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Three Dimensional Leader-Member Exchange Scale (LMX-3D): A Scale Development Study

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Abstract
The aim of this study is to develop a valid and reliable measurement tool to measuring teachers' leader-member exchange behaviors. The study group of the research consists of 396 teachers working in secondary schools in the central districts of Eskişehir, Odunpazarı and Tepebaşı, in the 2018-2019 academic year. The construct validity of the scale was examined by exploratory factor analysis. According to the results of the analysis, the scale measures a three-factor structure. It was also confirmed by confirmatory factor analysis that the scale measures the three-factor structure. The total variance rate explained by the scale was determined as 67,72%. In order to determine the reliability of the scale, the Cronbach Alpha internal consistency coefficient value was checked and this value was determined as 0.922. The results of all validity and reliability analyzes show that the Three Dimensional Leader-Member Exchange Scale (LMX-3D) can be used as a valid and reliable measurement tool in the studies that teachers will be taken as a working group.

Keywords: Leadership, Leader-member exchange, Leader-member exchange theory, İnteraction.

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Introduction

One of the most important factors in organizations' ability to sustain their existence and achieve their goals is leadership. An organization with a successful leadership structure not only maintains its existence by using the decision-making mechanism correctly, effectively and quickly; At the same time, it makes the best use of emerging opportunities and finds the most useful way for the organization in solving problems encountered at unexpected moments. Thus, the organization develops in every field. Therefore, it would not be wrong to say that leadership is very important in making the right decisions at the right time and taking actions that are beneficial to the organization.

When it comes to leadership, we first think of individuals who are in a higher position as leaders, that is, those who give direction, who can make others listen to their words and who can mobilize the masses. Individuals who are in the leaders' sphere of influence and follow the leader are generally ignored because they are considered to be individuals who act according to the instructions from the leader and are in a more passive position. Perhaps for this reason, in research and studies on leaders, leadership and leadership theories, the characteristics of leaders have generally been discussed, and studies involving followers have been conducted much less.

Many studies on leadership have contributed to the emergence of different theories on the subject (Bolden, Gosling, Marturano & Dennison, 2003: 6; Cherry, 2014:1-2 One of the most prominent theories among the theories put forward is the Leader-Member Exchange (LMX) Theory, which is a relationship-based theory. (Graen & Uhl-Bien, 1995: 225; Robbins & Judge, 2011: 377-378). Leader-Member Exchange Theory, unlike other leadership theories, is a theory that focuses on the relationship and interaction (a dyadic exchange) between the leader and the subordinate, as opposed to the leader's characteristics, behaviors, situational styles or other variables (Truckenbrodt, 2000: 234).

Another aspect of this theory that differs from other leadership theories is that it does not accept that those in managerial positions treat all their subordinates in the same way. According to the Leader-Member Exchange Theory, leaders establish a special relationship with a few people they choose from among their subordinates due to the idea of sufficient time or using it more effectively. These people form the in-group, that is, the leader's solidarity group. Leaders choose the people in this solidarity group they create from among subordinates who are similar to themselves in terms of their behaviors and characteristic features or who are talented. The leader trusts the subordinates in this group more, and the subordinates in this group have a greater effect on the leader than those outside the group. Since those who are members of this group (high-quality LMX) focus the leader's attention much more than others, they are more likely to gain special privileges. Subordinates who are not members of the group are members of the outgroup (low-quality LMX). Leaders spend less time with subordinates in this group, which consists of all employees outside the in-group, and these subordinates are less preferred when rewards are distributed. In addition, their relationship with the leader cannot go beyond the relationships established with formal authority. According to the theory, leaders and followers of the same gender tend to have closer (high-quality LMX) relationships than those of different genders. According to the theory, early in the history of the interaction between a leader and a given follower, the leader implicitly categorizes whether to include him/her in the in-group or leave him/her in the out-group. This idea usually does not change over time. However, in order for the LMX relationship to remain intact, the leader and especially the subordinates in the in-group must make an effort to continue the relationship (Graen & Uhl-Bien, 1995: 225; Bauer & Green, 1996: 1538-1539; Robbins & Judge, 2011: 377-378; Bauer & Erdogan 2015:3).

Major Theories about Leadership

When studies on leadership are examined, leadership theories are mostly under the headings of Traits, Behavioral and Situational Theories; It is seen that approaches other than these are examined under the headings of "New Approaches/Theories" or "Other Approaches/Theories" (Bakan & Büyükbeşe, 2010; Cevrioğlu, 2007: 7; Uğurluoğlu & Çelik, 2009). This study is based on the classification of leadership theories as Trait (Character/Personality) Theories, Behavioral Theories, Contingency (Unexpected Situation) Theories and Interactive Theories (Bildik, 2009: 29-30; Bolden, Gosling, Marturano and Dennison, 2003; Poornima, 2017; Yukl, 1989).

Interactive theories, which have been put forward more recently than other theories, are based on the relationship and interaction between the leader and the follower as a result of the leaders' interaction with the followers and the

conditions associated with it. As Gibb's (1958) stated, in the interaction between the leader and the followers, the personalities of the leader and the followers; followers' needs, values, attitudes; The nature of the job, the structure of interpersonal relationships and environmental conditions are important (Bass, 1990: 44). One of the theories that can be given as an example of interactive theories is Leader-Member Exchange Theory.

Leader-Member Exchange Theory

When we look at the studies in the field of leadership, it is seen that the subject is generally evaluated in terms of leadership or the group being managed, but not many studies have been conducted focusing on the dyadic relations between them (Graen & Uhl-Bien, 1995: 222). However, it would not be wrong to say that good or effective leadership partly results from good bilateral (dyadic) relations between leaders and followers. Relationship-based approaches in studies on leadership began to develop towards the end of the 21st century. Each unique relationship between leader and follower is called a "dyad." The dyad refers to the individualized relationship between the leader and each follower in a work unit. Theorists working in this field have focused on the development of separate dyadic relationships between leaders and followers and their effects (Achua & Lussier, 2010: 240).

LMX is a relationship-based theory that focuses on the bilateral relationship between the leader and the follower (Graen & Uhl-Bien, 1995: 221-225). The basic thesis of the theory is that an effective leadership process will occur when the relationships between the leader and the follower reach maturity (partnership) that can achieve many benefits (Graen & Uhl-Bien, 1995: 225). It can also be said that leader-member exchange is a theory that examines how leaders affect member behavior (Achua & Lussier, 2010: 247). Many studies have been conducted to conceptualize the Leader-Member Exchange (LMX) theory since its introduction in the 1970s, and many improvements and adjustments have been made on the theory through these studies. The theory, which began as an alternative to the average leadership style, has become a guide to producing more effective leadership through the development and maintenance of mature leadership relationships (Graen & Uhl-Bien, 1991: 219-220).

