DETERMINATION OF STAKEHOLDERS' PERCEPTION OF STUMPAGE SALES POLICY IN FOREST MANAGEMENT DIRECTORATE: A CASE STUDY FROM WESTERN BLACK SEA REGION OF TURKEY

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ABSTRACT

This paper is aimed to determine the stakeholders' perception against a new forest management policy for stumpage sales in the Western Black Sea Region of Turkey. Ownership of country's forests (99.9%) belongs to the government and timber production and sales have been managed by The General Directorate of Forest (GDF) in Turkey. In the last decade, GDF applied the new stumpage policy to increase efficiency and decrease costs of management procedures because of the last policy's deficiency. In the case of stumpage policy, it is also important to consider benefits of this policy change to stakeholders. There are four main stakeholders in stumpage policy: forest management (GDF's technical personal, forest engineers), forest villagers (FV), forest cooperatives (FC), forest industry and logging contractors (FI). To analyze and evaluate these factors, this paper examines the perception and point of views of the stakeholders, using a large number of survey data. The structural equation modeling results show that the stumpage policy needs to be revised by the forest management due to stakeholders' negative perception related to technical, social and managerial aspects of the stumpage policy. This policy should be reconsidered to decrease the negative perception of the stakeholders and improved by the participatory approach by decision makers in Turkish forestry.

KEYWORDS:
Stumpage policy, Stakeholder analysis, Perception, Structural equation modeling, Forest management, Turkey

INTRODUCTION

Regular forestry activities in Turkey were established by constituting the first forest law and institution, The General Directorate of Forest (GDF) at the end of the 1930s. The GDF was a state administration responsible for the management and conservation of the State forests that constitute 99.9% of the country's forests. In the period between 1937 and 1969, the GDF conducted all of the forestry activities under the Ministry of Agriculture and financed its activities by using the funds allocated by the government and the revenues from its own commercial activities, such as timber selling, entrance fees, etc. Given the diverse forest ecosystems and social-cultural structure of the country, almost all forest resources have been planned and managed under government jurisdictions over approximately 77 years [1].

In Turkey, the forest industry mainly meets the demand of wood raw materials from state forest enterprises. In Turkey, an average of 10 million m^3 of round timber is sold annually by the auction method from the sales depots of state forest enterprises [2]. However, the forest industry also imports about 3 million m^3 of round wood per year, in order to meet the need of wood raw materials. Sales policies can be classified in two major methods by GDF in Turkey. First one is the bid-based timber a sale, which is the most used policy for timber selling by GDF in the last 60 years. The second selling method is the stumpage policy which is the newest application in the last decades in Turkeys forestry. GDF has decided to increase the portion of stumpage in total forest product sales in the entire country.

The main purpose of the present study is to investigate and discuss the perceptions of stakeholder groups towards stumpage policy in Turkey. Another primary purpose is to determine the stumpage policy-related perceptions of stakeholder groups regarding six sub-factors (technical, economic, social, legal, managerial, environmental). Therefore, this study is focused on of the perception by stakeholder groups of stumpage sales (DASU, acronym for stumpage sales practice in Turkish) from the State forests in Turkey, with regard to technical, social, economic and environmental dimensions. Multivariate statistical techniques and structural equation modeling (SEM) methodology was used to analyze the views of stakeholders regarding stump-

age policy. Incidentally, there will be an analysis of forest villagers' perceptions about the changes in stumpage policy. This research intends to contribute to an understanding of the issue and to help reach better public decisions in this regard.

Primary stakeholders' perceptions regarding issues related to stumpage policy set out in a statistically adequate way, using structural equation modeling and multivariate statistical analysis methods. Measurement models created to assess standing on stakeholders' perceptions related to stumpage policy and stakeholder management strategies. The primary results of the study, which will be based on scientific grounds regarding the development of stumpage policy, can provide technical data.

MATERIALS AND METHODS

Theoretical framework. Since standing timber, unlike timber from depot sales, is harvested only after the purchase, expectations and uncertainties about harvest conditions also need to be considered when setting a price. The amount of competition between buyers also has an influence on stumpage prices and cost of timber [3].

