules and principles of the data protection law (Uncular, 2018, p. 233).

A large number of drivers are employed in the transportation services of the logistics sector, and some information and documents are requested from both drivers and other candidates for their recruitment. In the information and documents obtained during the study, it was observed that job application forms/advertisements of many logistics companies include questions such as the name and profession of the candidate's spouse, the number of children, marital status, whether he/is disabled/ex-convict, membership in associations, retirement registration number, whether a lawsuit or investigation about him/her has been conducted.

However, questions asked to candidates about their family members, membership in associations, health-related questions that are not required by a job/duty definition and questions such as criminal record and former conviction should be limited to those important in terms of the job/duty definition (Uncular, 2018). Most of this information is Personal Data of Special Nature, which is defined in Article 6 of the law. The companies interviewed stated that they did not include such questions in their job advertisements and application forms, and revised their questions. In addition, they stated that they employ female workers in overseas branches as drivers and they do not include any statements that will make gender discrimination in job advertisements.

5.2. Personal Data Sharing, Application

The logistics sector is a sector that can employ workers in national and international fields. In this respect, it is also possible to transfer workers' personal data abroad. Article 9 of the Law sets out this issue in detail: *"(1) Personal data cannot be transferred abroad without the explicit consent of the person concerned"* Exemptions are provided in the continuation of the article. It was asked to the companies, and they stated that they do not share personal data of workers between countries in their applications and that they provide foreign workers from the countries that they work (local workers). Furthermore, it was stated that the resume data are reviewed in the recruitment of the domestic personnel, that they do not share the candidate resumes recorded in their companies with other human resources or other group companies or persons without permission, that personal information about workers is not shared with the manager, colleagues, etc., and reference research is done with the approval of the worker. The obligations regarding data security are detailed in Article 12 of the law. Likewise, the Personal Data Production Board made the following decision in the event that *"personal data processed during the job application process is unlawfully shared with other job applicants without any legal reason"*: *"That it is illegal to share personal data of a candidate applying for job among the data controllers under a group of companies without the explicit consent by using the same database and an administrative fine shall be imposed on said Company"* (Personal Data Protection Board, 2018).

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5.3. Wearable Devices, GPS, Body Search, Health Data, and Application

With the development of technology, it is possible to monitor workers by tracking vehicles with GPS (The Global Positioning System). The opinion in the doctrine is that the employer is obliged to inform workers clearly that the tracking device is placed in the work vehicle (lorry, truck, etc.) and that the movements, driving, and position of the vehicle are recorded. It is stated placing this notification in each vehicle is the best way so that the driver can easily see it. The companies interviewed stated that their drivers sign an information document regarding the presence of GPS in their vehicles during their recruitment. Workers may be searched on the grounds that the entry of dangerous goods in warehouses or the unauthorized exit of valuable goods should be prevented. In the doctrine, it is argued that workers should be informed clearly, comprehensively, and extensively before such searches are done. Furthermore, it is possible to monitor places where workers work by a camera and to monitor their e-mails and searches on the internet. Decisions on this matter are state that the employer should clearly inform workers about the application. Some of the interviewed companies stated that with the publication of the law, procedures for these applications were determined by human resources, forms were prepared and signed by their workers during recruitment, and even included in employment contracts. Some stated that they were informed and they would revise their regulations in this way in accordance with the law.

Employers are increasingly using wearable devices to monitor, track, measure work speed, and breaks for workers' health and activities inside and outside the workplace. The data collected through sociometric name tags/badges are analyzed with artificial intelligence, and the productivity of workers is determined. These devices should be used without voice and conversation recording. Such devices are used in the logistics sector to direct warehouse employees to their next assignment. The misuse of these device applications will result in a breach of rights in the processing of personal data.

Health data is personal data of special nature. The results of the medical examination for the recruitment of the candidate / worker will only need to be indicated as to whether they are suitable for physical and / or mental recruitment (Uncular, 2018). Likewise, in the interviews with the companies, several companies stated that the application is made in this way, while others stated that as a result of the medical examination, the physician notifies whether the worker is suitable for the job and also sends a copy of the result to the personal file. Wearable devices can also be used to monitor the health of workers. Conducting such applications secretly without permission from the worker will be a breach of rights. Lastly, the companies were asked whether they receive any requests from candidates or workers regarding the erasure of personal data. The companies stated that they had not received any request on this subject and had not experienced such a situation yet.

