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Recommended Citation

Kuzey, C. (2018). Impact of Health Care Employees' Job Satisfaction on Organizational Performance Support Vector Machine Approach. *Journal of Economics and Financial Analysis*, 2(1), 45-68.
<http://dx.doi.org/10.1991/jefa.v2i1.a12>

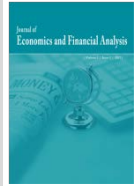
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Journal of Economics and Financial Analysis

Type: Double Blind Peer Reviewed Scientific Journal
Printed ISSN: 2521-6627 | Online ISSN: 2521-6619
Publisher: Tripal Publishing House | DOI:10.1991/jefa.v2i1.a12

Journal homepage: www.ojs.tripaledu.com/jefa



Impact of Health Care Employees' Job Satisfaction on Organizational Performance Support Vector Machine Approach

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Abstract

This study is undertaken to search for key factors that contribute to job satisfaction among health care workers, and also to determine the impact of these underlying dimensions of employee satisfaction on organizational performance. Exploratory Factor Analysis (EFA) is applied to initially uncover the key factors, and then, in the next stage of analysis, a popular data mining technique, Support Vector Machine (SVM) is employed on a sample of 249 to determine the impact of job satisfaction factors on organizational performance. According to the proposed model, the main factors are revealed to be management's attitude, pay/reward, job security and colleagues.

Keywords: *Job Satisfaction; Health Care Workers; Support Vector Machine (SVM)*

JEL Classification: J28, J54, J59, J81.

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1. Introduction

The shortage of health care employees in Turkey, particularly in the fields of nursing and doctoral care, as well as forecasted increases in required healthcare services have attracted increasing attention in hopes of discovering important and necessary strategies for improving job satisfaction and developing ways to retain current personnel. Job satisfaction is an essential measurement for managers as well as for policy makers.

Although the definition of job satisfaction is not clear, it remains a primary factor in achieving an excellent system (Huber, 2000). Developing a high level of commitment among nurses is one of the main human resource department policies. Shared values, including vocational commitment towards patient care and nursing are factors that influence nurses positively (McCabe, 2008). Other important factors include strong leadership, teamwork and support. Nurses acknowledge that training and development factors are important factors in health care delivery.

As noted above, there is currently a huge shortage of health care employees in Turkey. Focusing on the job satisfaction issues of these employees can be a constructive strategy to increase retention of current personnel, as well as to attract qualified professionals.

Since they play a significant role in social life, the responsibility of health care institutions for public health cannot be underestimated. The productive use of personnel can improve the performance of employees as well as increase job satisfaction. Medical care is a service industry that differs from others because of its work requirements, which encompass and combine many talents with a variety of necessary and important expertise (Fang et al, 2009). This study focuses on the empirical point of view between job satisfaction and organizational performance.

2. Literature

The definition of job satisfaction is open-ended, with many versions presented in the literature. There is no one universal definition for "*job satisfaction*", since it refers to general as well as to specific work satisfaction. The specificities include intrinsic and extrinsic satisfactions. It is a multi-dimensional concept that has been linked to various job aspects (Anderson, 1984). Assessing the nature of job tasks is considered to be intrinsic job satisfaction whereas assessing external issues to the job task, i.e. benefits, bonuses and salary is viewed as extrinsic (Hirschfeld, 2000). Spector (1997) defines job satisfaction as

"the extent to which people like (satisfaction) or dislike (dissatisfaction) their jobs". Herzberg (1968) described two factor theories: *"hygiene"* factors and *"motivators"*. Extrinsic factors such as administration, company strategies, work conditions, salary, and relationships among co-workers are considered *"hygiene"* factors which can cause job dissatisfaction. Intrinsic factors such as recognition, achievement, personal development, advancement, and responsibility are referred to as *"motivators"* that can create job satisfaction. Previous studies have shown that there are various factors explaining job satisfaction because it cannot be associated solely with one factor (Blegen, 1993).

There are complex problems in health care such as growing demand and the cost of providing it, as well as patients' expectations. Solutions to these problems are difficult to find. The concept of "quality" in health care has been introduced (Ruiz-Lopez, 2001) because of the many requirements for excellence. *"Satisfaction"*, therefore, becomes a necessary additional qualifier or indicator of quality (Una Cidon et al., 2012).

Since job satisfaction has a multifaceted structure, it is linked to organizational commitment (Alpander, 1990; Curry, et al., 1986; Knoop, 1995; Lum et al., 1998), and the relationship between satisfaction and organizational commitment is considered to be particularly important.

