

# Moderating Effects of Climate and External Support on Transformational Leadership and Technological Innovation: An Investigation in Creative Ventures in Turkey

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**Abstract**—The purpose of this study was to investigate the influence of transformational leadership on technological innovation at the organizational level. Specifically, it was proposed that transformational leadership would have a positive effect on organizational innovation. Furthermore, this effect was proposed to be moderated by an innovation-supporting climate and support received from external organizations. These relationships were tested on 163 R&D personnel and managers of 43 micro- and small-sized Turkish entrepreneurial software development companies. The results confirmed the positive impact of transformational leadership on organizational innovation, which was measured with a market-oriented criterion developed specifically for developing countries and newly developing industries. Furthermore, the relationship between transformational leadership and organizational innovation was stronger when external support was at high levels than when there was no external support. The moderating effect of an innovation-supporting climate was not significant. Managerial implications as well as policy recommendations are provided, for micro and small-sized enterprises in particular.

## I. INTRODUCTION

Almost all organizations today are faced with a dynamic environment characterized by rapid technological change, shortening product life cycles, and globalization. It is apparent that organizations, especially technologically-driven ones, operating in this kind of a market environment need to be more creative and innovative than before to survive, to compete, to grow, and to lead. Innovation through creativity is essential for the success and competitive advantage of organizations as well as for strong economies in the 21st century. Hence, increasing premium is placed on creativity and innovation in today's world [36]. This is why increasing number of practitioners and scholars have been attracted to this topic in the recent decades.

Amabile defines innovation as the successful implementation of creative ideas within an organization [3, 4, 5]. Leadership has been proposed to be among the most important factors affecting innovation [16]. This might be through their effect on organizational characteristics such as culture, strategy, structure, reward systems, or resources [51], or their direct behavior on employees' creativity [41], and motivation [48]. Leaders can help their followers to exhibit higher levels of creativity at work [45], can establish a work environment supportive of creativity [6, 5], can create an organizational climate serving as a guiding principle for more creative work processes [43], and can develop and maintain a

system that rewards creative performance through compensation and other human resource-related policies [31]. Furthermore, leaders can have an impact not only on the innovation process in the firm but also on marketing the innovative products. For example, their active participation in selling the innovative products might decrease resistance from the potential customers [24].

Recently, there has been an interest in the influence of transformational leadership on innovation. Transformational leadership has four components; charismatic role modeling, individualized consideration, inspirational motivation, and intellectual stimulation. By *charisma*, the leader instills admiration, respect, and loyalty, and emphasizes the importance of having a collective sense of mission. By *individualized consideration*, the leader builds a one-to-one relationship with his or her followers, and understands and considers their differing needs, skills, and aspirations. Thus, transformational leaders meet the emotional needs of each employee [9]. By *inspirational motivation*, the leader articulates an exciting vision of the future, shows the followers the ways to achieve the goals, and expresses his or her belief that they can do it. By *intellectual stimulation*, the leader broadens and elevates the interests of his or her employees [9], and stimulates followers to think about old problems in new ways [8]. Transformational leaders raise the performance expectations of their followers [10] and "seek to transform followers' personal values and self-concepts, and move them to higher level of needs and aspirations" [30].

Although the effects of transformational leadership on the performance of followers and organizations have been the subject of extensive research in the past decade [22, 28, 35], only a handful of studies have examined the effects of this type of leadership on organizational innovation [31]. Moreover, innovation theories have been developed and tested mostly in Western countries and therefore "research identifying what contextual conditions would be most relevant to individuals in different cultures is warranted" [44]. For example, although relations built by the external environment for the purposes of knowledge-acquisition [51] and resource-acquisition [14, 18] have been theoretically suggested to be an important source of organizational innovation, empirical studies have not examined the moderating role of this contextual factor while investigating the relationship between leadership and innovation. Similarly, an innovation supporting climate might influence the degree with which leadership can affect organizational innovation.

Based on the above, this study aims to examine the effect of transformational leadership on organizational innovation and the moderating effects of an innovation-supporting

climate and external support on this relationship. A model that includes these effects was developed for this purpose. The model is depicted in Figure 1.