Developmental Stages of Leader-Member Exchange

Graen and Uhl-Bien (1995) suggested that the development of LMX theory can be thought of as four stages. These are expressed as: the first stage is the discovery of differentiated dyads, the second stage is the investigation of characteristics of LMX relationships and their organizations implications (e.g. LMX results), the third stage is the description of dyadic partnership building, and the fourth stage is the aggregation of differentiated dyadic relationships to group and network levels. These stages occurred sequentially, and each stage was transitioned from the previous stage. These transitions show what LMX reveals as a leadership model and the evolution of thought about this theory - also based on the results of studies on LMX (Graen & Uhl-Bien, 1995: 225).

Dimensions of Leader-Member Exchange Theory

When the studies on the dimensionality of LMX are reviewed, it can be seen that Dienesch and Liden (1986, p. 624) were the first to state that LMX is multidimensional. Dienesch and Liden defined the dimensions of LMX as perceived contribution, loyalty, and affect (Graen & Uhl-Bien (1995: 236). Dienesch and Liden suggested that LMXs may be based on task-related behaviors (contribution), loyalty to one another (loyalty), and simply liking each other (affect) (Liden & Maslyn 1998: 45). Liden and Maslyn (1998) added "professional respect" as a fourth dimension to these dimensions. Graen and Uhl-Bien (1995: 237) also stated that LMX includes three dimensions: respect, trust and obligation, and that the proposal to establish an LMX partnership is based on these three factors. However, when the literature is scanned, it is seen that the most accepted dimensioning is the dimensioning that was finalized by adding the 4th dimension by Liden and Maslyn (1998).

Graen and Uhl-Bien (1995) stated that LMX theorizing and research has evolved, and that research has led to change and progress. They also suggested that LMX measurement has changed over the years, but that there is still debate about the measurement and dimensionality of the LMX construct, and that, accordingly, new and improved versions of LMX psychometrically will continue to be developed (Graen & Uhl-Bien 1995: 235-236). Therefore took "continuation of dimensionality studies in LMX" as the basis for this study.

Dimensions in the Three Dimensional Leader-Member Exchange Scale (LMX-3D)

Previous studies were largely used in determining the items within the scope of the study and naming the dimensions (Dansereau, Graen ve Haga 1975; Dienesch & Liden 1986; Liden & Maslyn 1998; Graen & Uhl-Bien 1995), but an attempt was made to develop a scale more suitable for the Turkish culture and education system with the contributions made by taking the essence of LMX as the criterion. The dimensions of the Three-Dimensional Leader-Member Exchange Scale developed in this study are briefly explained under the following headings.

Task:

This dimension is related to factors that reveal the situation related to working life and the task performed. The employee's acceptance of his superior as a leader is related to this dimension. If the employee trusts and believes in his leader, he will work harder to achieve the set goals and objectives. It is important for the leader to leave the initiative to the employees he trusts, to determine to what extent the work done is beneficial and which employees come to the fore. Because by acting in this way, individuals can improve themselves and become responsible.

Support:

This dimension is mostly related to the concepts of sacrifice, helpfulness, volunteering and supporting. A leader suitable for this dimension tends to make employees' jobs easier and remove obstacles that may prevent them from working extra hours. Employees perform their jobs in exchange for a certain gain. Therefore, they normally find it sufficient to work in accordance with what is in their job descriptions and expect extra gains for the time they work outside of their job descriptions. However, those who behave in accordance with this dimension try to contribute to the achievement of the organization's goals without calculating any extra benefit or expecting a reward. Sometimes they may even suffer losses because they give up their own benefits for the sacrifices they make. The most important factor for these employees, who respect and value the leader, is to make them feel that they are supported and valued by the manager. Since such employees do not prioritize their interests and make quick decisions based on intuition, without making too much profit calculations, loss of time in decision-making is prevented. In addition, such employees, that is, those who act on intuition without seeking self-interest, are more prone to cooperation.

Relationships:

This dimension is related to human relations. It is important for employees and the leader to develop positive relationships. The most important source of motivation for employees who respect and love their leaders is for the leader to make them feel loved. Employees who do their jobs will have high performance depending on their positive relationship with the leader. Employees who are appreciated professionally within the organization are kept in positions close to them by the leader, which is related to this dimension.

Aim of the research

The purpose of this research is to develop a valid and reliable measurement tool capable of measuring leader-member interaction behaviors of teachers according to the perceptions of teachers working in public secondary schools.

Method

Method of the research

The research is a scale development study aimed at creating the "Three-Dimensional Leader-Member Interaction Scale".

Participants

The study group consisted of 396 teachers working in secondary schools in Odunpazarı and Tepebaşı, which are the central districts of Eskişehir, in the 2018-2019 academic year. 66.4% of the study group is female, 33.6% is male; 86.4% is married, 13.6% is single; 90.7% has a bachelor's degree, 9.3% has a postgraduate degree; 64.1% is union member, and 35.9% is not union member.