The concept of motivation is studied in the early 1950's (Herzberg et al. 1959; Vroom, 1964) from the managerial point of view. These early studies discuss thoroughly the factors that motivate people in their work environment. To improve health care practices, management units should provide a suitable environment for workers that characteristically links to job satisfaction, motivation and any other desired outcomes (Vilma and Egle, 2007). There are various factors affecting motivation such as general job satisfaction, salary, promotion, organization and educational background (Tzeng, 2002; Davidhizar, 2004). Rewards and incentives may be insufficient when employees are encouraged to pursue external objectives (Herzberg et al., 1959; Deci and Ryan, 1985). This creates the necessity to look for other significant factors that contribute to employee satisfaction.

Some studies suggest that a supportive learning and working environment is the most crucial factor for job satisfaction, especially in the field of nursing (Jang et al. 2005; Kangas, et al. 1999; Brooks-Carthon, et al. 2011). An ageing population with an increasing number of patients suffering from chronic diseases is included in the factors affecting work environments negatively, resulting in dissatisfied employees. To improve the environment and prevent persistent employee dissatisfaction, Richer et al. (2009) suggest *"appreciative inquiry"* to create radical

changes. Knowles (1990) reports that a supportive learning environment is considered to be a critical of human resource development, and he acknowledges the need for the development of individual workers through improvements to the educational aspect.

The interaction between job satisfaction (or dissatisfaction) and personnel management is considered (Kokkinene et al., 2007; Ali and Mohammad, 2006), showing that this is essential for organizations, and good management of employees is therefore important. At the same time, shortcomings in personnel management may create dissatisfaction among employees (Newman et al., 2002).

Other studies have shown that low wages coupled with lack of pension programs and insurance are often connected to low levels of job satisfaction (Case et al. 2002; Harris-Kojetin et al. 2004). Kirpal (2004) points out the policy makers' responsibility in terms of potential negative effects as well as work identity by looking at workers in the current system from a qualitative point of view. He places emphasis on the fact that work identity is changing and moving towards a more flexible, more highly skilled and mobile workforce. Job satisfaction and dissatisfaction are related to staff turnover and the mobility of the health care sector. It is therefore vital to be aware that increasing workloads and low payment are connected to the dissatisfaction of employees.

Work environment is another significant factor affecting job satisfaction. The influence of hospital units in terms of whether they are open or closed has a profound impact. Employees working in open units tend to be less satisfied with their work in general and experience problems, both with their colleagues and management. On the other hand, employees who work in closed units generally tend to be more satisfied with their work, have better relations with their colleagues and also have positive cooperative relations with management (Khokher, et al. 2009).

Turnover intention is another key issue within the health care system. It is common knowledge that satisfied staffs are less inclined to seek new employment, which verifies that job satisfaction profoundly impacts an individual's desire to change jobs (Chiu et al. 2005). Williams et al. (2001) discover a link between job satisfaction and turnover intention in their research. While there are some preemptive attempts and approaches to help reduce the turnover rate by improving motivation for employees, it remains, nonetheless, an enormous challenge. Under these circumstances, reducing the turnover rate as well as attempting to implement creative ways to attract new employees is challenging in view of the current shortage of health care workers. Lum (1998) and Williams et al. (2001) address the importance of job satisfaction in relation to

job turnover, while the research of Lue et al. (2005) support the thesis that job satisfaction is a key factor influencing turnover.

The administrative contribution to health care is not underestimated (Clegg, 2000); the impact of managerial responsibility has been singled out in several studies (Bolton, 2005; du Gay, 1996). Wise (2007) emphasizes the pivotal role managers' play in terms of reinventing healthcare roles and services. As well, she addressed the factors of reward and recognition together with sufficient wages provided to workers as the major starting points. Apart from the issue of pay, practical support, time and resources need to be made available. It is evident that good management in health care can be very challenging. As well, Wise (2007) points out that management style very much affects job satisfaction.

There are many studies focused on the various factors comprising job satisfaction. The impact of social capital is one such factor. The research done by Ommen et al. (2009) demonstrates that the social capital of an organization is a significant predictor of overall job satisfaction for physicians. As well, their investigation reveals that workload and professional experience are key factors underlying job satisfaction. It is desirable that colleagues in the health care system exhibit certain qualities, among them trust, mutual understanding, common goals, and ethical values. These expressed characteristics create an atmosphere that encourages employees to work cooperatively.

Job satisfaction has been linked to personal (Kaplow, 1996; Bergmann et al., 1996; Blegen, 1993) as well as organizational factors (Walsh, 1999; Adams and Parrott, 1994; Lankau, 1997). The relationship between job satisfaction and various factors has been previously studied. Kavanaugh et al (2006) examine the connection between job satisfaction and demographic predictors such as previous job experience. They demonstrate that professional experience impacts job satisfaction significantly. The study also reveals that age, education and race have little effect on job satisfaction. As well, gender, functional grouping, and hospital tenure did not impact job satisfaction significantly.