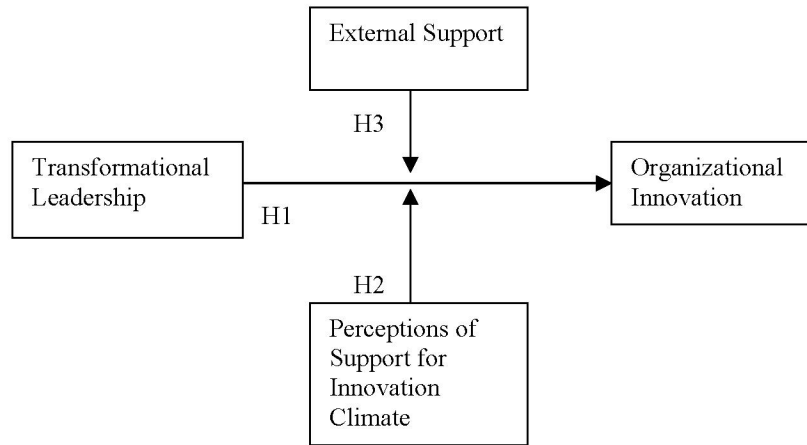


Figure 1. The Proposed Model

The model was tested on employees and managers of micro- and small-sized Turkish IT companies engaged in software development. This study is significant in that it tests the western theories of transformational leadership, and innovation both in Turkey, a developing country, and in software development, a newly developing industry in the country. Furthermore, organizational innovation was measured with a criterion developed specifically for developing countries and newly developing industries, as measurements used in developed countries might not apply.

#### IT Sector in Turkey

This study tests this model in IT sector for several reasons. It is evident that world faces a revolutionary change with the developments in information technologies. The contribution of the IT sector to national economies is very significant, for example, it accounted for 35% of the economic growth rate of the U.S.A. for the period of 1995-98, 19.3% of that of Canada in 1996-97 and 15% of that of France in 1998 [20]. IT sector, which includes hardware, software, and services, is as strategic to Turkey as it is to the other nations. However, Turkey ranks low in its development of this sector. The share of IT revenues in GNP of the year 1997 remained only 0.7%, while those for Europe and U.S.A. were 2% and 4%, respectively [20].

Software development, which dominates the IT sector in the world average, is newly developing in Turkey. As was stated in the Ad hoc Committee report on informational technologies and policies [20], software development is not considered as a strategic industry, and hence, policies to support the related parties as well as copyrights are not well-developed. According to the same report, in the IT market, it is the software development which ranks the first in Europe and which accounts for the greatest portion of the R&D expenditures in OECD countries. However, in Turkey, of the IT sector which is about 1.173 million dollars big and

dominated by hardware, the share of software development remains very low, was only 12% in 1997, then with a significant increase, reached 26.4%. Similarly, information services accounted for 19% of the total services in Turkey, which is only half of the world average with 38%.

In spite of the low standing of the Turkish IT sector in the world development average, this sector, among the other sectors in Turkey, ranks high in terms of innovativeness. According to the Technological Innovation Activities Survey conducted by Turkish State Institute of Statistics for the period of 1998-2000, in the IT sector, the share of innovativeness is about 50% and the share of R&D in total innovation expenditures is higher than that of the other sectors [19].

Investigation of the software development industry, to sum up, is important for two reasons. First, this industry has an increasing share in industrial innovations in the world [38] and Turkey's low standing within international comparisons, therefore, serves as an impetus for this research. Second, within an internal comparison, this sector's higher level of innovativeness serves as an adequate medium for measurement purposes. Apart from these practical observations, this industry has been neglected by empirical researchers in spite of its above mentioned significance. Besides, development tasks the companies in software industry are engaged in do require creativity [15] as they produce incremental innovations [23].

## II. THEORETICAL BACKGROUND AND HYPOTHESES

### A. Transformational Leadership and Organizational Innovation

Organizational innovation has been defined as the creation of valuable and useful new products/services within an organizational context [51]. Since most organizations engage in innovative activity as a competitive weapon, we

adopt a market-oriented approach and enhance this definition to include the returns due to innovation. Accordingly, organizational innovation in this study is defined as the tendency of the organization to develop new or improved products/services and its success in bringing those products/services to the market. This approach is consistent with Damanpour's [18] definition of product innovations as "new products/services introduced to meet an external user or market need," and the description provided by OECD [39] as "the successful bringing of the new product or the service to the market".