Sales policies can classify two basic methods by GDF in Turkey. First one is the bid-based timber a sale, which is the most used policy for timber selling by GDF in the last 60 years. The second selling method is the stumpage policy which is the newest application in the last decades in Turkeys forestry. GDF has decided to increase the portion of stumpage in total forest product sales in the entire country.

This policy change would surely bring about a series of immediate consequences as well as further repercussions in regards to the mode, quantity, assortment, timing and continuation of the public timber harvest in the country, since state-owned forests make up virtually the entire forest base of Turkey. This issue is also critical because it involves the socio-economic conditions of FV and FC who are traditionally employed by the state in timber harvesting. The forest industry and logging contractors (FI) are increasingly becoming important stakeholders, particularly the latter was a novelty until just a few years ago. The main stakeholders in the stumpage policy can be described as the GDF, FI, FV, and FC.

Study area and data. The study area has been chosen from GDF's 27 Forest Regional Directorate (OBM), which are according to timber auction and stumpage sales relatively high, contrary to average and lower amounts in the other OBM's in Turkey. These OBMs are Bolu, Kastamonu, Sakarya ve Zonguldak, located in Western Black Sea Region in Turkey (Figure 1). The stakeholders are the whole people living in the research area. The data was collected from stakeholder groups via survey.

Legend

🟥 SAKARYA FOREST REGIONAL DIRECTORATE   🟧 ZONGULDAK FOREST REGIONAL DIRECTORATE

🟩 BOLU FOREST REGIONAL DIRECTORATE   🟨 KASTAMONU FOREST REGIONAL DIRECTORATE
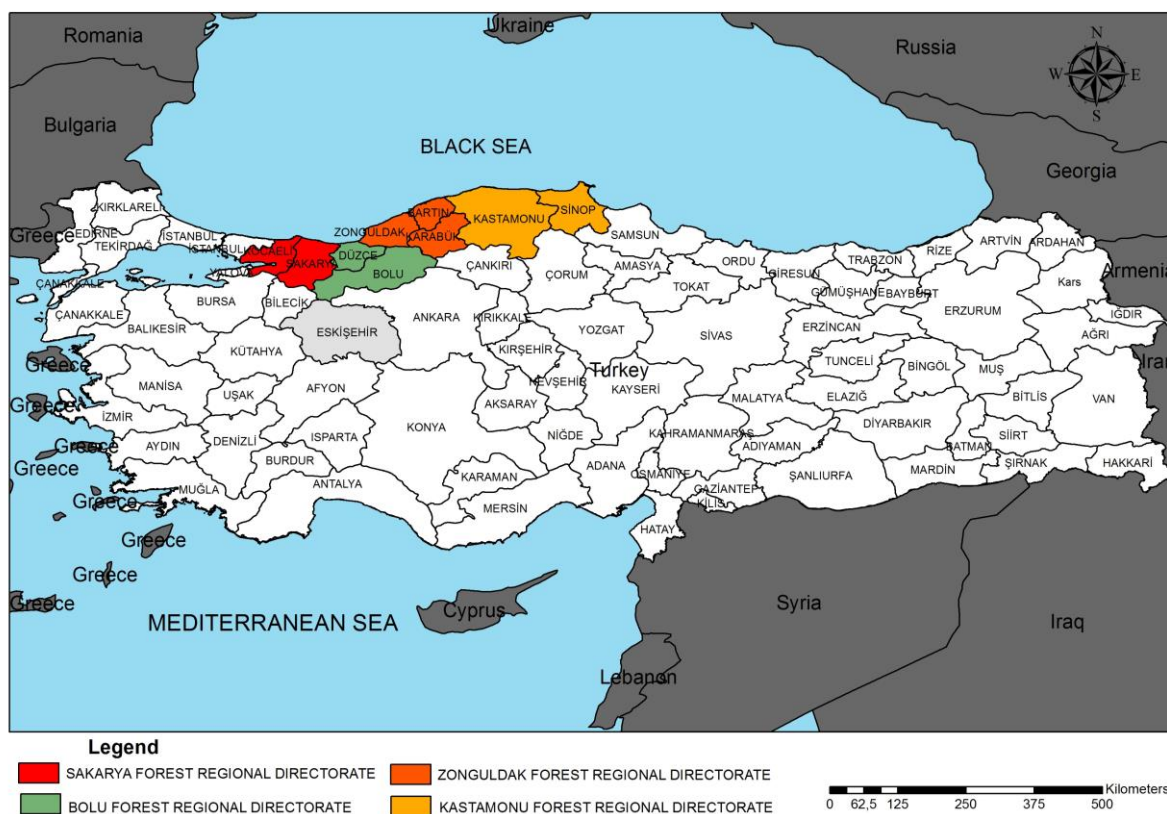
FIGURE 1
Research Area