Work environment is another factor affecting job satisfaction. Organizational culture has a positive impact on job satisfaction, and organizational culture combined with the work environment is strongly related. Gifford et al. (2002) show that organizational culture is a powerful attribute affecting work environment. In an organization where employees share positive interaction, and meet personal satisfaction as well as organizational goals, a constructive organizational culture might help to develop job satisfaction and establish a positive working environment (Mulcahy and Betts, 2005).

Interpersonal relationships between employees are considered by several researchers. Adam and Bond (2000) discover that human relationships are the best predictors of job satisfaction, and that job satisfaction is significantly predicted by professional relationships in the work environment. Likewise, Dunn et al. (2005) identify the fact that relationships among nursing staff is the single most important factor for building job satisfaction, contributing to high-quality patient care. As a result of this research, McNeese-Smith (1999) declares that a good relationship between nurses coupled with collaboration with health care staff in general is an essential ingredient for job satisfaction.

Job satisfaction and performance has been studied from differing points of view. It has been generally believed for some time that creating a positive working environment for employees affects productivity as well as the happiness of the workers. However, this view has been questioned in recent years. There is no conclusive evidence confirming that a happy person is a productive employee. There are studies showing conflicting results concerning the relationship between job satisfaction and performance. Packard and Motowidlo (1987) study job performance and satisfaction among hospital nurses, coming to the conclusion that job satisfaction and job performance is not correlated. Their controversial remarks concerning the relationship between job satisfaction and performance are supported by empirical results. To the contrary, Al Ahmadi (2008) investigates the factors influencing nursing performance. He discovers that job performance is strongly correlated with job satisfaction and organizational commitment. Furthermore, Fang et al. (2009) attempt to determine the effect of leadership upon employee job satisfaction, work performance and organizational commitment as well as the relationship between these variables. They discover that work satisfaction has a significant, positive and direct effect on work performance and organizational commitment.

There are few studies focusing on the impact of job satisfaction dimensions on organizational performance in the health care system. My research reveals that the relationship between job satisfaction and organizational performance has not yet been widely investigated.

3. Research Methodology

3.1. Support Vector Machine (SVM)

The Support Vector Machine (SVM), originally developed by Vapnik (Vapnik, 1995), is one of the most robust and accurate methods in data mining algorithms. Its theoretical foundation is derived from statistical learning theories, but it differs in that it combines statistical methods with machine learning methods.

SVM is a supervised learning method that generates input-output mapping functions from a set of training data. Basically, SVM learns through observation. There is an input space, an output space, and a training set. The nature of the output space determines the learning type, for example, binary or multiple classification problems. The standard SVM formulation solves only the binary classification problems.

SVM maps data into a high dimensional feature space. The mapping functions can be set to be either classification or regression. SVM belongs to the family of maximal margin classifiers. There are four kernel functions (linear, polynomial, radial-based and sigmoid) that can be used to solve classification problems when input data cannot be easily separated. To separate the input data easily, the kernel functions are used to transform the input data into high dimensional feature space.

The aim of SVM is to find the optimal hyperplane that separates clusters of vectors in such a way that cases with one category of the target variable are on one side of the plane, and cases in the other category are on the other side. The vectors near the hyperplane are the support vectors. A separator, drawn as a hyperplane, is placed between the two separated classes. The ultimate aim of SVM is to establish a maximal margin between the separated classes (Figure 1). This offers good classification performance on the training data, and also provides high predictive accuracy for future data from the same distribution. The characteristics of new data after separation can be used for prediction. Since SVM's learning ability is independent of the dimensionality of the future space, it provides good performance (Cristianini and Shawe, 2000).

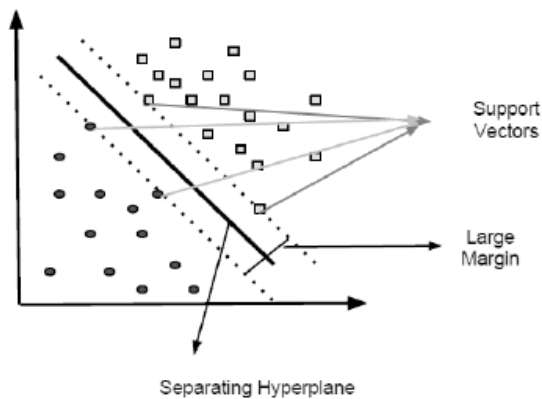


Figure 1. Illustration of Support Vector Machine (SVM)

3.2. Survey Instrument

A cross sectional on-line survey is conducted between June, 2011 and December, 2011. The data for the study is gathered by using a self-administered questionnaire pertaining to employee satisfaction, demographic variables and organizational performance. Respondents are asked to indicate their level of agreement based on five-point Likert scales ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The survey constructs (e.g. employee satisfaction and organizational performance) are based on Zaim and Zaim's (2007) measure of employee satisfaction and organizational performance. Demographic information, such as age, gender, and experience are collected. The participants are asked to rate their perception of satisfaction with their job and their perception of organizational performance.