Transformational leaders have been suggested to have an impact on innovation. Transformational leaders enhance innovation within the organizational context; in other words, the tendency of organizations to innovate. Leaders' use of inspirational motivation and intellectual stimulation is critical for organizational innovation [23]. Transformational leaders promote creative ideas within their organizations. This leader's behaviors are suggested to act as "creativity-enhancing forces" such that individualized consideration "serves as a reward" for the followers, intellectual stimulation "enhances exploratory thinking", and inspirational motivation "provides encouragement into the idea generation process" [46]. Howell and Higgins [27] state that this behavior reflects the "championing role" of the transformational leaders. This leader motivates his or her followers by his or her vision, increases their willingness to perform beyond expectations, and challenges them to adopt innovative approaches in their work. The resulting heightened levels of motivation is expected to enhance organizational innovation [37]. A number of empirical studies support this leader's positive impact on innovation [32, 50]. These studies examined the relationship between transformational leadership and innovation mostly in R&D units and at project levels. The proposed effect of transformational leadership on innovation at the *organizational* level has become a topic of empirical research only recently. For example, Jung et al. [31] in a study of 32 Taiwanese companies, found that transformational leadership was significantly and positively related to organizational innovation which was measured by R&D expenditures and number of patents obtained over the previous three years.

Transformational leaders may also have a positive influence on the market success of the innovations. Transformational leaders who articulate a strong vision of innovation and display a sense of power and confidence will strive for ensuring the market success of the innovation. This leader is suggested to mobilize his or her followers to ensure the innovations' success [31]. As Keller [32] suggests, leading professional employees might require more than traditional leader behaviors especially in R&D settings where *quality* rather than quantity is the primary performance criteria. Furthermore, in addition to the internal roles, transformational leadership has been suggested to be effective in playing external roles such as boundary spanning and entrepreneuring/championing [27] which might be important both for understanding the needs of the market and marketing of the innovation successfully. Based on the above,

we expect a positive impact of transformational leadership on organizational innovation which is conceptualized in this paper as including both the tendency of the organization to innovate and the success of innovations.

*H1. Transformational leadership is positively associated with organizational innovation.*

#### *B. Support for Innovation Climate*

A number of studies have offered empirical support for climate's effect on innovation [1, 31]. One of the critical factors affecting innovation is adequate amount of resources in the organization such as personnel and funding [14, 51]. Organizations support innovation by providing adequate amounts of such resources [43]. In addition to the resources allocated to innovation, an organizational climate may support innovation by encouraging, recognizing, and rewarding creativity [43]. Employees' perceptions of the extent to which creativity is encouraged at the workplace, and the extent to which organizational resources are allocated to supporting creativity influence their innovative behavior.

Transformational leaders promote higher performance under an innovative climate [28, 31]. When employees perceive an innovative climate, they will be encouraged to take initiative and risks, and will be challenged to use innovative approaches in their work. They might respond better to transformational leadership when they perceive that they are provided adequate resources and support. In other words, within such a supportive context the effect of transformational leadership on innovation will be stronger. Therefore,

*H2. Followers' perceptions of organizational support for innovation climate moderates the relationship between transformational leadership and organizational innovation such that the effect of this leadership on organizational innovation will be stronger when the perceptions of support for innovation climate are higher than when they are lower.*

#### *C. External Support*

One important source of organizational innovation is the knowledge acquired from the firm's external environment. Woodman et al. [51] hypothesized that information exchanges with the environment is an important contextual variable affecting organizational innovation. Damanpour [18], in his meta-analytical review of the organizational innovation studies, reported a positive association between external communication and innovation. Cohen and Levinthal [14] suggested that "external knowledge might complement and leverage a firm's own knowledge output" and thus be a critical source in the organizational innovation process.

Resource availability is another important factor in organizational innovation [14, 18]. The amount of resources such as personnel and funding will affect the followers' perceptions of an environment supportive of innovation in their organizations [5, 43]. Furthermore, Woodman et al. [51] maintain that availability of *slack* resources shall enhance organizational creative performance.

Firms can build a wide range of relationships with different parties and for different goals. They can build strategic alliances with other companies for sharing expertise, funding, or output; they can cooperate with research institutes and universities for technical assistance and consulting; and they can receive financial help from public or private support organizations for innovative projects.

Based on previous research, we expect that receiving either knowledge-based or resource-based support (i.e. technical and financial assistance) from external institutions enhances organizational innovation. This might be especially important for firms that lack sufficient internal resources. Consequently, it is proposed here that the positive impact of transformational leadership on organizational innovation depends on the degree of external support. It is expected that, under a higher level of technical and financial assistance acquired from outside the firm, this leader will find more support for his or her vision and, thereby, his or her effect on organizational innovation will get stronger.

*H3. External support moderates the relationship between transformational leadership and organizational innovation such that the effect of transformational leadership on organizational innovation will be stronger when the degree of external support is higher than when it is lower.*

### III. METHODS

#### A. Sample

Employees and their leaders in 43 Turkish entrepreneurial software development companies participated in this study. The sample was a highly homogeneous one in terms of size and type of task. All companies were small-sized with 3 to 17 employees and all were engaged in the development of new products and the improvement of existing products described as *development work* by Keller [32].