Measurement Tool

In the process of developing the "Three-Dimensional Leader-Member Interaction Scale", first of all, a literature review was conducted. In the literature review, books written on Leader-Member Exchange (Robbins & Judge, 2011; Yıldız, 2015; Bauer & Erdogan, 2015), theses (Cevrioğlu, 2007; Gürboyoğlu 2009; Öztürk, 2015; Cinel, 2014; Oğuzhan, 2015; Bader, 2008; Bayraktar, 2014; Çöp, 2015; Soylu, 2017); and articles (Dienesch & Liden, 1986; Liden, Sparrowe, & Wayne, 1997; Case, 1998; Liden & Maslyn, 1998; Schriesheim, Castro, & Cogliser, 1999; Truckenbrodt, 2000; Maslyn & Uhl-Bien, 2001; Dulebohn, Bommer, Liden, Brouer, & Ferris, 2012; Dunegan, Duchon & Uhl-Bien, 1992; Erdoğan, Liden, & Kraimer, 2006; Graen & Uhl-Bien, 1995); Leow & Khong, 2009; Çöp & Öztürk, 2017; Kırboğa, 2017; Akdoğan, Cingöz, & Mirap, 2009; Akkoç, Çalışkan, Uçak, & Özalp, 2013; Alparslan & Oktar, 2015; Altuntaş, Akça & Dönmez-Polat, 2020; Aras, 2013; Aslan & Özata, 2009; Avcı & Turunç, 2012; Ayan, Uysal & Eser, 2013; Baş, Keskin & Mert, 2010; Bolat, 2011; Ceylan, Özbal, Dinç & Kesgin 2005; Çekmecelioğlu & Ülker, 2014; Çınar & Koçak, 2017; Dal & Çorbacıoğlu, 2014; Dansereau, Graen & Haga, 1975; Demir & Demirkaya, 2011; Erdoğan & Rofcanin, 2013; Göksel & Aydıntan, 2012; Karcıoğlu & Kahya, 2011; Kaşlı & Seymen, 2010; Katrinli, Atabay, Günay & Çangarlı 2009; Ordun & Aktaş, 2014; Özdaşlı, Kanten & Alparslan, 2013; Özutku, Ağca & Cevrioğlu, 2008; Şahin, 2011; Turgut, Tokmak & Ateş, 2015; Uğurluoğlu, Şantaş & Demirgil 2013; Ürek & Uğurluoğlu, 2015; Yaşlıoğlu, Pekdemir & Toplu, 2013; Yıldız, Özutku & Cevrioğlu, 2008; Yolaç, 2011) were examined.

As a result of the literature review, an attempt was made to determine the dimensions that could best measure Leader-Member Exchange behaviors, and in this direction, an item pool consisting of 34 items was created based on an institutional basis (Tezbaşaran, 1997). While creating the item pool, studies conducted by Aslan & Özata (2009), Baş, Keskin, & Mert (2010), Cevrioğlu (2007), Graen & Uhl-Bien (1995), Dansereau, Graen & Haga (1975), Dienesch & Liden (1986), Liden & Maslyn (1998), Yıldız, Özutku, & Cevrioğlu (2008) were also utilized.

In the second stage, the number of items was reduced to 27 after the statements that were not found to be related to the underlying dimensions or that were perceived to have very little relationship and the removal of similar items.

In the third stage, the opinions of field experts were obtained for the scope and face validity of the measurement tool. In this direction, the information and opinions of faculty members who can be considered experts in the field of educational sciences were consulted. Following expert review, the number of items in the measurement tool was reduced to 23 by making adjustments to the statements.

In the fourth stage, an expert in Turkish Language and Literature was consulted in order to ensure the linguistic comprehensibility of the measurement tool. The scale items were reviewed in line with the opinions on spelling rules and the use of punctuation marks.

Finally, the items were listed directly on the draft scale without any dimensioning; a guideline explaining the purpose of the study and the participants' response principles and items (4 items) aimed at obtaining personal information about the participants were added to the scale. The draft scale, which was ready for implementation, was named as the "Three-Dimensional Leader-Member Exchange Scale" (LMX-3D). The scale, consisting of the options of Completely Agree (5), Significantly Agree (4), Moderate Level Agree (3), Disagree (2) and Completely disagree (1), was created in a way that would determine the responses of the participants to the items in the scale with a Likert-type five-point rating. A preliminary application was made to 24 teachers to determine the comprehensibility of the statements in the draft scale by the teachers. In the preliminary application, no criticism was made by the teachers to the items in the scale, and the teachers who had the preliminary application stated that the items were quite comprehensible. Thus, the draft scale consisting of 23 items was given its final form.

Data Analysis

In order to determine whether the measurement tool is a reliable measurement tool, it was applied to 420 teachers working in secondary schools in Odunpazarı and Tepebaşı, which are the central districts of Eskişehir province, in the 2018-2019 academic year. In order to collect data efficiently in the application, the necessary permissions

were obtained from the relevant authorities and the distributed scales were later collected by the researchers. 401 of the 420 measurement tools applied were returned, and when the returned scales were examined, it was determined that 5 measurement tools were filled incompletely or incorrectly (measurement tools with two, three, four or five options marked). As a result of removing the incorrectly filled scales, the number of scales to be used in the analysis was 396. Statistical analyzes were performed after the data were obtained. Since it is important for the sample group to represent the universe, the appropriate sample group and number should be determined. Gorsuch (1983) suggested that N should be at least 100, and Kline (1979) supported this suggestion (MacCallum, Widaman, Zhang & Hong 1999: 84). Guilford (1954) suggested that N should be at least 200, and Cattell (1978) argued that the minimum desirable N is 250 (MacCallum, Widaman, Zhang & Hong 1999: 84). Comrey and Lee (1992) suggested that 200 = fair, 300 = good, 500 = very good, 1,000 or more = excellent (MacCallum, Widaman, Zhang & Hong, 1999: 84).

When the literature was reviewed, it was understood that there were views emphasizing that the number of people to whom the measurement tool will be applied, that is, the sample size, should be determined by taking into account the number of items in the scale. In the scan, it was observed that there were authors who suggested that the number of participants in the application of the measurement tool should be five times or more than the number of items in the draft measurement tool (Bryman & Cramer, 2001), while there were also authors who suggested that the number of participants should be 10 (Nunually, 1978) or even 15 times (Gorusch, 1983) (Delice & Ergene, 2015: 64). According to these views, it is possible to say that the number of participants forming the research group is large enough to conduct factor analysis.

The suitability of the obtained data for factor analysis was determined using the Kaiser-Meyer-Oklin (KMO) sampling adequacy test and the Bartlett Sphericity test (BS). According to Ferguson and Cox (1993), KMO is performed to determine whether the relationships between the variables in the correlation matrix can be calculated by a smaller set of factors (as cited in Tehrani, 2004: 145). The reliability of the scale was determined by examining the Cronbach Alpha value, which determines the internal consistency measure, and the item total correlations. The construct validity of LMX-3D was examined by Exploratory Factor Analysis (EFA). Factor analysis is an important tool used in the development, improvement and evaluation of tests, scales and measures. EFA is an applied statistical approach widely used in the fields of information systems, social sciences, education and psychology (Williams, Brown and Onsman 2010: 1; as cited in Taherdoost, Sahibuddin and Jalaliyoon 2014: 375). With the EFA application, it was tried to determine how many factors LMX-3D, which has 23 items, has. For this purpose, principal component analysis and varimax, a rotation method, were used. In this study, the KMO value of the collected data was found to be .910 and the BS test result was found to be significant ($p<.05$, $df=253$). Looking at these values, it is understood that the data are suitable for factor analysis.