The companies stated that when the law came into force, they organized workshops to be informed and to determine a road map. One of the companies stated that they had problems in the implementation of the regulation, that they could not understand the law, and that the fines envisaged in the law were disproportionate. In addition, they stated that infrastructure investment is required in order to carry out regulatory procedures, and it is appropriate that the relevant regulations and other regulatory procedures should be issued by the Personal Data Protection Authority as soon as possible. They further stated that the adaptation process should be extended, there is a lot of application and labor mobility especially in the logistics sector, the revision process of old and new data takes time, and they demand more time and solution.

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6. Within The Scope Of The Lppd, The Responsibilities Of The Employer, Sanctions, The Requirements For Hr And The Personal Data Protection Board Decisions, Regulations

6.1. Employer's Responsibilities and Sanctions

Within the scope of Law on the Protection of Personal Data (LPPD), employers (human resources) have an obligation to inform candidates/workers as data controllers and to obtain their explicit consent. In addition, pursuant to Article 12 of the employer law, *"it is obliged to take all necessary technical and administrative measures to provide a sufficient level of security in order to a) prevent unlawful processing of personal data, b) prevent unlawful access to personal data, and c) ensure the retention of personal data."* Employers cannot disclose the personal data of the worker/candidate to others in contradiction with the LPPD and cannot use it for any purpose other than processing. These obligations continue after the worker leaves the job.

Moreover, in accordance with Article 12/5 of the Law, "*In case the processed data are collected by other parties through unlawful methods, the controller shall notify the data subject and the Board within the shortest time*." The company must register with the Data Controllers Registry. *"*Natural or legal persons who process personal data shall be obliged to enrol in the Registry of Data Controllers before proceeding with data processing*."* (Law No 6698 , 2016).

As stated in the Application section, the law gives individuals (workers) the right to know if personal data has been processed, to request information if personal data has been processed, to know whether personal data has been used for its intended purpose, to know third parties to whom personal data has been transferred within the country or abroad, and to request the erasure or destruction of personal data, etc. Sanctions to be applied in case of violation were also determined (Belge, 2017).

When all of these issues are considered together, personal data requests should be suitable for the purpose of collection and not exceed this purpose, and a reasonable connection should be established between them for the purpose of collection. The worker should be clearly informed before collecting personal data. Employers must protect the data. The law imposes hefty fines and imprisonment on individuals and institutions that violate rights. The Personal Data Protection Authority is of great importance in ensuring compliance with the procedures and provisions of the law. The decision-making body of the authority is the Personal Data Protection Board. The Board is in the central position of the sanction system prescribed by law. In case of violations such as not complying with the obligation of registration and notification to the Data Controllers Registry and not fulfilling the decisions made by the Board, administrative fines ranging from 20.000 TL to 1.000.000 TL can be imposed (Law No 6698 , 2016, p. art.18).

Another regulation on this subject is the Turkish Criminal Code. In the articles 135-140 of the Law, recording of personal data, unlawfull sharing or seizing, realizing such situations in a qualified manner, infiltration into information systems, destroying data, etc. are included subjects. It is stated in the LPPD Law that the provisions of Turkish Criminal Code will be applied for crimes related to personal data. The punishment envisaged for regulated crimes is imprisonment (Law No 6698 , 2016) (Turkish Criminal Code , 2004).

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Furthermore, in the event that data processing causes harm to the person concerned, private law sanctions and claims for damages may also be raised.

6.2. Requirements For The Employer (Human Resources)

The law concerns all public-private sectors, employers, and workers. Likewise, there are numerous rights violations through data sharing, not only by employers but also by workers. For example, there are "Board's principle decision dated 31/05/2018 and numbered 2018/63 concerning the processing of such data, outside the authority and purpose of the personnel authorized to access personal data before the data controller" and "Board's decision on unlawful sharing of the personal data of special nature on the internet and social media channels" (Personal Data Protection Board, 2018) (Personal Data Protection Board, 2018). In this respect, it is important that all personnel, especially human resources enforcement bodies, receive training and have information about the legislation. Training can be as follows:

1. The first stage is that all company workers and managers receive training on the basic Law on the Protection of Personal Data legislation.