A total of 163 employees participated in the current study. There were 130 men (79.7%) and 33 women (20.3%) in the sample. The average age of the followers was 27.6 years. 4.3% had high-school diplomas, 71.2% had bachelor's degrees, 22.1% had master's degrees and 2.5% had PhD's. The employees had 2.25 years of average company tenure and 4.71 years of average job tenure in the sector. All participants were Turkish. The average life of the companies was 5.9 years and the average size was 9.4 employees.

The reason for selecting micro- and small-sized entrepreneurial companies rather than large-sized ones was that they may be more innovative due to their "greater flexibility" and may have "younger and more growth-oriented personnel" [24]. Moreover, entrepreneurship orientation has been suggested [34] and empirically found [42] to be a driver of innovation. Besides, practical observations support these theoretical arguments. According to the Technological Innovation Activities Survey [19], in service sector, the share of innovativeness in micro-sized firms (1-9 employees) is 35.4%, in firms with 10-19 employees is 24% and in firms with 20-49 employees is

16.7%. Hence, it was expected that the firms in the sample, with an average size of 9.4 employees, would be appropriate for measurement of innovation.

#### B. Procedure

Interviews were conducted with six company owners in the software development industry in order to understand the specific nature of the development work the companies were engaged in. In addition, the definition of innovation and the specific descriptions of a technologically new product and improved product adopted in this study were explained. They unanimously agreed that the statements reflected the development work they were engaged in. Participants were also provided with the measures of organizational innovation commonly used in empirical research (such as number of patents and R&D intensity) and were asked to recommend measures for their industry. These comments and recommendations were taken into consideration while developing the measure of organizational innovation by the authors and then were presented to the leaders. The participants agreed with the measure without exception.

Out of the 90 micro- and small-sized information technology companies most of which are located in technoparks, 49 satisfied two criteria of this study: minimum firm age of 3 years and in-house software development. Leaders of 43 entrepreneurial companies agreed to participate in the study. They were both the owner-managers and immediate supervisors of the R&D personnel. The leaders were asked to give the names of the R&D employees engaging in problem definition and design stages of software development. Data was collected by two separate questionnaires: one for the employees and the other for their leaders. Data collected from the leaders and employees were matched and grouped for analysis. Out of 168 employees identified as explained above, 5 did not fill the questionnaire. All of the questionnaires were completed during regular working hours and the authors were present to answer questions and collect completed surveys. Since all of the participants in this study were Turkish, all questionnaire items (except the MLQ for which the copyright had been obtained for the Turkish version) were carefully translated and back-translated to ensure conceptual equivalence and comparability [12].

Employees' questionnaires included measures of transformational leadership and perception of support for innovation climate. On average, 4 employees rated each leader. Employees were also asked for their age, gender, educational level, job tenure, and company tenure. Leaders' questionnaires included questions about company innovations and the degree of support they received from external institutions. They were also asked for the age of their firms.

#### C. Measures

*Transformational leadership.* Transformational leadership was measured using twenty items from the Turkish version of Multi-Factor Leadership Questionnaire (MLQ-Form 5X) [11]. Avolio, Bass, and Jung [7] provided support for the convergent and discriminant validity of the

instrument. If subordinates provided both the transformational leadership ratings and the criterion ratings, the results could have been potentially biased by same-source (MLQ) data. Therefore, only the transformational leadership items were used from the questionnaire. Participants were asked to judge how frequently their immediate leader engaged in transformational leadership behaviors. Ratings were completed on a 5-point scale with 1 representing "Not at all" and 5 representing "Frequently, if not always". Sample items included: "Articulates a compelling vision of the future," "Treats me as an individual rather than as a member of the group," and "Gets me to look at problems from many different angles."

Exploratory factor analysis using the principal components method and varimax rotation was conducted on the twenty items in order to determine their factor structure. After two items with factor loadings less than 0.50 were removed, the resulting eighteen items loaded on one factor, which accounted for 47.06% of the variance. Thus, these items were averaged to form a scale. Reliability (i.e. Cronbach's alpha) of the scale was 0.93. Bycio, Hackett, and Allen [13] showed that the dimensions of transformational leadership failed to exhibit discriminant validity in predicting outcomes. Furthermore, since we did not have any a priori expectation that individual dimensions of transformational leadership would differentially affect creativity, we used a single index to measure transformational leadership. The use of a single scale to represent transformational leadership has been validated by prior research [29].