Confirmatory factor analysis (CFA) is a multivariate statistical procedure used to test how well the variables being measured represent the number of constructs. As a multivariate procedure, confirmatory factor analysis is used to test multiple hypotheses that collectively form a measurement model. Confirmatory factor analysis (CFA) is a tool used to confirm or reject measurement theory ("Statistical Solutions", 2013: 1, Hoyle, 2004: 169). CFA is performed with structural equation modeling (SEM). LISREL is one of the popular programs used in structural equation modeling. There are many similar programs to LISREL, which has been updated several times, such as EQS and Mplus (Prudon, 2015: 1). In this study, SPSS and LISREL programs were used to analyze data and determine the suitability of the factor structure in the measurement tool.

In order to determine whether the model is suitable for the data, a selection of commonly used goodness of fit indices was used. Chi-square, Root Mean Square Error of Approximation (RMSEA), Root Mean Square Residual (RMR) and Standardized-Root Mean Square Residual (SRMR), Normed Fit Index (NFI) and Non-Normed Fit Index (NNFI), Comparative Fit Index (CFI), Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI), Parsimonious Goodness of Fit Index (PGFI) and Parsimony Normed Fit Index (PNFI) are widely used by researchers (Erkorkmaz, Etikan, Demir, Özdamar & Sanisoglu 2013; Schermelleh-Engel, Moosbrugger & Müller 2003). In this study, the most commonly used fit indices, RMSEA, SRMR, CFI, GFI and Chi-Square, were used to determine the suitability of the model.

Findings

Construct Validity

Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were applied to test the construct validity of the measurements obtained from LMX-3D.

Exploratory Factor Analysis (EFA)

In the analysis studies, firstly the results of BS and KMO tests were examined. KMO test determines how suitable the data obtained from the sample are for extracting factors or in other words, the degree of suitability. The test result, whose value varies between 0 and 1.0, is high, that is, close to 1.0, means that a variable in the measurement tool can be perfectly predicted by other variables (Giesen 2004, cited by Şencan (2005: 384). If the values are zero or close to zero, factor analysis cannot be performed based on these values since there is a dispersion in the distribution of correlation coefficients. If the test result is greater than .50, it means that factor analysis can be continued. Kaiser (1974) reported that values lower than .50 are unacceptable regarding the KMO test, values between .50-.60 are bad; values between .60-.70 are weak; values between .70-.80 are average; values between .80-.90 are good, and values greater than .90 are excellent (Şencan, 2005: 384, cited in Jackson and Holland). The Bartlett Sphericity test, on the other hand, It gives the chi-square statistical value. In this test, as in other chi-square tests, the significance value is examined. If the significance value is less than .05, it is evaluated that factor analysis can be done for the data structure on which the test is applied; if it is greater, it is evaluated that it cannot be done (Şencan 2005: 384). In this study, the KMO value of the collected data was found to be .910 and the BS test result was found to be significant ($p<.05$, $df=253$). These values show that the data are suitable for factor analysis.

To determine the number of factors in the measurement tool, first the eigenvalues were examined. Köklü (2002) gave importance to factors with eigenvalues of 1 and above. In the first factor analysis conducted using the data obtained from the research, 4 factors with factor eigenvalues greater than 1 emerged. It was observed that the variance rate explained by these factors was 38.25% in the first factor, 14.03% in the second factor, 11.07% in the third factor and 4.36% in the fourth factor, making a total of 67.72%. Seçer (2017:164) emphasized that each of the sub-factors should explain at least 5% of the total variance in the scale; and that dimensions with a variance value above 5% should be determined as sub-dimensions when determining the number of factors. Accordingly, since the variance value of the fourth factor was below 5%, items 7, 11 and 20 in this factor were removed from the scale. After this stage, it was seen that the scale had a 3 factor structure with the renewed analysis, the number of factors was fixed to 3 in line with the expert opinion, and the rotation process was performed in the second stage to better determine the factor loadings of the items.

"Varimax", an orthogonal rotation method, was selected as the rotation method. After the second analysis was performed, it was seen that 4 items (9, 15, 17, 23) in the scale consisting of 3 factors were overlapped. Items with a difference of less than 0.1 between the loading values they have in two or more factors are called overlapped items. Since an item is intended to measure only one feature, overlapping is an undesirable situation in EFA (Çokluk, Şekercioğlu & Büyüköztürk, 2014: 234). For this reason, items 9, 15, 17 and 23, which were overlapped, were removed from the scale. In addition, when the correlation matrix was examined and the relationships between the items were examined, it was seen that there was a very low ($r<30$) relationship between items 13, 14 and 22 and many other items (Can, 2014: 303). Therefore, these items were also removed from the scale and the analysis was renewed.

As a result of the third analysis, it was seen that there were no overlapping items on the scale. The existence of significant relationships between variables that are independent of each other indicates that there is a connection or multicollinearity between them. Of course, this is an undesirable situation in regression analyses (as cited in Albayrak, 2005: 109). Again, when the correlation matrix table was examined, it was seen that there was multiple collinearity between the items in items 2 and 3 (0.851). Can (2014: 300) suggested that the items with high correlations ($r> 0.8$) should be eliminated and the analysis should be repeated. Çokluk, Şekercioğlu ve Büyüköztürk (2014: 223) de açımlayıcı faktör analizinde madde çıkarma kararı verilmiş ise (bir maddenin çıkarılması ile diğer maddelerin faktör yük değerlerinde değişiklik meydana gelebileceği gerekçesi ile) maddelerin denemeler yapılarak analiz dışı bırakılmasının daha uygun olacağını vurgulamışlardır. Diğer bir değişle ölçek dışı kalması ile en iyi sonuca ulaştıracak maddenin analiz dışı bırakılması gerekmektedir. Bu nedenle ortak varyanslar tablosu incelenerek daha düşük faktör yükü olan maddelerin üstünün çizilmesi yoluna gidilmiştir. 2. maddenin ortak varyans değeri (0,834) 3. maddenin değerinden daha düşük (0,838) olduğu görüldüğünden 2. madde ölçek dışında bırakılmıştır. Korelasyon matrisi incelenmek suretiyle maddeler arası ilişkilere bakıldığında, aralarında kabul edilebilir ilişkinin ($r>30$) olduğu maddelerin sayısının oldukça fazla olduğu (Can, 2014: 303) görülmüştür. Ayrıca matrisin determinantının 0,001 olması da Can (2014: 303)'a göre faktör çözümlemesine imkan tanımaktadır (Determinant >0.0001).