3.3. Sample Description

The cross-sectional online questionnaire is posted to 600 employees; out of whom 260 questionnaires are returned. Eleven of these returned questionnaires are eliminated. As a result, the response rate is almost 42%. A total of 249 health care workers are surveyed, using 44 items to assess demographic variables, employee satisfaction and job performance. The sample comprises workers with different levels of experience and education. The key demographic variables are gender, age, marital status, number of years in their profession, education and number of years working in a health care setting. As seen in Table 1, the gender level is distributed evenly. The majority of respondents are between 30 and 40 years old (53.01%); with only 3% over 50. 64% of the respondents are married, and almost 36% are single. Among the respondents, post graduate degree holders

comprise almost 55.4%, while 29.3% holds an undergraduate degree. The high school, college and PhD degree holders comprise a very small proportion of the total. 27.71% of the respondents have between 6 to 10 years' experience in health care, and 11.24% of respondents have more than 20 years. Almost 46% of these employees are nurses, while 32.93% are practitioners and 21.29% are administrative personnel.

Table 1. Demographic Data of Respondents

	Number	Percent
Gender		
<i>Male</i>	126	50.6
<i>Female</i>	213	49.4
Age		
<i>Less than 30 years</i>	71	28.51
<i>31-40</i>	132	53.01
<i>41-50</i>	43	17.27
<i>51 years or more</i>	3	1.21
Marital Status		
<i>Single</i>	89	35.7
<i>Married</i>	160	64.3
Education		
<i>High School</i>	12	4.82
<i>College</i>	11	4.42
<i>Undergrad</i>	73	29.32
<i>Master</i>	138	55.42
<i>Ph.D</i>	15	6.02
Experience		
<i>Less than 5 years</i>	57	22.89
<i>6-10 years</i>	69	27.71
<i>11-15 years</i>	43	21.29
<i>16-20 years</i>	42	16.87
<i>20 years or more</i>	28	11.24
Number of years working in health care setting		
<i>Less than 5 years</i>	73	29.32
<i>6-10 years</i>	72	28.92
<i>11-15 years</i>	46	18.47
<i>16-20 years</i>	34	13.65
<i>20 years or more</i>	24	9.64
Profession		
<i>Nurses</i>	114	45.78
<i>Practitioners</i>	82	32.93
<i>Administrative</i>	53	21.29

4. Analysis and Findings

4.1. Exploratory Factor Analysis (EFA)

Before carrying out decision tree models, a principal component factor analysis is used through SPSS for Windows. In order to extract the dimensions and to test the validity and reliability of the analysis, the exploratory factor analysis and Cronbach's alpha for internal consistency are employed to determine the satisfaction of the employees' items. Varimax orthogonal rotation is carried out during the EFA procedure. Manageable and meaningful factors contributed to the decision tree models in order to determine the impact of factors on organization performance. There is no missing data found in the survey.

It is vital to determine the suitability of the data size before factor analysis. Both the KMO (Kaiser-Meyer-Olkin measure of sampling adequacy) Index and Bartlett's Test of Sphericity are used to check the adequacy of sample size. KMO represents the ratio of the squared correlation between variables to the squared partial correlation between variables. The values of KMO range between 0 and 1. Any value close to 1 shows that the patterns of correlation are compact, and therefore the analysis should result in distinct and reliable factors (Field, 2005). According to Kaiser (1974), KMO values between 0.7 and 0.8 are good; values between 0.8 and 0.9 are great; and values above 0.9 are superb.

The sample size of the data set in this study is adequate for use in factor analysis according to KMO test results, since the KMO Index value is 0.934 (Table 2), which is superb. In addition, Bartlett's Test of Sphericity signifies whether the R-matrix is an identity matrix. It should be significant at $p < 0.05$, and it determines whether the population correlation matrix resembles an identity matrix. If there is an identity matrix, every variable correlates poorly with all the other variables, which means correlation coefficients are close to zero, leaving them perfectly independent from each other. In factor analysis, clusters of variables that measure similar things are identified. To determine clusters, the variables should correlate. Therefore, the test provides statistical analysis to prove that the matrix has significant correlations among the variables (Field, 2005). Bartlett's Test of Sphericity demonstrated that it is a highly significant $p < 0.000$. This indicates that the correlation coefficient matrix is not an identity matrix. Accordingly, the data used in this study is quite sufficient for exploratory factor analysis procedures.

