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Multidimensional analysis of the factors affecting the organizational and managerial structure of state forest management: Türkiye example

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Abstract

Aim of study: To reveal the most important factors affecting the administrative and organizational structure in Türkiye's forestry and their effects with a multidimensional approach.

Area of study: Nine provinces of Türkiye (İstanbul, İzmir, Antalya, Adana, Bolu, Trabzon, Erzurum, Şanlıurfa, and Ankara), which represent nine geographic regions, where forestry activities are intensive.

Materials and methods: Through the consideration of the literature review and expert opinions, 29 variables affecting the organizational and managerial structure were developed. These variables were grouped under six main headings, and questionnaire forms were prepared accordingly. They were applied to 463 technical and managerial staff in the forestry organizations with the face-to-face interview method. To evaluate the data, descriptive statistics, factor analysis, multiple regression analysis, and the Kruskal-Wallis H Test were used.

Main results: The most important factors affecting the organizational and managerial structure were found to be (i) working conditions and job satisfaction, (ii) educational level of employees, (iii) technical and managerial competence, and (iv) solidarity and institutional support. Approximately 67% of the managerial and organizational structure of Türkiye's forestry was explained by these four factors. The differences in the views of the interviewees in terms of working conditions and job satisfaction, educational level, technical and managerial competence, and solidarity and institutional support factors were determined according to some task variables.

Research highlights: Enabling employees in managerial positions to have postgraduate education and to apply their knowledge and experience is effective in increasing job satisfaction, managerial competence, participation in managerial decisions, and thus sustainable forestry.

Additional key words: organizational structure; managerial competence; forest management; sustainable forestry.

Abbreviation used: GDCDE (General Directorate of Combating Desertification and Erosion); GDF (General Directorate of Forestry); GDNCNP (General Directorate of Nature Conservation and National Parks); KMO (Kaiser-Meyer-Olkin); MFWA (Ministry of Forestry and Water Affairs); R&D (Research & Development).

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Introduction

While meeting global and national demands from forests, it is necessary to consider the sustainability of the ecological, social, economic and cultural functions of forests as a natural and renewable resource within ecosystem integrity. Managing forests according to the principles of sustainable resource management is the basic approach of contemporary forestry mentality (Daşdemir, 1999; Lorincová et al., 2016; Sanchez Badini et al., 2018). Management development is considered to be a strategic priority for contemporary organizations because talented managers ensure that their attitudes and behaviors are effectively reflected in business strategy management, and that they are necessary for organizing team processes and results and for overall corporate performance (Subramony et al., 2018). In addition, the subject of forest governance refers to new forms of management that go beyond the borders of states, and over the years, a wide knowledge has emerged on this subject (Arts & Visseren-Hamakers, 2012).

Executives' performance is important not only for themselves but also for their social reflections. From this point of view, issues such as health, happiness, education, learning, climate change, and disaster response are, in general, just a few examples of the areas that the scientific environment is asked to address in administrative terms (Fard & Karimi, 2015). These examples effectively understand social problems and determine the decisions to be taken by the relevant institution or organization.

Achieving high efficiency by quality is the dream of every organization. Through the consideration of scarce resources, raising the quality of products and services and increasing productivity in line with the demands and expectations of society is the target for every organization. In addition to the forestry organization, many related institutions, such as health, education, and infrastructure, can be given as examples. Investments made by organizations in the human resources management department require employees to develop, maintain and update the competitive sustainability and high performance of the organization and their skills. This helps to increase organizational vision and success (Foster & Akdere, 2006).

Especially in recent years, the evolution of science, medicine, and technology in developed countries has brought great social, cultural, and economic changes. Many business sectors have risen, and the global market has become more challenging and competitive than ever. As a result, an internal culture that reflects the structure and policy of each institution for employees has emerged (Belias et al., 2015). The concept of organizational culture began to attract attention in the 1970s, when organizations began to shift from machine-like entities (where employees were seen as mechanical parts of a larger system), with the realization of how the human factor influenced organizational processes and progress (Kissack & Callahan, 2010).

In general, organizational culture in this sense is defined as a set of shared values, artifacts, language, and rituals that direct the interaction and functioning within an organization (Bettini et al., 2017). Today, it is accepted that organizational culture acts as an engine for changes in organizations. However, organizational culture must be strong and flexible in order to act as an engine for change. Therefore, a strong organizational culture contributes positively to the organization's response to the expectations of its internal and external target groups, the motivation of its employees, and the development of a sense of corporate belonging. On the other hand, successful management requires a good organization and organizational structure. Hence, as in other organizations, it is not possible to talk about sustainable forest management without organizational and managerial success in the forestry organization.

Employees training and development of human resources are among the most emphasized issues in terms of forestry in developed countries (Hajjar & Oldekop, 2018). In a similar way, organizations also have a desire to have well-trained people with certain qualities, characteristics and abilities in order to make the most of their knowledge and skills and thus to achieve their goals and become successful. The objectivity of training and development and the continuous learning process has always been leveraging for many organizations (Gottesman & Morey, 2010). This situation has become a very important trend of social needs by emphasizing that today's organizations should surpass the learning culture as a social responsibility (Niazi, 2011). In addition, many studies in the past helped to establish strong links between various training and development practices and different organizational performance measures (Delery & Doty, 1996; Poole & Jenkins, 1996; Ferris et al., 1999).

Thanks to different social and economic relationships in forest management, great experience has been gained over the centuries. Accordingly, forest management, which is based on the principles of multifunctional forest use, considers the increase in economic production (Martynova et al., 2021). Also, it takes care of environmental criteria (biodiversity, quality characteristics of water bodies, carbon reserves, etc.) (Duncker et al., 2012), recreational use of the forest (Sultanova et al., 2018), fire risks, and the spread risks of pests and diseases (Jactel et al., 2012). Therefore, the expectations and needs of societies from forests should be met by taking sustainable forest resources management principles into account.

In order to ensure the sustainable management of forest resources, it is a necessity to improve human resources in terms of quality and quantity (Szaro et al., 2000). Hence, unless the problems related to human resources in forestry are solved, it is not possible to formulate effective policies, put policies into practice, solve many problems, and realize sectoral development (Hasanagas, 2016). Human resources in forest management are way beyond government employees. They do not have any direct say in forestry management in

Türkiye; however, when the issue is considered in terms of forestry management, forest villagers, representatives of various non-governmental organizations related to forestry, and managers of many institutions, such as highways, state hydraulic works, health education, tourism, etc., which have close working relations with the forestry organization, constitute a group in the forestry management system.