*Perceptions of support for innovation climate.* This variable was measured by 12 items adapted from Scott and Bruce [43]. On a 5-point scale ranging from 1 ("Strongly disagree") to 5 ("Strongly agree"), employees indicated the extent to which their companies supported creativity. Sample items were "This organization can be described as flexible and continually adapting to change" and "There are adequate resources devoted to innovation in this organization." Based on the factor analysis results, three items with loadings less than 0.50 were removed. The remaining 9 items loaded on one factor that accounted for 55.40% of the variance. These items were averaged to form a scale with a reliability of 0.88.

*Aggregation of transformational leadership and perceptions of support for innovation climate.* Since the dependent variable of this part of the analysis is organizational innovation, transformational leadership ratings as well as perceptions of support for innovation climate by the subordinates needed to be aggregated to organizational level. These variables were aggregated by averaging their values for each organization. Empirical justification for aggregating both of these subordinate ratings were obtained using one-way ANOVA. The results for transformational leadership showed that between-group differences were significantly higher than within-group differences ( $F = 3.06$ ,  $p < 0.001$ ). Similarly, between-group differences in perceptions of support for innovation climate were significantly higher than within-group differences ( $F = 2.83$ ,  $p < 0.001$ ). Interrater reliabilities of subordinate ratings of transformational leadership ( $ICC1 = 0.52$ ,  $ICC2 = 0.67$ ) and

support for innovation climate ( $ICC1 = 0.50$ ,  $ICC2 = 0.65$ ) were also at acceptable levels. These results showed that aggregation was appropriate for these variables.

*External support.* In order to measure this variable leaders were asked to indicate how many of their innovative projects received resource-based and knowledge-based support (i.e. financial and technical assistance) from external institutions in the last three years. The external institutions were organizations which support innovative projects, namely TUBITAK-TIDEB (Scientific and Technical Research Council of Turkey-Technology Monitoring and Evaluation Board) and TTGV (Technology Development Foundation of Turkey) (described in the Appendix). The definition of innovation and the descriptions of development and improvement work adopted by these institutions were the same as those of this study.

*Organizational innovation.* Organizational innovation is defined in this study as the tendency of the organization to develop new or improved products/services and its success in bringing that product/service to the market. Consistent with this definition and taking into consideration the comments of the leaders made during the interview, we developed a new measuring criterion for organizational innovation. The leaders' common concern was that quantifiable measures such as copyrights or quality certificates commonly employed to study established companies in developed industries and countries might not be applicable either to the growing software development industry or to the nature of competition among small-sized entrepreneurial companies in Turkey due to the poorly established rules of competition and legal structure in the country. Therefore, a market-oriented approach rather than such quantifiable input measures was adopted for developing the measurement of organizational innovation.

The measure of organizational innovation in the study is the product of two ratios, namely, coefficient of innovativeness tendency and success of product innovations. *Coefficient of innovativeness tendency* was measured as the ratio of sales generated by product innovations to total sales. This coefficient quantifies the innovativeness orientation of companies engaged in other work apart from software development such as marketing computer hardware. This measure of innovative activity was also used by Czarnitzki and Kraft [17], who investigated the innovative performance of European firms. In order to operationalize our definition of organizational innovation, we employed this measure as a coefficient to modify the success of product innovations.

*Success of product innovations* was computed as the sales generated by product innovations over expenditures in producing those product innovations. This ratio shows the success of the organization in both satisfying market needs and utilizing the organization's resources in producing the innovations. This is a better measure of outcomes rather than the R&D expenditures measured in absolute numbers. As stated by Jung et al [31], expenditures for innovation itself do not reflect the success of the company in generating "outcomes," but rather its "willingness" to support innovation.

New products developed and existing products improved [33, 51] as well as custom-made projects [38] by the companies were regarded as product innovations in this study. The definition of innovation [33] and descriptions by the [38] of new and improved products along with examples of innovation in the software development industry were included in the questionnaire administered to the leaders (provided in the Appendix). They were asked to analyze every product/custom-made project of their company to determine whether it would be considered as innovation according to the guidelines. They were then asked to answer three questions: total sales generated by product innovations during the previous three years, total sales of the company during the previous three years, and total expenditures in producing those product innovations during the same time period. Considering the newly emerging nature of this market in Turkey where software development might take a longer

time for some products and longer time in sales might be needed, all of the output questions covered the last three years.

*Control variable.* *Firm age* was used as a control variable in this part of the study, since prior studies reported its positive relationship with organization innovation [26, 31].