Table 2. KMO and Bartlett's Test results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.9340
Bartlett's Test of Sphericity	<i>Approx. Chi-Square</i>	5307.537
	<i>df</i>	276
	<i>Sig.</i>	0.0000

The beginning of the factor extraction process is designed to determine the linear components (eigenvectors) within the data sets by calculating the eigenvalues of the correlation coefficient matrix. The largest eigenvalue associated with each of the eigenvectors provides a single indicator of the substantive importance of each component. Factors with relatively large eigenvalues are retained, while those factors with relatively small eigenvalues are omitted. SPSS uses Kaiser's criterion of retaining factors with eigenvalues greater than 1. Table 3 lists the eigenvalues associated with each component (factor). There are 24 components, which correlate with 24 eigenvectors. It is obvious that the first four factors explain relatively large amounts of variance, whereas the rest of the factors explain only small amounts of variance. SPSS by default extracts all factors with eigenvalues greater than 1, which leaves us with four main factors.

Table 3. Total Variance Explained by Initial Eigen Values

Initial Eigen Values							
Component	Total	% of Variance	Cumulative %	Component	Total	% of Variance	Cumulative %
1	11.753	48.971	48.971	13	0.317	1.321	91.767
2	3.068	12.785	61.756	14	0.291	1.214	92.981
3	1.548	6.451	68.207	15	0.272	1.134	94.115
4	1.36	5.668	73.875	16	0.234	0.975	95.09
5	0.694	2.891	76.766	17	0.208	0.867	95.957
6	0.64	2.669	79.434	18	0.187	0.78	96.736
7	0.566	2.358	81.792	19	0.157	0.656	97.392
8	0.505	2.104	83.896	20	0.151	0.628	98.02
9	0.439	1.829	85.725	21	0.14	0.584	98.604
10	0.433	1.805	87.53	22	0.135	0.564	99.167
11	0.351	1.461	88.991	23	0.104	0.434	99.602
12	0.349	1.454	90.445	24	0.096	0.398	100

Table 4 shows the factor loadings and communalities. Communality is the proportion of common variance within a variable. After the factors are extracted, how much variance is in common can be seen under communalities. In other words, the amount of variance in each variable that can be explained by the retained factors is represented by the communalities after extraction (Field, 2005).

Table 4 also demonstrates the factor loadings and necessary quality indicators such as eigenvalues. 24 variables of exploratory factor analysis results indicated that these factors explain 73.8% of the total variance. Varimax orthogonal rotation of the factor structure clarifies the matrix considerably. The suppression of loadings is set to 0.4, to help make the interpretation of factors easier. Based on the items loading on each factor, they are labeled as "*management's attitude (factor 1)*", "*pay/reward (factor 2)*", "*colleagues (factor 3)*", and "*job security (factor 4)*".

After extracting the underlying factors, reliability analysis is used to measure the consistency of the questionnaire used in this study. Cronbach's alpha is the most commonly used measure of scale reliability, and that is the reason it is employed. In this study, there are multiple factors extracted from the given data set. Therefore, Cronbach (1951) suggests that alpha should be applied separately to each subscale when several factors exist. Table 5 shows the internal consistency reliability estimates (Cronbach's alpha) for each dimension. The Cronbach's alpha value for each extracted factor ranged from 0.772 to 0.945 which demonstrated a satisfactory level of construct reliability (Kline, 1999).

Table 4. Varimax Rotated Factor Loading Matrix

Items	Components				
	Factor1 Management's attitude	Factor2 Pay/reward	Factor3 Col- leagues	Factor4 Job security	Communalities
Administrators help me to do my job better	0.791				0.760
I can get feedback from my managers (negative or positive)	0.769				0.767
Administrators warn us without threatening when we make mistakes	0.747				0.649
I believe that my managers encourage me in terms of working better	0.732				0.800
We can reach people we need (including administrators) at any time	0.709				0.628
I respect my administrators in general	0.705				0.627
My organization has provided the necessary education opportunities to do my job properly	0.691				0.648
I am pleased with my organization	0.632				0.676
I believe that my organization values me	0.619				0.613
I recommend my organization to my friends as well	0.619				0.753
In general, I am satisfied with premiums and bonuses		0.838			0.766
I am satisfied with my salary		0.823			0.736
I am satisfied with the social benefits (education, health, rents, etc.) that my organization provides		0.794			0.729
I believe that the wage policy is fair		0.787			0.728
I am satisfied with the social opportunities that my organization provides for me		0.770			0.732
I am satisfied with my non-wage rewards		0.767			0.705
My colleagues are prone to teamwork.			0.919		0.895
Collaboration and cooperation between me and my colleagues are at a good level			0.891		0.875
I am able to make joint decisions with my colleagues			0.876		0.854
I am able to work with my colleagues collectively			0.829		0.847
I believe that I am encouraged by my colleagues to do better work			0.666		0.681
Strong communication amongst colleagues is available			0.658		0.700
I believe that I won't be laid off without clear justification				0.862	0.798
I believe that my job is secure				0.840	0.763
Eigenvalue*	6.094	4.921	4.863	1.852	
Variance Explained (%)	25.392	20.505	20.261	7.716	
Cumulative variance explained (%)	25.392	45.897	66.159	73.875	