Study design. There are 103 perception-related items from the measurement tools. These 103 items measure candidate stakeholder groups' perceptions toward stumpage sales in Western Black Sea region, which have been identified as a measurement tool in this study. The perceptions assessed in the measurement tool were compiled from the studies of [4-9]. There are at least 200 samples obtained from each stakeholder group [10]. In this context, more than 200 samples were obtained from all stakeholder groups. With the survey, 1373 questionnaires were obtained from all stakeholder groups in the field of research (436 from GDF, 420 from FI, 309 from FC and 208 from FV).

Research Method. Multivariate statistical techniques and structural equation modeling (SEM) methodology was used to analyze the views of stakeholders, regarding stumpage policy. Incidentally, there was an analysis of stakeholders' perceptions about the changes in stumpage sales policies [11]. Primary stakeholders' perception regarding issues related to stumpage sales policies set out in a scientifically adequate way using structural equation modeling and multivariate statistical analysis methods. Measurement models are built to assess standing on stakeholders' perception related to stumpage sales policies.

Factor analysis is a statistical process used to investigate relationships among observed and latent variable sets. Two basic factor analyses are exploratory factor analysis and confirmatory factor analysis. In exploratory factor analysis, the researcher is not aware of the number of factors measured through the measurement tool [12].

When attempting to obtain information on the nature of factors detected a priori, instead of examining a specific hypothesis, the researcher uses exploratory factor analysis. In case of examining a theory developed by the researcher to test a hypothesis, confirmatory factor analysis is used [13]. At the beginning in this study, exploratory factor analysis was applied to the data set obtained for the 11 items that make up the measurement. Maximum likelihood, commonly used in determining factors, was used together with a varimax rotation approach. The varimax rotation technique is by far the most commonly used procedure of factor rotation. This technique is ideal for producing orthogonal, uncorrelated factors that give the simple structure [14]. After performing factor analysis, the Cronbach's a coefficient was used to determine homogeneity of the measurement tool [15]. In test theory, the reliability of the instrument is one of the most important and basic features of a test [16].

The Structural Equation Modeling Software (EQS 6.2) was used for CFA, with the aim of examining the fit of the factor models, carried out by the exploratory analysis. In determining the fit of the model, multi-fit measures are used. In this study, adjusted goodness-of-fit index (AGFI), goodness-of-fit index (GFI), normed fit index (NFI), non-normed fit index (NNFI), and root mean square error of approximation (RMSEA) were used as absolute fit measures for determining the model fit [15, 17-19].

In terms of methods, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), SEM and multiple group analysis were combined in order to set forth the analyses. After the describing principal components, structural models of DASU-Perception for each stakeholder group as well as for whole groups collectively were constructed [20]. There were five structural models for both DASU-Perception modelling. In addition, inter-group differences were analyzed using Multiple Indicator - Multiple Cause (MIMIC) models [21]. Also, relationships between DASU-Perception for each stakeholder group as well as for all groups collectively were modeled. Moreover, subjects on which stakeholder groups agreed or disagreed were examined. The Analysis of Moment Structures (AMOS 16.0) program was used to analyze inter-group differences via MIMIC models.