#### IV. RESULTS

##### A. Descriptive Statistics

Means, standard deviations, and correlations among organizational-level variables are presented in Table 1. Transformational leadership had significant correlations with organizational innovation ( $r = 0.30, p < 0.05$ ) and perceptions of support for innovation climate ( $r = 0.81, p < 0.001$ ). Another significant correlation was between firm age and external support ( $r = 0.48, p < 0.01$ ).

TABLE 1. DESCRIPTIVE STATISTICS AND CORRELATIONS AMONG THE VARIABLES

Variables	Mean	S.D.	1	2	3	4
1. Transformational Leadership	3.90	0.53				
2. Perceptions of Support for Innovation Climate	3.77	0.58	0.81***			
3. External Support	0.51	1.32	-0.62	-0.19		
4. Firm Age	5.90	3.73	-0.11	-0.12	0.48**	
5. Organizational Innovation	1.57	0.56	0.30*	0.21	0.13	0.29

\*  $p < 0.05$

\*\*  $p < 0.01$

\*\*\*  $p < 0.001$

##### B. Hypothesis Tests

A three-stage hierarchical regression analysis was utilized to test the hypothesized direct effect of transformational leadership and the moderating effects of perceptions of support for innovation climate and external support on organizational innovation. In stage 1, the control variable (firm age) was entered as a predictor of innovation. Next, the main effects predictor variables (transformational leadership, perceptions of support for innovation climate, and external support) were entered. In the third and fourth steps,

the multiplicative interaction terms were entered separately. The moderator hypotheses were tested by examining the significance of the interaction terms and the F-tests associated with the changes in the multiple squared correlation coefficients ( $R^2$ s) of the equations in the third and fourth steps. Following Aiken and West's [2] recommendation for regression analysis with multiplicative interaction terms, all the variables in the regression equations were centered. Results of this analysis are presented in Table 2.

TABLE 2. RESULTS OF THE MODERATED REGRESSION ANALYSIS FOR ORGANIZATIONAL INNOVATION

	Step 1	Step 2	Step 3	Step 4
Firm Age	0.04	0.05	0.05	0.04
Transformational Leadership		0.41	0.35	0.65*
Perceptions of Support for Innovation Climate		-0.06	-0.06	-0.16
External Support		-0.01	-0.01	0.05
Transformational Leadership x Perceptions of Support for Innovation Climate			-0.18	-0.05
Transformational Leadership x External Support				0.61*
F	3.68	2.30	1.90	3.01*
Df	1	4	5	5
$R^2$	0.08	0.20	0.20	0.29
$\Delta R^2$		0.12	0.00	0.09*

\*  $p < 0.05$

Hypothesis 1 predicted a positive relationship between transformational leadership and organizational innovation. Results of the analysis revealed that, after controlling for firm age, transformational leadership had a significant positive effect on organizational innovation ( $b = 0.65$ ,  $p < 0.05$ ). Therefore, Hypothesis 1 was supported.

Hypotheses 2 was related to the moderating effect of perceptions of support for innovation climate on the relationship between transformational leadership and organizational innovation. The results showed that the interaction between perceptions of support for innovation climate and transformational leadership was not significant ( $b = -0.18$ , n.s.). Change in the  $R^2$  when the interaction term was added was also not significant ( $\Delta R^2 = 0.00$ , n.s.). Thus, Hypothesis 2 was not supported.

Hypothesis 3 predicted a moderating effect of external support on the relationship between transformational leadership and organizational innovation. According to the results, the interaction term was statistically significant ( $b = 0.61$ ,  $p < 0.05$ ). Change in the  $R^2$  when the interaction term was added was also significant ( $\Delta R^2 = 0.09$ ,  $p < 0.05$ ). Therefore, transformational leadership and external support had a significant joint effect on organizational innovation.

In order to interpret the form of the moderated relationship, the interaction effect was plotted using the procedure suggested by Aiken and West [2]. Specifically, the regression equations of transformation leadership on organizational innovation for high and low levels of the moderating variable, external support were plotted. For high levels of external support one standard deviation above its mean was used. For low levels of external support, 0 was used, since the minimum number of external support could only be zero. Figure 2 depicts the interaction plot.