Türkiye's forestry, which has a history of about 180 years, is under public management and ownership. Protection of forest assets and meeting the society's need for forest products and services in a sustainable manner are a duty imposed on the forestry organization by the constitution and laws (Toksoy et al., 2012). The management and operation of forests are carried out by the General Directorate of Forestry and various general directorates affiliated to the Ministry of Agriculture and Forestry and provincial organizations. Also, due to the complex organizational structure, it has various structural problems in Türkiye's forestry (Daşdemir, 1996; Geray, 1998; Gümüş, 2014; Köse et al., 2019). One of the most important issues is the qualitative and quantitative competence of employees in terms of human resources in a forestry organization (Yurdakul Erol & Köse, 2017). Although there are some partial studies (TODAİE, 2002; Türker & Yılmaz, 2010; Yaman, 2010; Toksoy et al., 2012; Köse et al., 2018a,b) on the management and organizational structure in Türkiye's forestry, there is no study dealing with Türkiye's forestry as a whole and investigating the organizational and managerial structure through a multidimensional approach. On the other hand, in order for the forestry organization to achieve its goals and become successful, it must have an ideal organizational structure as well as the necessary competence and performance of its employees (Köse et al., 2019). In fact, the forestry organization has not been able to enough develop itself according to the conditions of the day in matters such as organizational structure, human resources management, and specialization. In this study, since the factors affecting the organizational and managerial structure are handled in a multidimensional manner, it will at least contribute to the recognition of such a deficiency.

This study was conducted in order to reveal the most important factors affecting the organizational and administrative structure in Türkiye's forestry as a whole through a multidimensional approach. This study also aimed to reveal the most important factors affecting the organizational and managerial structure in Türkiye's forestry and to analyze to what extent and in what direction they affected the managerial competence of technical and managerial staff. In this regard, this study determined whether the most important factors affecting the organizational and managerial structure created meaningful and important differences according to various task variables (task region, duty unit, task type, and experience) in terms of the opinions of the employees. This study constitutes an important example for forest managers who work in nature, and also have a deep-rooted organizational management culture in Türkiye. The results of the study will, therefore, contribute to forestry science and sustainable forest management.

Material and methods

This study was carried out in the forestry organizations (The General Directorate of Forestry (GDF), the General Directorate of Nature Conservation and National Parks (GDNCNP), and the General Directorate of Combating Desertification and Erosion (GDCDE)) which are affiliated to the Ministry of Agriculture and Forestry in Türkiye. Nine provinces (İstanbul, İzmir, Antalya, Adana, Bolu, Trabzon, Erzurum, Şanlıurfa, and Ankara), where forestry activities are intensive and which represent nine geographic regions of Türkiye (task regions), were included in the study (Fig. 1). In the study, 15% of the technical staff and managers interviewed work in the Marmara Region (İstanbul), 14% in the Aegean Region (İzmir), 6% in the Eastern Mediterranean Region (Antalya), 14% in the Western Mediterranean Region (Adana), 15% in the Western Black Sea Region (Bolu), 9% in the Eastern Black Sea Region (Trabzon), 17% in the Central Anatolia Region (Ankara), 5% in the Eastern Anatolia Region (Erzurum), and 5% in the Southeastern Anatolia Region (Şanlıurfa). Face-to-face interviews were held with forestry organization employees, and a questionnaire was conducted. The data obtained from the questionnaire application and literature review were used as a material.

The factors affecting the organizational and managerial structure should be handled in a multidimensional way because the knowledge level of the staff and their competence in forest resources management, working conditions and workload, job satisfaction, expectations, etc. are effective on the organizational structure and management of Türkiye's forestry. To determine this effect, 29 variables were identified considering the literature review and expert opinions. While identifying the variables, it was considered that they directly or indirectly affected the organizational and managerial structure and that they could be accepted by experts. For this purpose, firstly, the literature on the subject was reviewed and 40 variables, which were thought to affect the organizational and managerial structure directly or indirectly in Turkish forestry, were identified. Then, the opinions of a number of faculty members, who are experts in forestry management and organization in forestry faculties in Türkiye, and senior executives working in or retired from the forestry organization were consulted. As a result, the number of variables identified in the beginning was reduced from 40 to 29. Among the 29 variables given in Table 1, those based on the Likert Scale are qualitative variables, while the others (Q4, Q10, Q11, Q12, Q13, Q14, Q17, Q20, Q24, Q27, Q28, and Q29) are quantitative variables. During the identification of the quantitative variables, different

Table 1. Defining research variables. SD: standard deviation.

Group	Variable name and description	Code	Min	Max	Mean	SD	Scale
Education and development	The adequacy of undergraduate education at the university	Q1	1	5	2.79	0.74	1-5
	Adequacy of pre-service education	Q2	1	5	2.53	0.76	1-5
	Adequacy of in-service education and development activities	Q3	1	5	2.85	0.73	1-5
	Information most needed in forest resources management	Q4	2	50	37.14	13.86	2-50
	Opportunity to improve yourself in administrative and technical issues	Q5	1	5	2.98	0.75	1-5
Managerial competence	Own competence in forest resources management	Q6	1	5	3.23	0.70	1-5
	Competence of superiors in forest resources management	Q7	1	5	3.00	0.74	1-5
	Competence of subordinates in forest resources management	Q8	1	5	2.74	0.67	1-5
	Competence of technical staff in forest resources management	Q9	1	5	2.95	0.60	1-5
	Knowing the legislation	Q10	2	5	3.33	0.71	2-5
	Following R&D (Research & Development) studies	Q11	1	3	1.86	0.60	1-3
	Defining managerial and organizational success in forestry	Q12	1	74	55.90	30.30	1-74
	Identifying the most important variables affecting success in forestry	Q13	4	57	36.77	23.50	4-57
Working conditions and workload	The most important variables affecting work efficiency	Q14	3	47	32.63	9.38	3-47
	Possibility of applying scientific knowledge, thoughts, and experiences	Q15	1	5	2.70	0.85	1-5
	Ability to make and implement decisions appropriate to local conditions	Q16	1	5	2.48	0.88	1-5
Organizational expectations and job satisfaction	Realization degree of expectations	Q17	1	4	2.59	0.75	1-4
	Believing that expectations for the future will come true	Q18	1	5	2.26	0.89	1-5
	Satisfaction from the work done	Q19	1	5	2.92	0.92	1-5
	The main variables affecting job satisfaction	Q20	2	41	23.20	15.28	2-41
	Satisfaction with their wages	Q21	1	5	2.56	0.88	1-5
Communication and solidarity	Discussing thoughts and opinions with subordinates	Q22	1	5	3.68	0.86	1-5
	Discussing thoughts and opinions with superiors	Q23	1	5	3.06	1.01	1-5
	Things to be done for the monitoring and evaluation system	Q24	2	82	58.26	24.75	2-82
	Institutional support of the upper authorities	Q25	1	5	2.32	1.04	1-5
	Individual support and solidarity of colleagues	Q26	1	5	2.84	0.95	1-5
Motivation and rewarding	Evaluating the relationship between success and appointed, promoted, appreciated, premium and rewarded, etc.	Q27	-1	2	0.27	0.80	-1-2
	Things to do to increase the motivation/success of the employees	Q28	4	42	24.40	15.26	4-42
	Performance measurement system in forestry organizational structure	Q29	1	4	3.10	1.08	1-4