An item may be related to more than one factor, and the sum of the squares of the correlation coefficients between an item and the factors it is related to constitutes the common variance of that item (Can, 2014: 305). In the communalities table, the ratios of each item explaining the variance in a common factor together are given. It should be carefully evaluated whether the items in this table that are seen to have lower values than the others work (Çokluk, Şekercioğlu & Büyüköztürk, 2014: 229). The common variance distributions of the data obtained through the research were also reviewed. As can be understood from Table 1, the common variances vary between 0.585 and 0.838.

Table 1. LMX-3D Scale Communalities Table

Items	Initial	Extraction
Madde 1	1,000	,757
Madde 3	1,000	,838
Madde 4	1,000	,789
Madde 5	1,000	,641
Madde 6	1,000	,585
Madde 8	1,000	,626
Madde 10	1,000	,648
Madde 12	1,000	,688
Madde 16	1,000	,774
Madde 18	1,000	,747
Madde 19	1,000	,743
Madde 21	1,000	,730

According to Field (2005), when the number of samples reached within the scope of the study exceeds 250, having a common variance average above 0.6 can increase the reliability of the criteria used in the research (Can, 2014: 306). In this study, the common variance average was calculated as 0.8566 / 12 = 0.71. In accordance with this calculated result, it was not deemed necessary to exclude any item from the scale based on the common variances of the items.

The factor loading values of the items in the scale obtained as a result of EFA and the item total correlation values are shown in Table 2. When Table 2 is examined, it is seen that the items in the scale form three separate factors. The factors that make up the scale; It was named by benefiting from the studies conducted by Aslan and Özata (2009), Baş, Keskin & Mert (2010), Cevrioğlu (2007), Çekmecelioğlu & Ülker (2014), Dienesch and Liden, (1986), Liden & Maslyn (1998), Yıldız, Özutku & Cevrioğlu (2008), Uğurluoğlu, Santaş & Demirgil (2013). In this context, the first dimension was named "Task"; the second dimension was named "Support" and the third dimension was named "Relationships".

Table 2. Factor Loadings and Item Total Correlation Values of the LMX-3D Scale

Factor	Items	Component	Item Total Correlation Values
Task (Loyalty)	4	,852	,686
	6	,601	,691
	10	,621	,733
	12	,658	,662
	19	,789	,742
	21	,828	,791
Support (Contribution)	5	,725	,594
	8	,710	,584
	16	,797	,639
Relationships (affect)	1	,786	,672
	3	,706	,708
	18	,729	,699

When Table 2 is examined, it is seen that the factor loadings of the items in the “Task” dimension vary between .601 and .852; the factor loadings of the items in the “Support” dimension vary between .710 and .797, and the factor loadings of the items in the “Relationships” dimension vary between .706 and .786. Factor loadings of items being 0.45 and above is often a desired situation in research (Büyüköztürk, 2010; Seçer, 2017). According to these

data, it can be said that the factor loading values of the Three-Dimensional Leader-Member Exchange Scale are at a sufficient level.

In order to reveal the discrimination of the items, the item-total score correlation was examined. The item-total correlation provides information about the relationship between the item scores and the total score. The fact that the item-total correlation is positive and at the same time high is an important factor in the high internal consistency of the test (Büyüköztürk, 2010: 171). It can be said that the items with an item-total correlation of 0.30 and higher have a good level of discrimination; items between 0.20-0.30 can be included in the test if necessary or corrections should be made on these items; and items below 0.20 should be excluded from the test (Büyüköztürk, Kılıç, Akgün, Karadeniz & Demirel, 2008). When the item-total correlations of the Three-Dimensional Leader-Member Interaction Scale are reviewed (Table 2), it is understood that the values are positive and generally high.

In its final form, the Three-Dimensional Leader-Member Exchange Scale has become a scale consisting of 12 items. Of these 12 items, 6 (4, 6, 10, 12, 19, 21) constitute the Task factor; 3 (5, 8, 16) constitute the Support factor and 3 (1, 3, 18) constitute the Relationships factor. The eigenvalues of the factors of the Three-Dimensional Leader-Member Exchange Scale (in its final form), which was determined to have three factors, and the variance rates they explain are shown in Table 3.

Table 3. Eigenvalues of LMX-3D Scale Factors and Variance Proportions They Explain

Factor	Eigenvalues	Variance **(%)**
Task	8,974	30,448
Support	3,975	21,054
Relationships	1,138	19,892
Overall Scale	---	71,394

After the completion of the exploratory factor analysis, it was understood that the scale, which took its final form before the confirmatory factor analysis, showed a three-factor structure as a result of excluding 11 items (2, 7, 9, 11, 13, 14, 15, 17, 20, 22, 23). As can be seen in Table 3, the variance rates explained by the factors were determined as 30.448% in the 1st factor, 21.054% in the 2nd factor, and 19.892% in the 3rd factor, respectively. It is seen in Table 3 that the first factor is stronger than the 2nd and 3rd factors in terms of explained variance. The total variance value explained by the factors was also determined as 71.394%. The variance rate explained by a measurement tool should be higher than the rate it could not explain (Seçer, 2017). Accordingly, it is possible to say that the total variance rate explained is sufficient.

In order to obtain a total score from the Three-Dimensional Leader-Member Interaction Scale or to obtain separate scores from its dimensions, the score ranges and the meanings they express have been arranged. In this direction, the work started with determining the range coefficient. Since the Likert-type five-point scoring technique is used in the scale, the rating items consist of the options “1 point”, “2 points”, “3 points”, “4 points”, and “5 points”. Based on the rule of dividing the value obtained by subtracting the largest measurement from the smallest measurement by the desired group number, the range coefficient was calculated as 5-1=4 and 4/5=0.80 and the option ranges were arranged accordingly. The score ranges of the Three-Dimensional Leader-Member Interaction Scale, the rating options and the meanings expressed by each are shown in Table 4.

Table 4. LMX-3D Scale Evaluation Ranges

Score Range	Rating	Meaning
1,00-1,80	Completely disagree	Very low
1,81-2,60	Disagree	Low
2,61-3,40	Moderate Level Agree	Middle
3,41-4,20	Significantly Agree	High
4,21-5,00	Completely Agree	Very high

Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) is a process that is carried out to create a latent variable, that is, a factor, based on observed variables through a previously created model. CFA, which is carried out to show that a previously determined structure is confirmed, is mostly used in scale development studies and validity analyses (Aktaran

Aytaç and Öngen, 2012). For this reason, the factor structure that emerged in the exploratory factor analysis of the Three-Dimensional Leader-Member Interaction Scale (in order to determine whether it is confirmed or not) was examined with CFA.