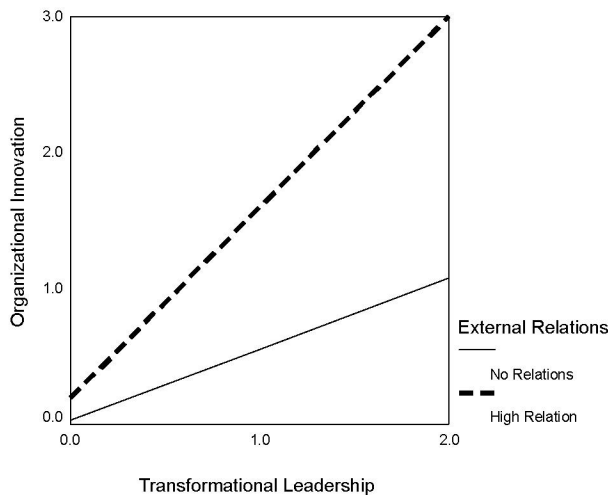


Figure 2. Moderating Effect of External Support on the Transformational Leadership-Organizational Innovation Relationship

As predicted by Hypothesis 3, the positive impact of transformational leadership on organizational innovation is stronger for higher levels of external support. Thus, Hypothesis 3 was supported.

## V. DISCUSSION

This study has both theoretical and methodological contributions to the literature. First, in line with the findings of Jung et al. [31], we found that transformational leadership has a significant positive influence on organizational innovation. Moreover, as stated before, previous research focused on this leader's effect on the tendency of organizations to innovate. Our definition of organizational innovation included the success of innovations as well as the tendency to innovate. Therefore, the findings of this study suggest that transformational leaders might not only promote innovative activity within the organization but also ensure the market success of the innovations. Second, since the innovations under investigation in this study were related to development work, the positive influence of this leadership was identified on incremental innovation. This finding somewhat contradicts Keller's [32] suggestion that developmental work might need more of a transactional leader to allocate and coordinate tasks. Transactional leadership was not under investigation here, but this study shows that as transformational character of the leader increases, innovation in developmental work increases. This contrary result might stem from the collectivist character of the Turkish participants who would expect their leaders to exhibit transformational leader behaviors [10] and would readily respond to transformational leadership.

Our results also showed that external support moderated the relationship between transformational leadership and organizational innovation. It is suggested in the literature [23] that relations built with the external environment, in particular for the acquisition of knowledge and resources, are strong sources of organizational innovation. Therefore, it is equally important to have shown *empirically* that this leader's effect on organizational innovation increases under a high level of such external support. To our knowledge, this is the first study investigating the effects of transformational leadership in this contextual condition.

The hypothesized moderator role of perceptions of support for innovation climate was not confirmed. This might be due to the sample in this study, which includes micro- and small-sized companies. It may be that for companies of this size the role of internal support within the organization may not be as significant as that of external support received from outside the organization in facilitating organizational innovation. Another reason for this finding might be that the high correlation between transformational leadership and perceptions of support for innovation climate might have diminished the contribution of perceptions of support for innovation in predicting organizational innovation.

The methodological contributions of this study are twofold. First, this study investigated transformational leadership and innovation in Turkey, a developing country, and it showed the external validity of these theories which were developed and tested in the Western developed countries. Second, we believe that the *market-oriented measure* developed and used as a proxy for organizational innovation in the study qualifies as a methodological contribution. It can be used as a measure of innovation in newly developing industries and in entrepreneurial companies, especially in underdeveloped or developing countries, where quantifiable measures such as patents or copyrights are not relevant. Furthermore, it differs from other measures of organizational innovation reflecting not only the firms' propensity to innovate but also the returns on innovations, which is an important indicator of competitive advantage.

This study is not without its limitations. One limitation of the study was the cross-sectional design employed. In real work settings, longitudinal studies can better analyze the effects of climate and future organizational innovations. In addition, the sample of this study might be another limitation. This study focused on micro- and small-sized entrepreneurial software development companies operating in Turkey, and therefore the findings might not be generalizable to other software development companies or to other types of organizations in different industries and/or countries.

#### *A. Directions for Future Research*

This study investigated the direct and moderated relationships between transformational leadership and organizational innovation. Future research might also examine the processes that mediate this relationship. Furthermore, external support found to be a significant moderator of the transformational leadership-organizational innovation relationship in this study focused on relationships with support institutions. The effects of other contextual variables such as relationships with customers and competitors in the market might also be investigated in future studies.

The measure of organizational innovation developed and used in this study might be employed in studies conducted in industries other than software development, or in industries which produce radical innovation. Furthermore, this measure should be used in studies conducted in different countries in order to evaluate its external validity.

#### *B. Practical Implications*

This study is the first to investigate transformational leadership and its effect on organizational innovation in Turkey. Equally important is that this study was conducted in entrepreneurial companies in the information technologies sector, in the software development industry in particular. This sector is particularly important for Turkey, because of its low standing in the world development average [20]. Thus, encouraging the development and raising the competitiveness

of the software development industry should be a priority for all stakeholders, in particular managers. We recommend that transformational leadership be the subject of management training and development in Turkey.