Table 2. Number of participants interviewed by geographic regions and duty units

Geographic regions	GDF		GDNCNP		GDCDE		Center of the MFWA		General	
	Staff	Sample	Staff	Sample	Staff	Sample	Staff	Sample	Total Staff	Total Sample
Marmara (İstanbul)	721	62	73	9					794	71
Aegean (İzmir)	693	59	57	5					750	64
Western Mediterranean (Antalya)	335	27	30	3					365	30
Eastern Mediterranean (Adana)	459	49	30	15					489	64
Western Black Sea (Bolu)	680	68	34	4					714	72
Eastern Black Sea (Trabzon)	364	30	20	4					384	34
Central Anatolia (Ankara)	692	65	79	6	48	5	54	4	873	80
Eastern Anatolia (Erzurum)	187	20	21	3					208	23
Southeastern Anatolia (Şanlıurfa)	89	18	38	7					127	25
TOTAL	4220	398	382	56	48	5	54	4	4704	463

GDF: General Directorate of Forestry. GDNCNP: General Directorate of Nature Conservation and National Parks. GDCDE: General Directorate of Combating Desertification and Erosion. MFWA: Ministry of Forestry and Water Affairs.

preferences that are likely to affect these variables were presented to the participants, and each quantitative variable and its scale were created by considering the answers given by the participants and their percentage preferences. Accordingly, a questionnaire form with 29 questions was developed according to the variables in Table 1. The questions in the form were collected under six groups as 1) education and development, 2) managerial competence, 3) working conditions and workload, 4) organizational expectations and job satisfaction, 5) communication and solidarity, 6) motivation and rewarding.

Data collection method

The total number of managers and technical staff (N) in the central and provincial forestry organizations (GDF, GDNCNP, and GDCDE) affiliated to the Ministry of Agriculture and Forestry in Türkiye was 4704 in 2016. The number of employees to be interviewed within the scope of the research was calculated using the following formula (Eq. 1), which gives the sample size at limited communities (Daşdemir, 2019):

$$n \geq \frac{Z^2 \cdot N \cdot p \cdot q}{N \cdot D^2 + Z^2 \cdot p \cdot q} \quad (1)$$

where n is the sample size, Z is reliability coefficient (Z=1.96 for 95 % of confidence level), N is the size of the population (N=4704), p is the existence possibility of the measured feature in the population, q is the absence possibility of the measured feature in the population (p=0.5; q=0.5 a), and D is acceptable sampling error (0.05).

According to these data, the n value was calculated as 355, and it was determined that interviews should be conducted with at least this number of employees. The minimum number of interviewees was determined in each region by multiplying the number of employees in each region of Türkiye and the calculated n/N coefficient (0.098=463/4704). However, the number 355 was exceeded, and 463 people were interviewed in the study. The number of employees (technical staff and managers) working in the forestry organization in Türkiye's nine geographic regions was as follows: a total of 4704 people including 794 in the Marmara Region, 750 in the Aegean Region, 365 in the Western Mediterranean Region, 489 in the Eastern Mediterranean Region, 714 in the Western Black Sea Region, 384 in the Eastern Black Sea Region, 873 in the Central Anatolia Region, 208 in the Eastern Anatolia Region and 127 in the Southeastern Anatolia Region. According to the coefficient n/N (=0.098), interviews were conducted with a total of 463 employees, successively including 71, 64, 30, 64, 72, 34, 80, 23, and 25 people in these regions (Table 2). The people interviewed in each region were determined according to the random sampling method.

The interviews were conducted in 2016. The interview applications started with a preliminary trial. In the pre-trial, the evaluations of the participants about the questionnaire application were determined, and necessary corrections were made. In this process, based on the complaints from the participants, the incomprehensible questions

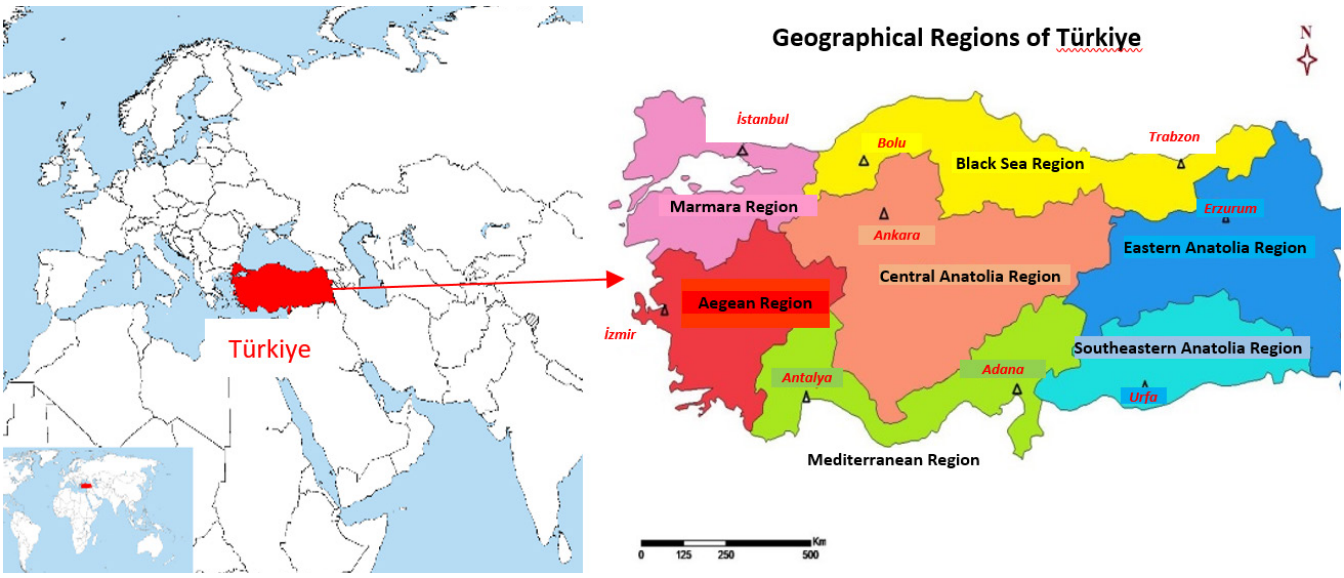

Figure 1. Study area map.