In order to reveal the fit adequacy of the models subjected to CFA in scientific studies, different fit index values are reviewed and a decision is made to accept or reject the model according to the results obtained (Ayyıldız, Cengiz and Ustasüleyman, 2006: 31). The most commonly used fit indices, RMSEA, SRMR, CFI, GFI and Chi-Square, were used to test the suitability of the model in this research.

RMSEA is an index that is somewhat similar to SRMR but is calculated and works differently (Steiger, 2000 as cited in Iacobucci, 2009: 96). It was developed by Steiger and Lind (Steiger 1980, 1990 as cited in Hooper, Coughlan, & Mullen, 2008: 54). Browne ve Cudeck (1993), .05 ve altındaki RMSEA değerlerini iyi uyum, .05 ile .08 arasındaki değerleri yeterli, .08 ile .10 arasındaki değerleri ise "vasat" olarak değerlendirirken, 10'dan büyük değerleri kabul edilemez olarak değerlendirmiştir. Genel olarak iyi bir model için kabul edilen RMSEA değeri .05'ten küçük olmasına rağmen Hu ve Bentler (1999), .06'dan küçük değerlerin iyi uyum olarak kabul edilmesi gerektiğini öne sürmüştür (Schermelleh-Engel ve Moosbrugger, 2003:36).

SRMR is the index of incompatibility (larger values indicate poor fit) and ranges from 0.0 to 1.0. When the model predictions perfectly match the data, SRMR is zero (Iacobucci, 2009: 91). In order to be a good fit indicator, the SRMR value obtained by the model should be below .05 (Hu & Bentler, 1995 as cited in Schermelleh-Engel, Moosbrugger, & Müller, 2003: 38), but values less than .10 can be interpreted as acceptable (Schermelleh-Engel, Moosbrugger, & Müller, 2003: 38).

CFI can give healthy results even if the sample size is small. This index, which came into use by researchers with Bentler (1990), assumes that all latent variables are unrelated to each other. The values for this statistic range from 0.0 to 1.0, and as with many other fit indices, values approaching 1.0 indicate good fit. While values of 0.90 and above were initially considered to be indicative of good fit, recent research has shown that a value higher than 0.90 is needed to prevent the acceptance of misspecificated models. Currently, values of 0.95 and above are considered to be an indicator of good fit (as cited in Hooper, Coughlan & Mullen, 2008: 55).

GFI, which is related to the relative variance and covariance amount, is expressed with values between 0 and 1, and the closer its value is to 1, the better the model is (Hair et al., 1995 as cited in Yılmaz, 2004: 82). Therefore, although the most emphasized acceptability limit for the GFI value is stated as 90 (as cited in Ergül, Baydık & Demir, 2013: 505), as Brown also stated, it is necessary to take into consideration the situations where the values of the fit indexes are very close to the acceptance limit (Ahioğlu-Lindberg & Demircan, 2013: 42). When the literature is examined, there are authors who state that GFI values between 0.80-0.89 are acceptable values (as cited in Dağlı, 2015: 213), researchers who suggest 0.85 as the limit (Ergul, Baydik & Demir, 2013: 505), and even authors who state that values above 0.80 indicate a good fit (as cited in Yener, 2015: 301).

The important test for evaluating the absolute suitability of the model to the database is Chi-square ($\chi 2$) (Bollen, 1989, cited in Özabacı, 2011:164). The Chi-square test is shaped according to the sample size and generally does not give reliable results when the sample size exceeds 200 (Schumacker and Lomax, 1996, cited in Özabacı, 2011:164). In this case, the degree of freedom (sd) is also an important criterion in the chi-square test. In large samples, the ratio of sd to $\chi 2$ can also be used as a criterion for adequacy. Although it is generally accepted that rates lower than 2 indicate good fit, there are also authors such as Çokluk, Şekercioğlu & Büyüköztürk (2014: 268) who accept rates of 3 and lower as good fit and rates up to 5 as sufficient fit.

These cut-off points are important for the research, but they should not be considered as absolutely necessary criteria. Because these indices can be affected by incorrect definition of the research model, small and biased sample, violations of normality and independence, and differences in estimation and evaluation style (as cited in Schermelleh-Engel, Moosbrugger, & Müller, 2003: 53). Therefore, even if one or more fit measurements indicate poor fit, it is always possible for a model to fit the data (Schermelleh-Engel, Moosbrugger, & Müller, 2003: 53).

The CFA results of the Three-Dimensional Leader-Member Exchange Scale are given in Table 5. After modification was made in line with the modification suggestions given for improvement purposes for the factor structure tested in the CFA, it was seen that the Chi-square value of the scale ($\chi 2$= 161.08, N=396, df = 47, p = 0.00) was significant and the $\chi 2$/sd ratio was 3.43.

Table 5. LMX-3D Scale CFA Results and Fit Index Value Ranges

Fit Measures	Acceptable Fit	Good Fit	Determined Value
RMSEA	.05 <RMSEA ≤.08	0 ≤ RMSEA ≤ .05	**0.078**
SRMR	.05 < SRMR ≤ .10	0 ≤ SRMR ≤ .05	**0.040**
CFI	.95 ≤ CFI < .97	.97 ≤ CFI ≤ 1.00	**0.96**
GFI	.85 ≤*GFI* < .95	.95 ≤*GFI* ≤1.00	**0.90**
X^2/sd	3< X^2/sd ≤5	0≤ X^2/sd ≤3	**3.43**

References: Schermelleh-Engel, Moosbrugger & Müller, 2003; Wakslak, Jost, Tyler & Chen 2007: 269; Ergül, Baydık & Demir, 2013: 505); Meyers, Gamst and Guarino, 2006; Bektaş, Kural & Orçan 2017: 82

When Table 5 is examined, it is seen that the SRMR fit index values are in the "good fit" range and the other fit indexes are in the "acceptable fit" range. As can be understood from Table 5, the fit index values obtained as a result of subjecting the model to CFA are in the satisfactory range. Therefore, according to the results, it can be claimed that the model consisting of three factors is acceptable. The path diagram for the model is shown in Figure 1.