This study also suggests that, to boost the level of company innovation, leaders (especially of micro- and small-sized entrepreneurial companies) should build relationships with external institutions which provide technical and financial support. Policies that relate to such support should be developed and implemented at once. There is still a lack of a shared vision and commitment by all stakeholders in establishing a national innovation system [49]. Although state aids towards R&D has been addressed in the 8th five-year development plan as an important challenge for the national innovation system of Turkey, as noted by Elçi, "total amount of funds disbursed between 1992-2004 by two main innovation financing agencies, TUBITAK-TIDEB and TTGV, is 250.42 million euro, which is a very small amount compared to the R&D spending of the business sector in Turkey, which was 157.86 million euro only in year 2000" [25]. Besides, although surveys with existing and potential beneficiaries of financial support for R&D projects revealed that the funds helped the beneficiaries to accomplish their projects to a big extent, provision of collaterals and the amount of service fee, in the case of TTGV, and delays in disbursement, in the case of TUBITAK-TIDEB, remain as major problems [47]. Similar problem areas were also addressed in the report, Ad hoc Committee on Evaluation of State Aids [21]. Thus, according to Elçi, "the policy measures fail to respond to the demand of companies in innovation financing" [25]. Moreover, not only the successful innovation in the firms, but also the marketing of new products/services deserves attention. "Government should support this second part of the innovation process which is bringing the new concept successfully to the market" [39]. Finally, government financing of R&D is mainly directed to large firms in Turkey. In 2003, Turkish firms with fewer than 50 employees received only about 6% of government-financed business R&D while their counterparts in Ireland, New Zealand, and Australia received more than 50% [40]. Thus, high potential of micro- and small-sized firms in terms of innovativeness, as was presented in DIE [19], can only be realized with higher levels of support and better disbursement terms.

IT sector reshapes economic development of nations. Subsequently, the wealth of nations very much depends on the importance and support given to this sector. To this end, we hope these avenues addressed by the findings of this study shall be fruitful both for future research and policy making and implementation.

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## APPENDIX

### *Descriptions and Examples of Innovation Provided to the Leaders*

#### Innovation

**Innovation** is an important product, process, or idea leading to a new or improved product that is new to the organization. According to this definition, new products developed, existing products improved, and custom-made projects which display significantly different attributes from the firms' previous products are considered as product innovations in this study.

#### Technological Product Innovation

The term "product" is used to cover both goods and services. Technological product innovation can take two broad forms:

**A technologically new product** is a product whose technological characteristics or intended uses differ significantly from those of previously produced products. Such innovations can involve radically new technologies, can be based on combining existing technologies in new uses, or can be derived from the use of new knowledge.

**A technologically improved product** is an existing product whose performance has been significantly enhanced or upgraded. A simple product may be improved (in terms of better performance or lower cost) through the use of higher-performance components or materials, or a complex product which consists of a number of integrated sub-systems may be improved by partial changes to one of the sub-systems.

#### Examples of Technological Innovations in Software Development Companies

\*The introduction of new multimedia software applications that can be used for educational purposes and thus eliminate the need for a real life human instructor.

\*The development of a whole range of different customer packages in which clients are offered varying degrees of assistance/support.

\*Developing software applications through computer-aided design (CAD)

#### **Support Organizations**

**TİDEB** (Technology Monitoring and Evaluation Board), located within TUBITAK (Scientific and Technical Research Council of Turkey), provides subsidies and assistance to industrial and software development companies for their development and improvement projects. Financing is provided to several items such as personnel, equipment, software, publications, material, travel, and consulting services purchased. (This assistance is based on the Decree by Government published on June 1995 and improved on Nov. 1998. The responsible agency is the Undersecretariat of Foreign Trade).

**TTGV** (Technology Development Foundation of Turkey) is a non-profit association whose mission is to distribute World Bank funds allocated by the Treasury to finance R&D and it assumes the credit risk involved. Similar to TİDEB, it provides support to industrial and software development companies for their development and improvement projects. It provides long-term subsidized loans to companies for their expenditures such as personnel, equipment, software, publications, material, travel, consulting services purchased.

TİDEB and TTGV also provide consultancy to these firms in technological, financial, and legal issues. SMEs account for 73% of firms receiving project support from TTGV. They account for 70% of TUBITAK-TİDEB's portfolio (OECD, 2004).