2. In addition, it is important that human resources workers receive Personal Data Protection information training for human resources management sub-processes after basic training. This stage may be in the subheadings of candidate applications, recruitment processes, worker-related processes, and former worker post-employment data.

3. The 3rd stage of the training is the Inventory training of Human Resources officers who have completed the 1st and 2nd training.
4. The final stage will be the documentation training, and it will be bringing the recruitment forms, employment contracts, workplace application forms, etc. into compliance with the law. According to the stages of the training, it will be beneficial to organize them with the participation of human resources officers, lawyers, quality officers, and IT experts.

In particular, Human Resources inventory studies will need to be revised in a digital environment. It is understood from the company interviews that most companies have difficulty in determining the road map to carry out these processes. "*In the decision of the dated 31/01/2018 PPD Board on the measures to be taken in the processing of personal data of special nature, providing regular training to employees, determining the personnel to be authorized to access the data, preserving and encrypting the data using cryptographic methods if the information is accessed electronically, and logging all transactions performed on the data securely, etc."* were regulated in detail (Personal Data Protection Board, 2018).

6.3. Examples of The Personal Data Protection Board Decisions and Regulations

The Personal Data Protection Board decisions on personal data processing violations have started to be established. Some decisions are included in the relevant sections of the study. Regulations and communiqués are also issued. Some other board decisions and regulations are as follows:

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Table 3. Personal Data Protection Board Decisions and Regulations (Personal Data Protection Authority, 2019)

Process	Subject
Board Decision	The decision that "the obligation of informing by the data controller and the need for explicit consent processes should be carried out separately"
Board Decision	"The Principle Decision on Protection of Personal Data in Service Areas such as Banks, Counters, Tables"
Board Decision	"The decision on the data controller that transfers health data to a third party without one of the processing conditions set out in Article 6 of the Law"
Regulation	The Communiqué on Procedures and Principles for Data Controller Applications
Board Decision	A Failure to Fulfill the Request for Erasure of the Personal Data of the Person Concerned
Regulation	The Communiqué on the Procedures and Principles to be Followed in the Fulfillment of the Obligation of Information
Regulation	The Regulation on Erasure, Destruction or Anonymizing of Personal Data
Regulation	Minimum elements to be included in the letter of undertaking to be prepared by data controllers for data transfer abroad
Regulation	The announcement of the Personal Data Protection Board dated 24.01.2019 on the principles and procedures for reporting personal data breaches

7. Conclusion And Suggestions

Due to the specific nature of the labor law, personal data are collected while the worker is still in the candidate stage. With the recruitment, an employment contract is drawn up, and the interaction between the personal data and the employer continues within the framework of the management authority of the employer and the dependence of the employee. The data remains at the employer when the employment contract is terminated. The Law on the Protection of Personal Data is a very important law for the human resources that process data since it defines "*the natural or legal person who processes personal data based on the authority given by the data controller on its behalf as the data processor.*" (Law No 6698 , 2016, p. art.3)

In the study, the specific nature of the labor law and the situation of the personal data protection applications in the logistics sector were examined. In the sector, workers' mobility is experienced intensively and rapidly. The number of field workers is higher than that of office workers, and many personal data entries are made every day.

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There are different fields of work, and there is an international dimension of the works. Legal regulations are not limited to the rules of domestic law, but also include international conventions to which Turkey is a party. For all these reasons, it is important that international conventions and the Law on the Protection of Personal Data are taken into consideration by Human Resources officers of logistics companies and it is crucial that law harmonization studies are conducted in the time and manner ordered.

Sector Human Resources officers should first receive the Law on the Protection of Personal Data basic legislation training, LPPD information training for human resources sub-processes, the processes of recruitment, workers and those who leave should be determined, information technology infrastructure and business processes should be reviewed for data processing, protection, and storage, inventory preparation studies should be carried out, documentation training should be received, all personnel should be informed through the LPPD basic training, human resources forms and employment contracts should be revised in accordance with the law, informing and explicit consent texts should be prepared, and their placement on the digital media should be performed. While obtaining the consent of the worker, he/she should be fully informed and conscious about the subject he/she consents and should be informed by the employer. This provision is one of the most important regulations and forms the basis of correct data processing. In the literature, no study conducted on the subject of this research has been found.

It is thought that this study, which conceptually addresses the protection of personal data, includes national and international legal regulations and provides examples from applications, will contribute to the literature and the sector.

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