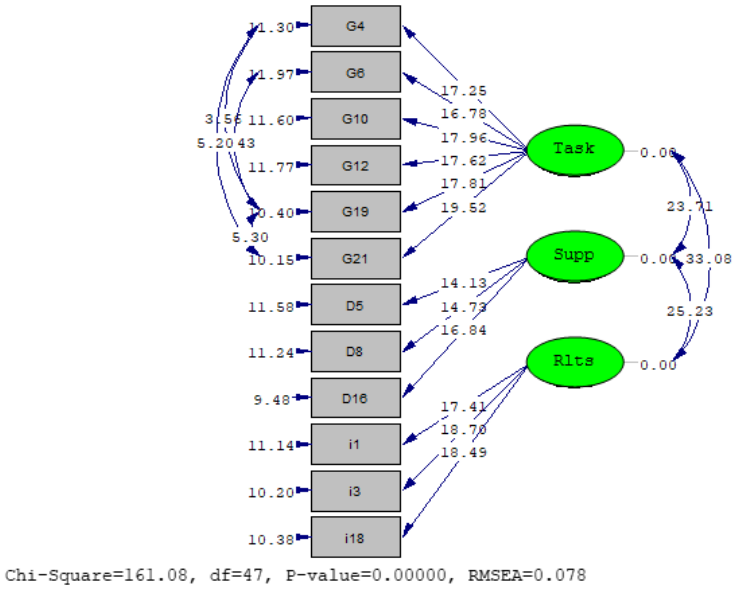

Figure 1. LMX-3D Scale "t-values" Diagram (LISREL Output)

The t values for the model were determined by the LISREL program. If the t-values exceed 1.96, they are significant at the 0.05 level; if they exceed 2.56, they are significant at the 0.01 level. If non-significant t-values are detected as a result of determining the t values, they should be excluded from the analysis (Çokluk, Şekercioğlu & Büyüköztürk, 2014: 304). When the t-values of the LMX-3D scale shown in Figure 1 are examined, it is understood that the values vary between 14.13 and 19.52, and accordingly, the t-values of the scale are significant at the 0.01 level.

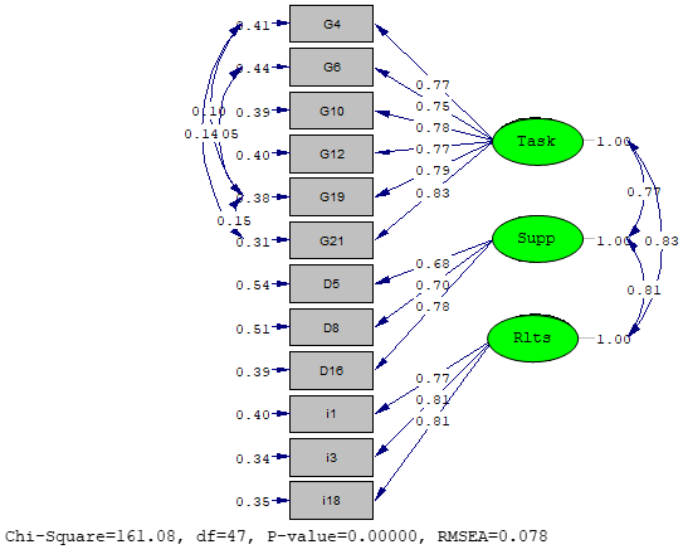

Figure 2. LMX-3D Scale "Standardized Solution" Diagram (LISREL Output)

One of the values that will be useful if reviewed in confirmatory factor analysis is the error variance. It is desired that the error variance, which shows the unexplained part of the variance related to the data set, is not too high, that is, not too close to 1.00 (Büyüköztürk, 2002: 473; Çokluk, Şekercioğlu and Büyüköztürk, 2014: 305; Çepni, 2010: 50). When the error variances of the scale are reviewed, it is understood that the highest value is 0.54 (item 5); the values of the other items vary between 0.31 and 0.51, and therefore there is no item in the scale with a very high error variance, that is, very close to 1.00 (Figure 2).

In addition, for models with multiple factors, it is expected that the correlations between factors should not exceed 0.85. If the factor correlations exceed 0.85, it is possible that the number of factors determined is greater than necessary and that the existing factors do not actually represent different concepts. (Çepni, 2010:50,142). When the factor correlations of the LMX-3D Scale are considered, it is understood that there is no value above 0.85 (Figure 2; Table 6).

Table 6. LMX-3D Scale Factor Correlations

Factors	Correlations Between Factors
Task	0,77
Support	0,83
Relationships	0,81

This situation shows that the exploratory factor analysis results confirm that the model-data fit can be achieved with 3 factors and that the 3 factors are separate concepts.

Reliability

Reliability can be defined as the results obtained with a measurement tool accurately revealing the phenomenon related to the conceptual structure and being consistent with the results of other measurement tools measuring the same conceptual structure; the similarity of the measurement/evaluation results made by different practitioners with the same measurement tool (Şencan, 2005: 7-9). Cronbach Alpha is the most widely used objective reliability measure. It was developed by Lee Cronbach in 1951 as a measure of the internal consistency of tests or scales, and therefore named Cronbach Alpha. Cronbach Alpha is expressed as a number between 0.00 and 1.00. A low alpha value may be due to a low number of questions, weak relationships between items or heterogeneous structures. There are different studies indicating that acceptable values of the alpha coefficient vary between 0.70 and 0.95 (Tavakol & Dennick, 2011: 53, 54). A high value for Cronbach's Alpha indicates that the internal consistency of the items within the scale is good, while .80 is a reasonable target. According to George & Mallery (2003), >.90

is excellent, >.80 is good, >.70 is acceptable, >60 is questionable, >.50 is poor, and <.50 is unacceptable (Gliem & Gliem, 2003: 87).

Cronbach Alpha value was examined to determine the reliability of the Three-Dimensional Leader-Member Exchange Scale. Cronbach Alpha values obtained regarding Leader-Member Exchange are given in Table 7.

Table 7. LMX-3D Scale Cronbach Alpha Coefficients.

Factors	Cronbach Alpha
Task	0,907
Relationships	0,834
Support	0,759
LMX-3D	**0,922**

The Cronbach Alpha reliability coefficient of the Three-Dimensional Leader-Member Interaction Scale was determined as 0.922. When the alpha reliability coefficients are considered in terms of dimensions, it is understood that the Cronbach Alpha coefficient calculated for the Task factor is 0.907; for the Relationships factor, 0.834 and for the Support factor, 0.759, as seen in Table 10. When all the analyses and other studies are evaluated together, it is possible to say that the LMX-3D scale is a valid and reliable measurement tool.