Notes: Extraction Method - Principal Component Analysis; Rotation Method - Varimax with Kaiser Normalization. * - Values Obtained After Rotation

Table 5. Job Satisfaction Dimensions, Descriptive Statistics and Reliability

Dimension	Mean	S.D	n
Management's attitude: Cronbach's Alpha=0.945			
I believe that my organization values me	3.454	1.231	249
Administrators help me to do my job better	3.329	1.321	249
My organization has provided the necessary education opportunities to do my job properly	3.265	1.293	249
I can get feedback from my managers (negative or positive)	3.257	1.288	249
Administrators warn us without threatening when we make mistakes	3.486	1.267	249
I respect our administrators in general	3.888	1.109	249
I can reach people we need (including administrators) at any time	3.767	1.158	249
I am pleased with my organization	3.462	1.282	249
I believe that my managers encourage me in terms of working better	3.068	1.323	249
I recommend my organization to my friends as well	3.064	1.306	249
Pay/Reward: Cronbach's Alpha=0.918			
I am satisfied with my salary	2.936	1.315	249
I believe that the wage policy is fair	2.598	1.379	249
I am satisfied with my non-wage rewards	2.277	1.341	249
In general, I am satisfied with premiums and bonuses	2.245	1.338	249
I am satisfied with social opportunities provided by the organization	2.55	1.396	249
I am satisfied with the social benefits (education, health, rents, etc.) that the organization provides for me	2.378	1.418	249
Colleagues: Cronbach's Alpha=0.943			
I am able to work with my colleagues collectively	3.759	1.11	249
Collaboration and cooperation between me and my colleagues are at a good level	3.815	1.117	249
My colleagues are prone to teamwork.	3.61	1.22	249
I am able to make joint decisions with my colleagues	3.727	1.146	249
Strong communication amongst my colleagues is provided	3.229	1.198	249
I believe that I am encouraged by my colleagues to do better work	3.185	1.237	249
Job security: Cronbach's Alpha=0.772			
I believe that I have job security	3.855	1.219	249
I believe that I won't be laid off without clear justification	4.133	1.137	249

4.2. Correlation Analysis

Correlation analysis is used to determine the correlation of each job satisfaction factor with organizational performance at the 0.05 level of significance. The analysis shed a light on a fact that there is a significant positive correlation between organizational performance and the factors comprising job satisfaction (Table 6).

Table 6. The Pearson Correlation Analysis between Organizational Performance and the Factors of Job Satisfaction (n=249)

	Management's attitude	Pay/Reward	Colleagues	Job security	Performance
Management's attitude	1	0.618**	0.690**	0.385**	0.667**
Pay/Reward	0.618**	1	0.353**	0.272**	0.563**
Colleagues	0.690**	0.353**	1	0.272**	0.466**
Job security	0.385**	0.272**	0.272**	1	0.260**
Performance	0.667**	0.563**	0.466**	0.260**	1

4.3. Application of Support Vector Machine (SVM)

The model in this study is shown in figure 2 below. It basically illustrates the impact of job satisfaction on organizational performance. After employing the analysis, it is four basic underlying factors for job satisfaction are found. Our aim is to determine the relative importance of these factors on performance; hence we use the Support Vector Machine as a classification tool.

To begin the analysis, the organizational performance variable is divided into two clusters by using the two-step clustering method. The homogeneous clusters of performance variable are then labeled as successful (1) and not successful (2). Table 7 shows that 48.6% of the performance variable is labeled as successful (1) while 51.4% is labeled as not successful (2).