were made more understandable, the missing points were corrected, and the questionnaires were finalized. Afterward, all of the participants were interviewed face-to-face, necessary explanations were made, and an interview application was carried out. During the interviews, firstly, the importance of the subject was explained to each participant, and the participants were asked to get information in case of questions that were not understood in the questionnaires.

Data evaluation method

Factor analysis was carried out in order to reveal the organizational structure and to determine in how many different dimensions the questions were perceived by the respondents. Factor analysis tries to comprehend a multivariate structure with fewer factors consisting of variables that are highly correlated with each other and come together in a meaningful way (Sipahi et al., 2006; Gürbüz & Şahin, 2016).

In the study, factor analysis was used to determine the most important factors affecting the organizational and managerial structure in Türkiye's forestry based on 29 variables in Table 1. Factor analysis was carried out in four basic stages. In the first stage, the suitability of the data for factor analysis was evaluated; in the second stage, the common factors were derived; in the third stage, the factors were rotated; and in the fourth stage, the factors were named and interpreted. Kaiser-Meyer-Olkin (KMO) and Bartlett tests were used to evaluate whether the data were suitable for factor analysis (Akgül & Çevik, 2003).

The Principal Component Analysis method (PCA) was used to derive common factors. The number of common factors was determined according to the Kaiser Criterion, and the Varimax rotation method was used for the orthogonalization of the factors. The data of the factor analysis, in which the 463 × 29-dimensional data matrix was used as input, were obtained from the responses of the interviewees to 29 variables in the questionnaire. Each of the 29 questions was defined as a variable affecting the organizational and managerial structure.

The data were found to be suitable for factor analysis because KMO coefficient (0.829) and Bartlett test results ($\chi^2 = 2928.910$; $p < 0.05$) were found to be significant. During the solution, the variables with anti-image correlation below 0.5 were excluded from the analysis (Q12), factor analysis was re-performed with the remaining variables, and no overlapping factor was seen. Additionally, the questions in univariate factors and variables with factor loads below 0.5 (Q1, Q5, Q6, Q10, Q11, Q21, Q27) were removed from the analysis, and the factor analysis was renewed. The process of the renewal of the analysis was continued by excluding the variables with an anti-image correlation below 0.5 (Q4, Q29) and the variables with a factor load below 0.5 (Q22 and Q23) from the analysis.

In order to facilitate the naming and interpretation of the factors, factor loads higher than 0.5 were taken into account as absolute values (Kaiser, 1958; Harman, 1976; Daşdemir, 1996). Then, the variables belonging to each factor were subjected to factor-based reliability analysis and Cronbach's Alpha (α) values were calculated. The variables related to the factors with $\alpha < 0.70$ were excluded from the analysis (Kalaycı, 2014). If $\alpha \geq 0.70$, this value was accepted as the limit since it indicates that the scale was reliable.

Additionally, multiple linear regression analyses were performed by accepting three of the factors (F1, F2, F4) determined by factor analysis as independent variables (predictors) and by taking eight variables (Q6, Q7, …, Q13) related to managerial competence (Table 1) as dependent variables (responses). This relation is presented in the following regression equation (Eq. 2);

F3 (Q6, … ,Q13) = constant+β1F1+β2F2+β3F4+error (2)

Besides, Kruskal-Wallis H Test was used to check whether the dimensions (factors) perceived by the interviewees showed a statistically significant difference according to various task variables (task region, duty unit, task type, and experience), and different groups were determined by post-hoc multiple comparison test. Excel-2013 and SPSS (23.0 version) programs were used to evaluate the data.

In this study, each of three general directorates (GDF, GDNCNP, and GDCDE) was considered as a "duty unit". Each of the nine geographical regions was considered as a "task region". "Task type" represents the tasks such as engineer, enterprise chief, enterprise director, deputy enterprise director, branch director, regional director, and deputy regional director, etc. Here, engineers are technical staff working as engineers in the forestry organization. The person who is primarily responsible for the field in forestry practices is the enterprise chief. The enterprise chief is the main responsible person for the execution of many forestry-related works, each of which requires a separate expertise, such as protection of forests, silvicultural practices, permits, and easement works. Forest engineers working in the public sector usually start their career as enterprise chiefs because enterprise chiefs are the lowest level managers in the forestry organization. The enterprise director is the manager for whom enterprise chiefs are primarily responsible for forestry-related works. The deputy enterprise director is the assistant to the business manager. Branch directors are experts in their fields. They mostly act as consultants and guides. Regional director is a senior manager for whom enterprise directors are primarily responsible due to their duties. The deputy regional director is the assistant of the regional director. "Experience" is the expression, in years, of the duration of employment in the forestry organization of those performing the task types.