There are six different dimensions according to literature about stumpage policy in Turkey [4-9]. These are perceived technical (TBA), perceived economic (EBA), perceived social (SBA), perceived legal (YBA), perceived managerial (YOBA) and perceived environmental (CBA) dimensions (Figure 2).

Specifically, the following hypotheses are set to be tested in this study:

H1. There is significant difference the technical dimensions of DASU perception among stakeholder groups.

H2. There is significant difference the economic dimensions of DASU perception among stakeholder groups.

H3. There is significant difference the social dimensions of DASU perception among stakeholder groups.

H4. There is significant difference the legal dimensions of DASU perception among stakeholder groups.

H5. There is significant difference the managerial dimensions of DASU perception among stakeholder groups.

H6. There is significant difference the environmental dimensions of DASU perception among stakeholder groups.

H7. There is significant difference the DASU-Perception models among stakeholder groups.
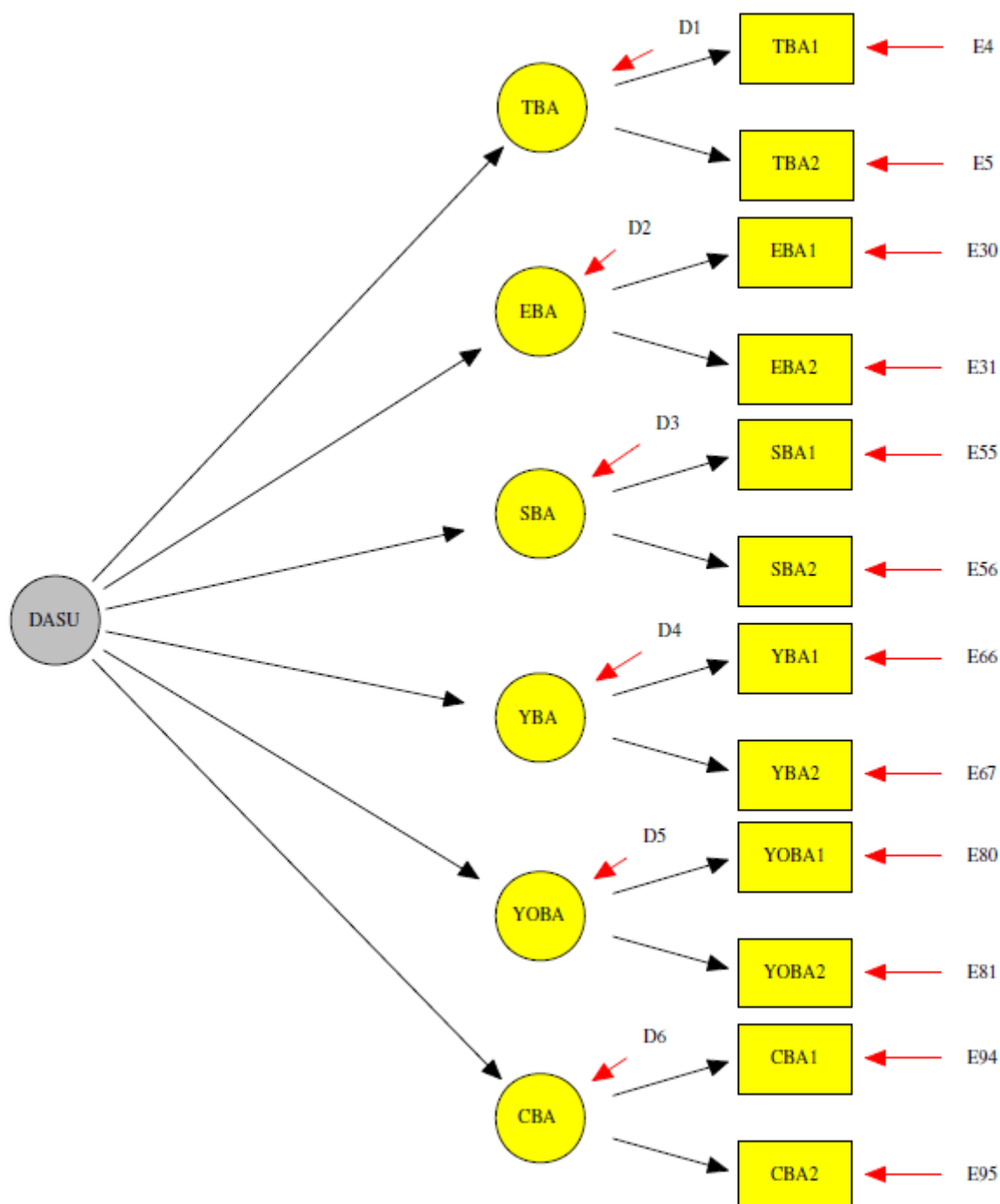
FIGURE 2
Measurement Model