Table 7. Cluster of Performance as Successful and Not Successful

	Frequency	Percent	Cumulative Percent
Successful (1)	121	48.6	48.6
Not Successful (2)	128	51.4	100.0
Total	249	100.0	

In order to obtain a good indication as to how well our model will generalize in comparison to larger data sets similar to the current data, this study is partitioned into two sample groups: one sample generated the model by training it, and the other tested the model. Therefore, the data set is partitioned into training and testing data sets. By default, (SPSS Clementine v.12), 50% of the data is used for training and 50% is used for testing. For performance analysis, the test data sets are used for assessment.

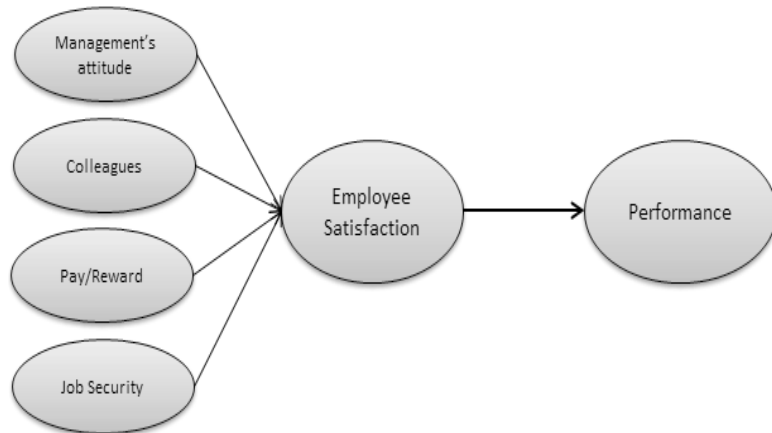


Figure 2. Impact of Job Satisfaction on Organizational Performance

4.4. Support Vector Machine Classification Analysis

In this study, the Support Vector Machine classification technique is used to determine the impact of job satisfaction factors on organization performance. SVM in SPSS Clementine supports linear, polynomial, radial basis function (RBF) and sigmoid kernel functions. It is crucial to decide which of these kernels to use. The comparison of kernel functions in terms of performance is shown below (Table 8). There are various performance measurements to compare models used in this study such as: overall accuracy, area under curve, maximum profit and lift. Overall accuracy is the percentage of records that is correctly predicted by the model.

According to table 8, the linear and RBF SVM kernel functions outperform the sigmoid kernel significantly and perform much better than polynomial kernel functions. They are equally the most accurate models in this study. The other well-known performance measurement is AUC (Area under the ROC Curve). AUC provides an index for the performance of a model: the further the curve lays above the reference line, the more accurate the test. In terms of Area under the ROC curve performance measurement, the linear SVM kernel model has the highest proportion (89.2%). Therefore, the linear-SVM model perform better than the other kernel functions. It is obvious that "*Lift*" and "*Max profit*" performance measurements indicate that linear-SVM is the most appropriate model to use. Therefore, the linear SVM model is used to determine the impact of the factors of job satisfaction on the performance of health care organizations. Figure 3 shows the ROI performance measurement confirming that the linear-SVM model perform better than the other three SVM models.

Table 8. Performance Comparison of Kernel Functions

Model	Overall Accuracy (%)	Area Under Curve (%)	Lift (Top 30%)	Max Profit
<i>SVM-Linear</i>	83.2	0.892	1.871	230
<i>SVM-RBF</i>	83.2	0.888	1.871	225
<i>SVM-Polynomial</i>	80.8	0.873	1.819	215
<i>SVM-Sigmoid</i>	75.2	0.812	1.715	180

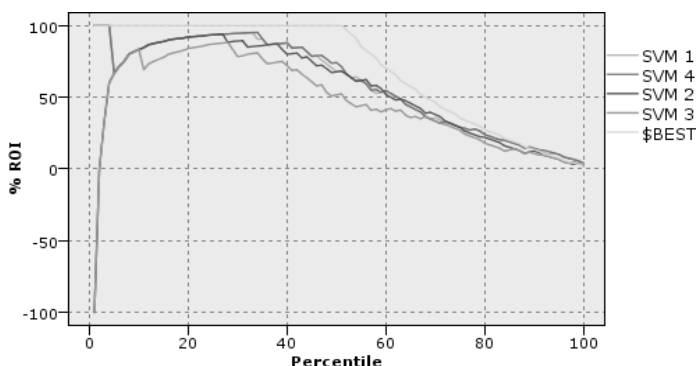


Figure 3. %ROI performance graph of SVM Models (SVM1: RBF, SVM2: Polynomial, SVM3: Sigmoid, SVM4: Linear)

4.5. Determining the Impact of Job Satisfaction Factors on Performance

Through investigating the performances of the SVM models, we determine that the best model to use is the linear-SVM. We can now focus on the linear-SVM model’s results obtained, highlighting the variables that matter most in health care organization performance. Figure 4 and table 9 indicate the relative importance of each variable in estimating the model. Since the values are relative, the sum of the variables on the display is 1.0. Variable importance relates to the importance of each variable in making a prediction, not whether the prediction is accurate. The relative importance of each dimension of satisfaction is calculated and ranked by using the linear-SVM model.