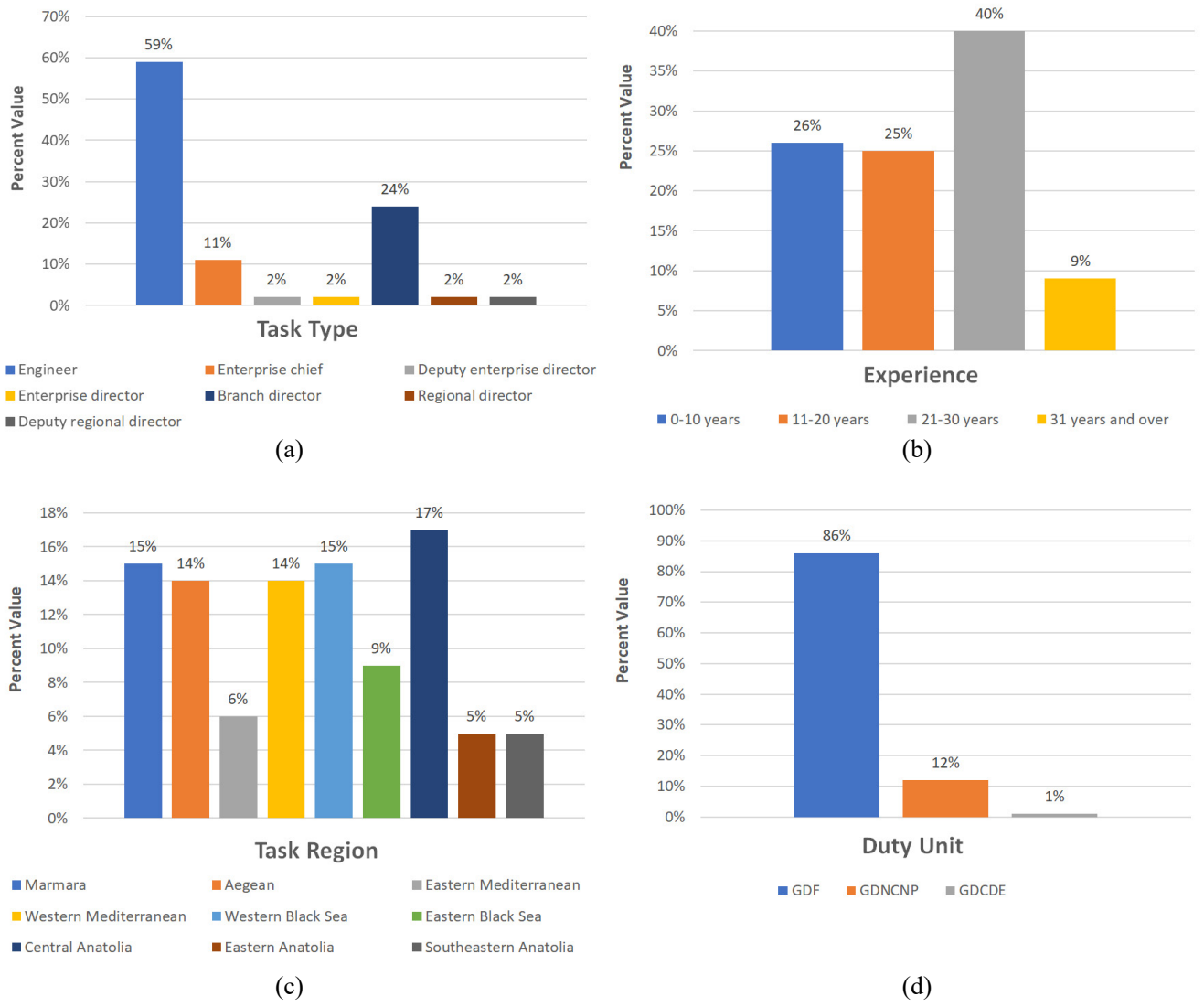

Figure 2. Percentage distribution of employees by: (a) task type, (b) experience, (c) task region, (d) duty unit.

Table 3. Factors derived with factor analysis and amount of explained variance.

Factors	Initial eigenvalues			Rotation sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
F1	3.69	33.58	33.58	2.56	23.29	23.29
F2	1.46	13.24	46.83	1.64	14.94	38.23
F3	1.16	10.56	57.39	1.61	14.59	52.82
F4	1.09	9.89	67.28	1.59	14.46	67.28

Results

General results and evaluations

The percentage distributions of the participants working as technical personnel and managers in the forestry organization by task type, experience, task region and duty unit are given, respectively, in Figs. 2a, b, c, d. Accordingly, the majority of the participants (59%) were working as engineers, and the ratio of those who had been working for 21-30 years was the highest (40%). Since the central organization of the forestry organization is in Ankara, the rate of employees in the Central Anatolia Region was the highest (17%). In addition, the rate of employees (86%) in GDF was very high compared to the other duty units.

The majority (65%) of 463 technical staff and managers working in the forestry organization have been working for 0-5 years in their current administrative duties. The proportion of those who have worked in the same place for 6-10 years is 22%. The rate of those working in the same administrative position for 11 years or more is 13%; 87% of the interviewees working in administrative duties have continued their duties for a maximum of 11 years. Additionally, 24% of them have an MA or PhD degree, and 3% completed another faculty. These ratios are an important development in terms of training qualified managers and technical staff.

Most important factors affecting the organizational and managerial structure

Factor analysis was applied to determine the most important factors affecting the organizational and managerial structure. As a result of the factor analysis, four common factors with the amount of participation in the variance greater than 1 (Kaiser Criterion) were derived by using the Principal Component factor derivation method and Varimax rotation method. Then, the variables of each common factor were subjected to factor-based reliability analysis and their values were calculated. The variables (Q7, Q13, Q14, Q20, Q24, Q28) related to the factors with $\alpha < 0.70$ were excluded from the analysis, and the factor analysis was repeated. The explained variance values before and after rotation related to the four common factors obtained as a result of the factor analysis made with the remaining 11 variables and the variance percentages of the factors are given in Table 3.

The first factor derived from the factor analysis was the most important one, and the variance percentages of the factors as a result of rotation varied between 23.29% and 14.46%. Accordingly, ~ 67% of the opinions regarding the organizational and managerial structure of the interviewees employed in the forestry organization were explained by these four common factors. The rotated factor matrix, which consists of factor loads and shows the relationship of the variables with factors as a result of the factor rotation process performed to facilitate the interpretation and naming of the common factors scientifically, is given in Table 4. Accordingly, the common factors were interpreted and named as follows.

Factor 1 consists of the variables Q15, Q16, Q19, Q17, and Q18. These variables are related to the ability of the forestry organization employees to apply their scientific thoughts and experiences and to make decisions appropriate to local conditions, job satisfaction, and their expectations for the present and the future. Therefore, it is possible to name and interpret this factor as *"working conditions and job satisfaction"*. According to the analysis results, F1 was the most important factor affecting the organizational and managerial structure. The Q15 variable was taken as the measure of F1 because it had a higher factor load (0.765) than the others.

Factor 2 contains the Q2 and Q3 variables. These variables are related to pre-service and in-service education. Therefore, this factor was named and interpreted as *"educational level of employees"*. Q2, one of the variables that make up this factor, was taken as the measure of F2.