RESULTS

Exploratory factor analysis results. Maximum likelihood with varimax rotation was used to extract factors. Eigenvalue and scree plot were used to determine the number of factors extracted. The initial factor analysis result revealed a three-factor solution, which accounted for 70% of variance. The first factor had two items and it accounted for 35% of variance. This factor was entitled perceived technical dimension (Factor TBA). TBA1 is about

the lack of volume calculation in stumpage sales. TBA6 is about the inadequacy to percentage of yield. The second factor contained three items, which accounted for 19% of variance. The second factor, perceived social dimension (Factor SBA), related to stumpage policy. The last factor had two items. This factor was named perceived managerial dimension (Factor YOBA) which accounted for 16% of variance. The reliability coefficient computed for the measurement tool of 103 items is 0.84. Based on the Cronbach's a value, the measurement tool used, appears to be fairly reliable in

Table 1 [22, 23]. In addition to these results, alpha coefficients were computed for each of the three factors. There is not enough evidence to obtain for EBA, YBA and CBA for stumpage policy with factor solutions.

TABLE 1
Reliability analysis related to pilot scheme

Name of Scale	Cronbach's Alpha α	Cronbach's Alpha Based on Standardized Items	Number of the Items
DASU-Perception	,844	,850	103

Confirmatory factor analysis results. The conformity of the three factors obtained as a result of exploratory **analysis** was evaluated as confirmatory factor analysis. Results concerning CFA analysis have been presented in Table 2. By using EQS 6.2, data regarding 11 items of perceptions were used in the application of CFA. In the examination of this model with three latent variables, fit statistics were examined in detail. The goodness-of-fit indices suggest satisfactory results. The data can be seen in Table 3.

The total effects of independent latent variables on dependent latent variables of DASU-Perception Measurement Model are given in Table 4. According to Table 4, it is confirmed that perceived technical dimension (TBA) have a positive effect for the DASU-Perception measurement model for the stakeholder groups. There is a significant relationship between two latent variables ($\beta = 0.38$). It is confirmed that perceived social dimension (SBA) has a positive effect for the DASU-Perception measurement model for the stakeholder groups. There is also a significant relationship between two latent variables ($\beta = 0.56$). It is also confirmed that perceived managerial dimension

TABLE 2
CFA results of DASU-Perception measurement model for the stakeholder groups, reliability, means and standard deviation values

Factors / items	Standardized factor Loads	t-values	Cronbach's α	R2	Means	SD
Factor 1- SBA	0.56		0.93	0.32		
SBA1	0.78	88.04		0.61	3.17	1.33
SBA2	0.82	90.23		0.68	3.19	1.31
SBA3	0.87	88.92		0.76	3.17	1.32
SBA4	0.82	84.82		0.68	3.11	1.36
SBA5	0.81	92.73		0.66	3.44	1.38
SBA6	0.83	98.94		0.68	3.41	1.28
SBA7	0.79	95.02		0.63	3.36	1.31
Factor 2- YOBA	0.74		0.78	0.54		
YOBA4	0.94	100.01		0.89	3.17	1.17
YOBA5	0.68	88.76		0.46	3.14	1.31
Factor 3- TBA	0.38		0.72	0.15		
TBA1	0.60	105.66		0.36	3.58	1.26
TBA6	0.93	111.47		0.87	3.51	1.17