Results and Discussion

This study aimed to develop a valid and reliable measurement tool to determine the leader-member interaction behaviors of schools. The scale was prepared in a five-point Likert type. The scale, which initially consisted of 42 items, was applied to a total of 420 teachers; however, 401 of the measurement tools were returned. When the returned measurement tools were examined, it was determined that 5 measurement tools were filled incompletely or incorrectly (measurements with two, three, four or five options marked). Therefore, the total number of scales to be used in the analyses was determined as 396.

Before performing EFA, the KMO and BS test results were examined and it was seen that the KMO value was .910 and the BS value was less than p<.05. Accordingly, it was concluded that the data were suitable for EFA.

In order to determine the construct validity of the Three-Dimensional Leader-Member Interaction Scale, a total of 11 items were excluded from the scale with the EFA conducted and it was concluded that the scale had a 3-factor structure. The scale was sized in accordance with the determined factors. While the 1st Dimension (Task) of the scale explained 38.25% of the total variance; the 2nd Dimension (Support) explained 14.03% and the 3rd Dimension (Relationships) explained 11.07%. It was understood that the total variance explained by the three dimensions was 67.72%.

As a result of CFA, it was seen that the factor structure determined by EFA was confirmed and it was understood that the scale was 3-dimensional. In the CFA, the fit indices of the scale were also examined and it was seen that the Chi-square value ($\chi 2$= 161.08, N=396, df = 47, p = 0.00) was significant. The fit index values were determined as RMSEA 0.078, SRMR 0.040, CFI 0.96, GFI 0.90 and x2/df 3.43. According to these values, it can be stated that the model provided a good fit.

For the reliability of the scale, the Cranbach Alpha internal consistency coefficient was examined. The Cronbach Alpha internal consistency coefficient of the Three-Dimensional Leader-Member Exchange Scale was determined as 0.922 for the entire scale. Cronbach Alpha internal consistency coefficients for the dimensions of the scale were determined as 0.907 for the Task dimension; 0.834 for the Relationships dimension and 0.759 for Support.

Conclusion

When the studies and analyses are considered as a whole, it is possible to say that the Three-Dimensional Leader-Member Interaction Scale (LMX-3D) is a valid and reliable measurement tool that can be used to reveal the views of teachers working in schools on leader-member interaction behaviors.

Recommendations
It may be recommended to conduct comparative studies by applying the LMX-3D scale in different countries.

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Author (s) Contribution Rate
The first author contributed 50%, the second author 50%.

Ethical Approval
For this study, approval was received from the Dicle University Educational Sciences Ethics Committee with the decision numbered 2019/1-2 and dated 21/01/2019.

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Appendix A

THREE DİMENSİONAL LEADER-MEMBER EXCHANGE SCALE (LMX-3D) TURKİSH (ORİGİNAL LANGUAGE) VERSION

Açıklama: Aşağıdaki maddeler, aynı örgütte görev yapan lider ve üyeler arasında kişilerarası bir ilişkinin bulunduğunu öne süren "Lider-Üye Etkileşimi" Teorisi ile ilgilidir. Lütfen çalıştığınız kurumu göz önünde bulundurarak, size uygun olan seçeneğin altındaki kutucuğa "X" işareti koyunuz.		**Hiç katılmıyorum (1)**	**Az katılıyorum (2)**	**Orta düzeyde katılıyorum (3)**	**Önemli ölçüde katılıyorum (4)**	**Tamamen Katılıyorum (5)**
No	**Maddeler**					
	Görev					
1	Müdürüm bana işle ilgili davranışlarımda -mevzuat çerçevesinde- bağımsızlık sağlar.	1	2	3	4	5
2	Müdürüm ile okulumuzun amaçlarını gerçekleştirmek için yoğun çaba sarf ederiz.	1	2	3	4	5
3	Müdürüm işini mükemmel yaptığı için onu takdir ederim.	1	2	3	4	5
4	Müdürümün iş yeteneğine güvenirim.	1	2	3	4	5
5	Müdürüm okula katkı sağlayan öğretmenleri tespit eder.	1	2	3	4	5
6	Müdürüm bireysel karar vermeyi gerektiren işleri güvendiği öğretmenlere verir.	1	2	3	4	5
	Destek					
7	Öğretmenler okulun örgütsel ikliminden memnundurlar.	1	2	3	4	5
8	Öğretmenler birbirlerine güvenirler.	1	2	3	4	5
9	Öğretmenler meslektaşlarından destek alırlar.	1	2	3	4	5
	İlişkiler					
10	Müdürüm ile birbirimizi insan olarak severiz.	1	2	3	4	5
11	Müdürüm ile birlikte çalışmaktan keyif alırım.	1	2	3	4	5
12	Müdürüm mesleki bilgisine güvendiği öğretmenlerle ilişkilerini geliştirir.	1	2	3	4	5

Appendix B

ENGLİSH TRANSLATİON OF SCALE THREE DİMENSİONAL LEADER-MEMBER EXCHANGE SCALE (LMX-3D)

Explanation: The following items are related to the "Leader-Member Exchange" Theory, which proposes that there is an interpersonal relationship between leaders and members working in the same organization. Please put an "X" sign in the box under the option that suits you, taking into account the institution you work for.		Completely disagree (1)	Disagree (2)	Moderate level agree (3)	Significantly agree (4)	Completely Agree **(5)**
No	**Items**					
	Task					
1	My principal provides me with independence in my work related behavior within the framework of the legislation.	1	2	3	4	5
2	My principal and I work hard to achieve the goals of our school.	1	2	3	4	5
3	I commend my principal for doing her/his job perfectly.	1	2	3	4	5
4	I trust her/him work ability.	1	2	3	4	5
5	identifies teachers who contribute to the school.	1	2	3	4	5
6	assigns jobs that require individual decision making to teachers he trusts.	1	2	3	4	5
	Support					
7	Teachers are satisfied with the organizational climate of the school.	1	2	3	4	5
8	Teachers trust each other.	1	2	3	4	5
9	Teachers receive support from their colleagues.	1	2	3	4	5
	Relationships					
10	My principal and I like each other.	1	2	3	4	5
11	I enjoy working with my principal.	1	2	3	4	5
12	My principal develops relationships with teachers whose professional knowledge he trusts.	1	2	3	4	5