Factor 3 includes the Q9 and Q8 variables, which are related to the competence of technical staff and subordinates in forest resources management in terms of managerial and technical knowledge. For this reason, F3 was named and interpreted as *"technical and managerial competence"*, considering the common features of the two variables that make up F3. However, Q9 was taken as the measure of F3 because it had a higher factor load (0.878).

Factor 4 consists of variables Q26 and Q25. This factor includes the opinions of the employees of the institution about solidarity with each other and the institutional sup-

Table 4. Factors affecting the organizational and managerial structure as a result of factor rotation.

Variables	Factors			
Code	F1	F2	F3	F4
Q15	0.765			
Q16	0.713			
Q19	0.707			
Q17	0.669			
Q18	0.609			
Q2		0.852		
Q3		0.846		
Q9			0.878	
Q8			0.859	
Q26				0.877
Q25				0.828

port of the higher authorities. This factor was named and interpreted as *"solidarity and institutional support",* considering the common feature of the two variables that make up F4. However, Q26 had a higher factor load (0.877); therefore, it was taken as the measure of F4.

Subsequently, the most important factors affecting the organizational and managerial structure and some of their features in Türkiye's forestry are presented in Table 5.

Factors effective on technical and managerial competence

To determine how and to what extent F1, F2, and F4, the most important factors affecting the organizational and managerial structure, were effective on the managerial competence of the technical and managerial staff (F3), F1, F2, and F4 factors were accepted as independent variables (predictors), and the eight variables (Q6, Q7, Q8, Q9, Q10, Q11, Q12, and Q13) in the managerial competence group of Table 1 were considered as dependent variables (responses), and multiple linear regression analyses were performed (Table 6).

Table 6 shows which variables were statistically significant in eight regression models and the statistics of these models (R^2, F, and p values). Accordingly, three independent variables (F1, F2, and F4) had a significant effect in five regression models (Q6, Q7, Q8, Q10, and Q11) while they did not have a significant effect in three models (Q9, Q12, and Q13). In other words, none of the F1, F2, and F4 factors had a significant effect on the variables of "competence of technical staff in forest resources management (Q9)", "defining managerial and organizational success in forestry (Q12)" and "identifying the most important factors affecting success in forestry (Q13)". Increases in the F1 and F2 factors created positive effects on the variables of "own competence in forest resources management (Q6)", "competence of superiors in forest resources management (Q7)", "competence of subordinates in forest resources management (Q8)", "knowing the legislation (Q10)" and "following

Table 5. The most important factors affecting the organizational and managerial structure and some of their features.

Factor No	Name of factor	Weight of factor (%)	Indicator variable of factor	Variable weight	Reliability (α)
F1	Working conditions and job satisfaction	23.29	Q15	0.765	0.769
F2	Educational level of employees	14.94	Q2	0.852	0.720
F3	Technical and managerial competence	14.59	Q9	0.878	0.715
F4	Solidarity and institutional support	14.46	Q26	0.877	0.732
	TOTAL	67.28			

Table 6. Multiple linear regression analysis results.

	Regression models							
	Predictor variable							
	Q6	**Q7**	**Q8**	**Q9**	**Q10**	**Q11**	**Q12**	**Q13**
Constant	3.23*** (0.03)	3.00*** (0.03)	2.74*** (0.03)	-	3.34*** (0.03)	1.86*** (0.03)	-	-
Response variables								
F1: Working conditions and job satisfaction	0.21*** (0.03)		0.07** (0.03)	-	0.18*** (0.03)	0.14*** (0.03)	-	-
F2: Educational level of employees	0.13*** (0.03)	0.19*** (0.03)	0.07** (0.03)	-	0.15*** (0.03)	0.07*** (0.03)	-	-
F4: Solidarity and institutional support	-0.09*** (0.03)	0.14*** (0.03)	0.06** (0.03)	-	-0.07** (0.03)	-0.01* (0.03)	-	-
R^2	0.14	0.17	0.03	0.01	0.12	0.07	0.00	0.00
F	24.58	30.63	5.09	1.97	21.67	11.68	0.01	0.53
p	0.00	0.00	0.00	0.12	0.00	0.00	0.99	0.67

Values in parentheses are standard errors. *,**,***: $p<0.10$, $p<0.05$, $p<0.01$, respectively

R&D studies (Q11)". Increases in the F4 factor had a positive effect on Q7 and Q8, while they had a negative effect on Q6, Q10, and Q11.

Testing differences of factors affecting the organizational and managerial structure according to some task variables

Kruskal-Wallis H test was used to investigate whether the most important factors (F1, F2, F3, F4) affecting the organizational and managerial structure obtained as a result of the factor and reliability analyses were different according to the various features of the employees or task variables (task region, duty unit, task type, and experience), and different groups were determined by post-hoc multiple comparison test (Table 7).

In terms of *"task region"*, nine different task regions were established for the interviewees based on the data obtained in the study. According to the difference audit results in Table 7, it was observed that the opinions of the interviewees differed according to their task regions in terms of the factors F1 and F2, while there was no significant difference in the opinions of the interviewees in terms of F3 and F4 factors. Accordingly, the interviewees in the Western Black Sea (Bolu), Eastern Black Sea (Trabzon), and Eastern Anatolia (Erzurum) regions accepted the opinions (variables) about the *"working conditions and job satisfaction (F1)"* and *"educational level of employees (F2)"* factors more than the interviewees in the other regions.

There were differences among duty units in terms of other factors, except for F3 (Table 7). Hence, the employees in the GDNCNP and GDCDE further accepted the thoughts about the F1 factor. On the other hand, the employees in the GDCDE were more sensitive about the F2 factor. However, the employees in the GDNCNP generally give more importance to the opinions about the "solidarity and institutional support" (F4).

According to the difference audit results in terms of *"task type"*, it is seen that the opinions of task types differ in terms of all other factors except for the *"technical and managerial competence (F3)"* factor (Table 7). According to this, those working as forest enterprise chief, enterprise director, deputy enterprise director, regional director, and deputy regional director adopted more ideas about the *"working conditions and job satisfaction (F1)"* factor than those who have other positions. Those working as deputy enterprise director, branch director, regional director, and deputy regional director are more likely to agree with the "*educational level of employees (F2)"* factor. On the other hand, those working as forest enterprise chief, enterprise director, and deputy enterprise director are more likely to adopt the opinions about the *"solidarity and institutional support (F4)*" factor than those working in other positions (engineer, branch director, regional director, and deputy regional director). For that reason, those who work directly in the application need institutional support more.