TABLE 3
Evaluation of measurement model DASU-Perception for the stakeholder groups

Fitness Criteria	Multi-fit values	Fit
χ2 fit test	548.269	Accepted
(χ2/sd=126)	4.35	Accepted
NFI	0,94	Acceptable
NNFI	0,93	Acceptable
CFI	0,94	Acceptable
RMSEA	0,08	Acceptable
GFI	0,93	Good fit
AGFI	0,88	Acceptable
SRMR	0,04	Good fit
AIC-Model	8950.51>466.27	Accepted
CAIC-Model	8608.15>211.05	Accepted

(YOBA) has a positive effect for the DASU-Perception measurement model for the stakeholder groups. Another significant relationship was found between two latent variables ($\beta = 0.73$). Table 4 shows that the standardized path coefficients express the amount of change in one unit in independent variables and they how affect the latent variables. DASU-Perception Measurement Model for the Stakeholder Groups can be seen in a path diagram in Figure 3.

Structural relations and multiple coefficients of variation (R^2) values are given in Table 5. TBA, SBA and YOBA latent variables and all items related to the measurement model, DASU-Perception have been added for the CFA. The AMOS 16.0 program was used for the analyses.

The CFA analysis results of the standardized estimates, standard error, critical ratio and significance level can be seen in Table 6 and Table 7. According to Table 6 there are significant differences between stakeholder groups ($\chi^2=984,413$, df=152, p <0.001, CFI=0.91, GFI=0.90, NFI=0.90, RMSEA=0,06). Regression loads related to differences between stakeholder groups can be seen in

Table 7. These results show that regression loads ($R^2 >0.40$), related to latent variables for the stakeholder groups, have highly valuable explanations. [24-26].

TABLE 4
Total effects of independent latent variables on dependent latent variables of DASU-Perception measurement model

Independent Latent Variable	Dependent Latent Variables		
	SBA	TBA	YOBA
DASU-Perception	0.56	0.38	0.73

TABLE 5
SEM results for the DASU-Perception measurement model

Structural Equations	R2
TBA = 0.38 * DASU + 0.93 (D2)	0.14
SBA = 0.56 * DASU + 0.83 (D3)	0.32
YOBA = 0.74 * DASU + 0.68 (D4)	0.54
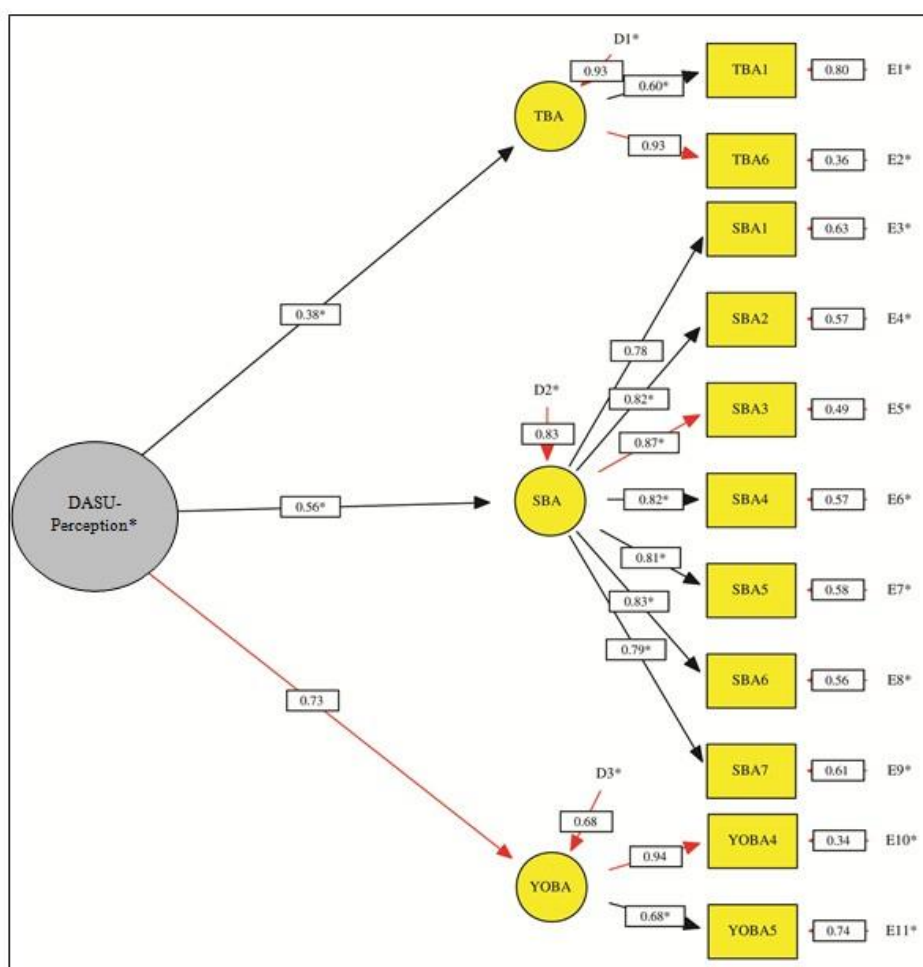
FIGURE 3
Path diagram of DASU-Perception measurement model for the stakeholder groups