Table 9. Importance of Job Satisfaction on Organizational Performance

Dimension	Importance
1) Management’s Attitude	0.4077
2) Pay/Reward	0.3068
3) Job Security	0.1492
4) Colleagues	0.1363

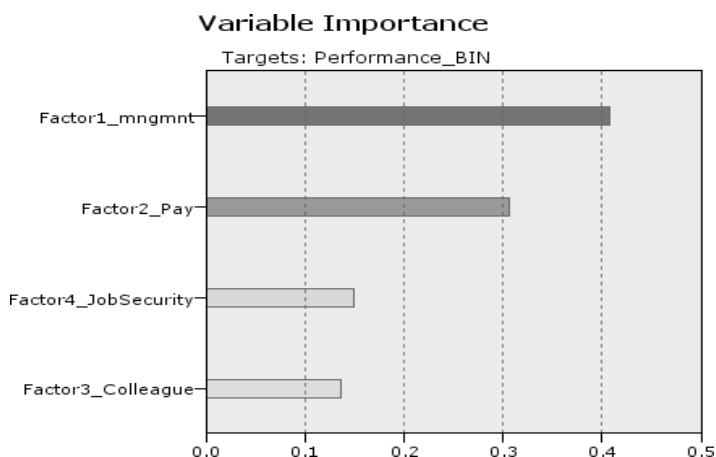


Figure 4. Relative Variable Importance of Job Satisfaction Dimensions

According to the variable importance chart, the impact of job satisfaction factors on organizational performance is, in order of their importance: management's attitude, pay/reward, job security and colleagues. Out of the four underlying dimensions of satisfaction, management's attitude with a 40.77% relative variable importance is the major factor impacting organizational performance. The pay/reward dimension is the second most significant effect on performance (30.68%). In contrast, the job security and colleague dimensions are found to have the least impact on performance, with 14.92% and 13.63% relative variable importance proportions respectively, but they are still significant and must be considered.

5. Conclusion

The determination of job satisfaction factors and their impact on organizational performance is very important in the health care system. Improving performance can significantly improve the quality and efficiency of patient care. In view of the fact that there are insufficient numbers of health care workers in Turkey as well as world wide, employee satisfaction should be given great importance by researchers, policy makers and administrators, making it imperative for administrators to understand the factors significantly impacting their organization's performance.

In this research, we adapt an Exploratory Factor Analysis (EFA) in order to extract the underlying dimensions of job satisfaction for health care employees. The EFA analysis revealed four major aspects: management's attitude, pay/reward, colleagues, and job security. We study importance of these

underlying dimensions of job satisfaction thoroughly by various researchers (Vilma & Egle, 2007; Bolton, 2005; Wise, 2007; du Gay, 1996; Khokher et al, 2009; Lum et al., 1998).

The correlation analysis between the various job satisfaction dimensions indicates that good organizational performance depends in good part upon management's attitude towards employees. In addition, the performance factor has a significant correlation to pay/rewards as well as to colleagues. Although also important, job security is the factor ranked the lowest in association with performance. At the same time, the correlation analysis shows a significant relationship connecting the various job satisfaction factors. These results contain valuable insights that can enable policy makers as well as administrators to raise the satisfaction and – by inference – the excellent performance of their employees to the betterment of society as a whole.

We also employ Support Vector Machine technique to determine the impact of the key factors creating job satisfaction and their effect on organizational performance. The linear-SVM model is selected as the most appropriate one, after assessing each of the models. The findings suggest that management's attitude towards employees is the most significant dimension of job satisfaction, and that this impacts performance greatly. This result supports the thesis that the administrative contribution in a health care organization is vital. Not surprisingly, pay/reward is found to be the second most important factor. Although they must be taken seriously, job security and colleagues are found to be the least important factors affecting performance. The correlation analysis results and the SVM-model results are parallel to each other, and in both statistical analyses, management's attitude is pinpointed as the major factor impacting organizational performance.

The study findings have practical implications for researchers as well as administrators of health care organizations. It provides decision makers with valuable insights in identifying factors to focus on in order to improve organizational performance overall. Obviously, supportive management practices will greatly improve the performance of employees.

The findings of this study are limited to health care institutions located in Istanbul, Turkey. To generalize the obtained result, further research with an enlarged sample should be conducted to test the within results. The aspects of job satisfaction can be added to the enlarged study as a means to further explore the relationship with organizational performance in detail.

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