Four different groups were formed as less (≤10 years), medium (11-20 years), much (21-30 years), and too much (≥31 years) in terms of *"experience"*. There was no significant difference in terms of *"working conditions and job satisfaction" (F1)* and *"technical and managerial competence" (F3)* factors according to the duration of experience; however, the views of the experience groups differ in terms of other factors (*educational level of employees-F2,*

Table 7. Examination of differences in factors affecting the organizational and managerial structure according to some task variables.

Factors	Kruskal-Wallis H test results			Identify differences by post-hoc multiple comparison test (groups and in-group elements were ranked as to their significance level)			
	Criteria	Chi-square value	DF	Different groups			
				No.	Group elements	$\bar{X}$	N
F1: Working conditions and job satisfaction	Task region	25.18**	8	1	İzmir and Urfa	2.40	89
				2	İstanbul and Adana	2.49	135
				3	Ankara and Antalya	2.63	110
				4	Bolu, Trabzon and Erzurum	2.83	129
	Duty unit	9.93**	2	1	GDF	2.56	405
				2	GDNCNP and GDCDE	2.81	58
	Task type	27.45**	5	1	Engineer and branch director	2.58	3384
				2	Enterprise chief and enterprise director	2.75	59
				3	Deputy enterprise director, regional director, and deputy regional director	3.08	20
	There was no significant difference in terms of experience					--	--
F2: Educational level of employees	Task region	30.77**	8	1	İstanbul, İzmir and Urfa	2.48	160
				2	Ankara, Adana and Antalya	2.71	174
				3	Bolu, Trabzon and Erzurum	2.88	129
	Duty unit	9.42**	2	1	GDF and GDNCNP	2.76	458
				2	GDCDE	3.40	5
	Task type	22.85**	5	1	Engineer, enterprise chief, and enterprise director	2.71	332
				2	Deputy enterprise director, branch director, regional director, and deputy regional director	2.97	131
	Experience	10.84*	3	1	Less and medium experienced (0 -20 years)	2.59	238
				2	Much and too much experienced (≥21 years)	2.83	225
F3: Technical and managerial competence	There was no significant difference in terms of task region, duty unit, task type, and experience					--	--
F4: Solidarity and institutional support	There was no significant difference in terms of task region					--	--
	Duty unit	13.15**	2	1	GDF and GDCDE	2.41	410
				2	GDNCNP	2.97	53
	Task type	13.24*	6	1	Engineer, branch director, regional director, and deputy regional director	2.44	132
				2	Enterprise chief, enterprise director, and deputy enterprise director	3.01	68
	Experience	17.57**	3	1	Too much experienced (≥31 years)	2.21	40
				2	Medium and much experienced (11-30 years)	2.56	302
				3	Less experienced (0 -10 years)	2.78	121

*,**: significant at 0.05 and 0.01 confidence levels, respectively

solidarity and institutional support-F4) (Table 7). According to this, the thoughts about the *"educational level of employees (F2)"* are more likely to be adopted by those who have "much and too much experience (≥21 years)". This situation shows that as the experience duration increases, the importance given to education increases. On the other hand, those with "less experience (≤10 years)" are more sensitive about the *"solidarity and institutional support (F4)"* factor.

Discussion

In this study, the factors affecting the organizational and managerial structure in Türkiye's forestry were analyzed with a multidimensional approach. As a result of the factor analysis with 29 variables, approximately 67% of the factors affecting the organizational and managerial structure were explained by four factors: (1) working conditions and job satisfaction, (2) educational level of employees, (3) technical and managerial competence, (4) solidarity and institutional support.

In a study conducted by Yaman (2010) in the forestry organization of Zonguldak and Kastamonu in Türkiye, the most important factors affecting organizational and managerial success were as follow, respectively: (1) freedom and satisfaction at work, (2) managerial competence of superiors, (3) managerial and technical competence of technical personnel, (4) wages and working conditions, (5) autonomy, communication and motivation. In another study conducted by Yılmaz et al. (2009) in the Mersin Regional Directorate of Forestry and its affiliated forest management directorates in Türkiye, the most important factors affecting the job satisfaction of employees were: (1) participation in management and opportunity for promotion, (2) independence-creativity-pretentiousness, (3) conscientiousness (spiritual peace), (4) technical and managerial competence of managers, and (5) wages and working conditions. Although the studies conducted by Yılmaz et al. (2009) and Yaman (2010) had a regional dimension, when evaluated in terms of their results, they showed great similarities with this study.

Furthermore, linear regression analyses were performed to determine the effects of the most important factors, which affect the organizational and managerial structure in Türkiye's forestry, on the managerial competence of the technical and management staff. Accordingly, the technical and managerial staff found themselves, their subordinates and superiors sufficient in forest resources management, whereas to the extent that they had the opportunity to apply scientific thoughts and experiences and to make and implement decisions in accordance with local conditions was found out along with their satisfaction with the work done and realization of their future expectation.

On the other hand, increasing the pre-service and in-service training provided to the employees helps to increase the legislation knowledge required in the execution of forestry activities and to follow up R&D studies. The key factor for the success of any organization is to recruit talented employees, retrain them and employ them in order to achieve a set of goals (Lindner & Wald, 2011; Maruta, 2012). According to Köse et al. (2019), pre-service and in-service training was considered inadequate by the majority of the interviewees. Also, it is known that socio-economic courses are more important in forestry education and training in countries where contemporary forestry mentality is dominant (Geray, 1993; Lorincová et al., 2016; Köse et al., 2019). In some studies conducted in Türkiye, it was determined that forest engineers mostly needed socio-economic comprehensive courses such as management and organization, public relations, decision-making methods, and scientific research methods (Çepel, 1984; Daşdemir, 1998). While the share of the courses with socio-economic content in the forestry education of some universities in the USA, Australia, and Sweden varies between 23 and 36%, this rate is 14-17% in Türkiye (Daşdemir, 2016). This situation reveals that although 20-60 years have passed, there has not been much change in the content of the education that forest engineers receive at universities and the pre-service and in-service trainings they receive in the forestry organization. In addition, this reveals that pre-service and in-service training related to the profession should be aimed at improving themselves, solving problems encountered in the profession, and applying them to social and economic issues.