TABLE 6
Significance level, critical ratios, standardized estimates and standard error values of measurement model DASU-Perception for the stakeholder groups

Stakeholder Groups	Relations			Estimate	Standard Error	Critical Ratio	Significance Level
	SBA1	<---	SBA	1,000			
	SBA2	<---	SBA	1,325	,103	12,827	***
	SBA3	<---	SBA	1,440	,091	15,760	***
	SBA4	<---	SBA	1,403	,104	13,518	***
	SBA5	<---	SBA	1,110	,102	10,904	***
GDF	SBA6	<---	SBA	1,168	,097	12,015	***
	SBA7	<---	SBA	1,157	,100	11,537	***
	YOBA5	<---	YOBA	1,000			
	YOBA4	<---	YOBA	1,054	,067	15,759	***
	TBA6	<---	TBA	1,000			
	TBA1	<---	TBA	,466	,139	3,348	***
	SBA1	<---	SBA	1,000			
	SBA2	<---	SBA	1,114	,058	19,121	***
	SBA3	<---	SBA	1,112	,052	21,330	***
	SBA4	<---	SBA	1,090	,055	19,789	***
	SBA5	<---	SBA	1,070	,056	19,023	***
FI	SBA6	<---	SBA	,956	,052	18,365	***
	SBA7	<---	SBA	,779	,048	16,091	***
	YOBA5	<---	YOBA	1,000			
	YOBA4	<---	YOBA	,576	,077	7,449	***
	TBA6	<---	TBA	1,000			
	TBA1	<---	TBA	1,417	,403	3,518	***
	SBA1	<---	SBA	1,000			
	SBA2	<---	SBA	,976	,069	14,085	***
	SBA3	<---	SBA	,892	,058	15,458	***
	SBA4	<---	SBA	1,084	,074	14,556	***
	SBA5	<---	SBA	1,158	,072	16,027	***
FC	SBA6	<---	SBA	,786	,065	12,072	***
	SBA7	<---	SBA	1,026	,070	14,570	***
	YOBA5	<---	YOBA	1,000			
	YOBA4	<---	YOBA	2,944	1,421	2,072	,038
	TBA6	<---	TBA	1,000			
	TBA1	<---	TBA	1,009	,118	8,530	***
	SBA1	<---	SBA	1,000			
	SBA2	<---	SBA	,920	,053	17,454	***
	SBA3	<---	SBA	,902	,045	19,902	***
	SBA4	<---	SBA	,492	,068	7,259	***
	SBA5	<---	SBA	,815	,067	12,198	***
FV	SBA6	<---	SBA	,783	,052	15,009	***
	SBA7	<---	SBA	,791	,054	14,706	***
	YOBA5	<---	YOBA	1,000			
	YOBA4	<---	YOBA	1,052	,151	6,986	***
	TBA6	<---	TBA	1,000			
	TBA1	<---	TBA	,970	,256	3,783	***