In addition, the individual support of colleagues and the institutional support of upper authorities support the idea of finding sufficient subordinates and superiors in forest resources management. Being in constant expectation of support from others and upper managers in the face of problems leads to the weakening of the thought of the staff to find themselves competent in forest resources management, and it also makes it difficult to develop the necessary legislative knowledge in the execution of forestry activities and to follow up R&D studies.

Besides, there were significant differences between the opinions of the employees according to various task variables (task region, duty unit, task type, and experience). The high-level managers (regional director and deputy regional director) and the mid-level managers (forest enterprise chief, enterprise director, and deputy enterprise director) attach importance to applying their scientific ideas and experiences in the field. Furthermore, all the managers draw attention to making decisions regarding forestry activities in accordance with local conditions because each geographic region of Türkiye has different ecological conditions, and forest structures in terms of forestry activities. In this context, the employees in the Black Sea and Eastern Anatolia regions, which have very difficult land structures, were more sensitive in terms of "working conditions and job satisfaction" and "education of employees" factors. Therefore, making decisions appropriate to local condi-

tions and allowing technical and managerial staff to apply their knowledge and experience in the field are important for the sustainable management and planning of natural resources. This situation also had a positive effect on meeting employee expectation from the profession and job satisfaction since an attractive and supportive work environment is one of the most important factors affecting the job satisfaction level and motivation of employees (Agbozo et al., 2017). Institutional loyalty and trust in the institution increase as the expectations regarding the profession are realized (Meng & Berger, 2019). Obviously, the increase in the job satisfaction and motivation of employees and in the level of corporate loyalty and trust in the institution will contribute to the realization of corporate goals and objectives.

Organizations determine their strategies by considering their own competencies and resources. For this, in order to achieve the goal with the least expense and effort, the necessary order should be created and the members of the organization should cooperate in full harmony (Çubukçu, 2018). The balance between forest management practices and forest ecosystem services can be harmonized when the behavior and power of stakeholders and environmental justice are well understood (Barlı et al., 2006; Paloniemi et al., 2015). The mid-and high-level managers attach more importance to the in-service and pre-service training of the employees. At the same time, as the experience duration increases, the importance given to education increases. On the other hand, the employees with less experience and those who work directly in the application need more individual solidarity and institutional support between the colleagues. It is a natural and real result that the employees, who are not well-versed and experienced in the profession, and especially forest enterprise chiefs need more solidarity and institutional support because in Türkiye's forestry, forest enterprise chiefs are primarily responsible for the execution of many works, each of which requires different expertise. Forest enterprise chiefs are also legally responsible for the protection of all forests in their area of responsibility, which causes forest enterprise chiefs to be under a heavy workload and to not be adequately specialized in any business line.

In this regard, Kalıpsız (1963), Türkmen (1972), Daşdemir (1999), Geray (2001), TODAİE (2002) and Köse et al. (2018a,b) proposed the establishment of service units based on specialization within the forest enterprise directorates and the restructuring of the forestry organization accordingly. Additionally, sharing work in a balanced manner, division of labor, and cooperation between units, believing that the expectations regarding the profession will come true, and participating in management directly affect the management mentality in the forestry organization of Türkiye. As a matter of fact, Türker & Yılmaz (2010) emphasize that an effective and efficient management and organization based on expertise, flexible and stable working in accordance with the requirements of strategic management will considerably eliminate the problems in forestry organization. Achieving this will only be possible with forestry policies that will be put forward correctly and effectively (Gümüş, 2014).

The most important success factors in global competition are people's competencies, motivation to learn and realize, leadership and cooperation, corporate values, and culture (Kučerová et al., 2015). Also, employees are seen as the most important factor in the success and failure of any organization (Ahmad et al., 2012). In other words, in terms of sustainable forest resources management, first, human resources should be managed well. In this context, it is seen that the concepts of education, motivation, working conditions, and managerial and organizational success in forestry stand out in terms of sustainable forest resources management (Tumpach et al., 2018; Köse et al., 2019).

One of the most important factors affecting decisions regarding human resources management is organizational culture (Florentina & Maxim, 2012). It is an organizational culture that draws a framework for those working in decision making in organizations, drives the organizational structure, ensures coordination by gathering employees around common goals, facilitates the executive function by helping to mobilize the workforce in line with these purposes, and provides control by shaping employee behaviors (Gün & Derin, 2017). Organizational culture has been formed in relation to the practices and policies carried out in the forestry organization for approximately 180 years in Türkiye, as parallel with the developments in the world. In this sense, some factors, such as the staff in the forestry organization having hierarchically up-down relationships, shares, educational levels, professional expectations, corporate goals and objectives, corporate structure, etc., have been effective in the formation of this culture. Therefore, it is thought that it will be beneficial to consider the findings of this study in order to achieve institutional goals.

Conclusion

It was revealed that the employees in the forestry organization thought differently and had different expectations in terms of working conditions and job satisfaction, educational level, technical and managerial competence, solidarity and institutional support factors according to some task features (task region, duty unit, task type, and experience). At this point, firstly, there is a need to improve working conditions as well as legal and administrative regulations and economic and social developments in order to ensure this. The education system in forest faculties should be arranged in accordance with the contemporary forestry mentality, in a way to focus on socio-economic content courses and applied education. Another important point is that giving employees, especially in managerial positions, the opportunity to have postgraduate education and applying their knowledge and experience will increase their job satisfaction and

help them to find themselves managerially competent and be effective in participating in administrative decisions. It is clear that the deficiencies in technical matters can be supported by graduate or certificate programs, and at the same time, it will develop the feeling of being owned within the organization. In addition, emphasis should be placed on in-service training in order to improve the institutional commitment of new staff members, to increase their knowledge, and to continuously improve themselves. The institution's human resources must transform itself into a system that constantly learns and develops.

Consequently, if the necessary importance is given to working conditions and job satisfaction, the educational level of employees, technical and managerial competence, solidarity and institutional support, and if necessary improvements are made in these matters in Türkiye's forestry, the organizational and managerial structure will develop, the success will increase in state forest management, and positive contributions will be provided to sustainable forestry. The training and experience of forestry organization employees will affect the delivery of ecosystem services for the benefit of society. Likewise, policies, legal regulations regarding forestry, and the behavior of stakeholders have different effects on the ecosystem structure and management of ecosystem services. In fact, non-governmental organizations related to forestry, associations, foundations, and universities in Türkiye will contribute to the protection and development of forests. Also, the characteristics of forestry technical personnel and managers, policies and legal regulation, practices related to forestry, and the participation of relevant stakeholders in the management will affect the sustainable management of forests.

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