TABLE 7
Standardized regression loadings of measurement model DASU-Perception for the stakeholder groups

Stakeholder Groups	Relations			R²	Stakeholder Groups	Relations			R²
GDF	SBA1	<---	SBA	,614	FC	SBA1	<---	SBA	,782
	SBA2	<---	SBA	,788		SBA2	<---	SBA	,758
	SBA3	<---	SBA	,850		SBA3	<---	SBA	,733
	SBA4	<---	SBA	,860		SBA4	<---	SBA	,779
	SBA5	<---	SBA	,629		SBA5	<---	SBA	,845
	SBA6	<---	SBA	,717		SBA6	<---	SBA	,679
	SBA7	<---	SBA	,678		SBA7	<---	SBA	,781
	YOBA5	<---	YOBA	,825		YOBA5	<---	YOBA	,368
	YOBA4	<---	YOBA	,908		YOBA4	<---	YOBA	1,526
	TBA6	<---	TBA	1,117		TBA6	<---	TBA	,735
	TBA1	<---	TBA	,492		TBA1	<---	TBA	,596
FI	SBA1	<---	SBA	,759	FV	SBA1	<---	SBA	,918
	SBA2	<---	SBA	,871		SBA2	<---	SBA	,851
	SBA3	<---	SBA	,903		SBA3	<---	SBA	,856
	SBA4	<---	SBA	,897		SBA4	<---	SBA	,475
	SBA5	<---	SBA	,869		SBA5	<---	SBA	,700
	SBA6	<---	SBA	,845		SBA6	<---	SBA	,794
	SBA7	<---	SBA	,753		SBA7	<---	SBA	,783
	YOBA5	<---	YOBA	1,070		YOBA5	<---	YOBA	,677
	YOBA4	<---	YOBA	,659		YOBA4	<---	YOBA	,732
	TBA6	<---	TBA	,649		TBA6	<---	TBA	,551
	TBA1	<---	TBA	,867		TBA1	<---	TBA	,417

TABLE 8
Results of testing the research hypotheses on DASU-Perception

Hypothesis	Result
H (1): There is significant difference the technical dimensions of DASU perception among stakeholder groups.	Confirmed
H (2): There is significant difference the economic dimensions of DASU perception among stakeholder groups.	Not Confirmed
H (3): There is significant difference the social dimensions of DASU perception among stakeholder groups.	Confirmed
H (4): There is significant difference the legal dimensions of DASU perception among stakeholder groups.	Not Confirmed
H (5): There is significant difference the managerial dimensions of DASU perception among stakeholder groups.	Confirmed
H (6): There is significant difference the environmental dimensions of DASU perception among stakeholder groups.	Not Confirmed
H (7): There is significant difference the DASU-Perception models among stakeholder groups.	Confirmed

　　　Results of the hypotheses related to research are shown in Table 8. Hypotheses H(1), H(3) and H(5) are statistically confirmed (χ2= 984,413, df=152, p<0.001, CFI=0,91, GFI=0,90, RMSEA=0,06). It is statistically confirmed that there are significant differences for the perceived technical dimension (TBA), perceived social dimension (SBA) and perceived managerial dimension (YOBA) between stakeholder groups.

　　　Research hypotheses H(2), H(4), H(6), are statistically not confirmed. There is not enough evidence to confirm the perceived economic dimen-

sion EBA, perceived legal dimension YBA and perceived environmental dimension CBA between stakeholder groups for the stumpage policy. Although GDF affirms the economic benefits of stumpage sales for the buyers, these research results show that there is no evidence to confirm this situation for stumpage policy. In addition, this legal and environmental concern is mostly discussed in regards with stumpage policy [4-6]. But we could not find any result or evidence about both legal and environmental commentaries about stumpage policy.
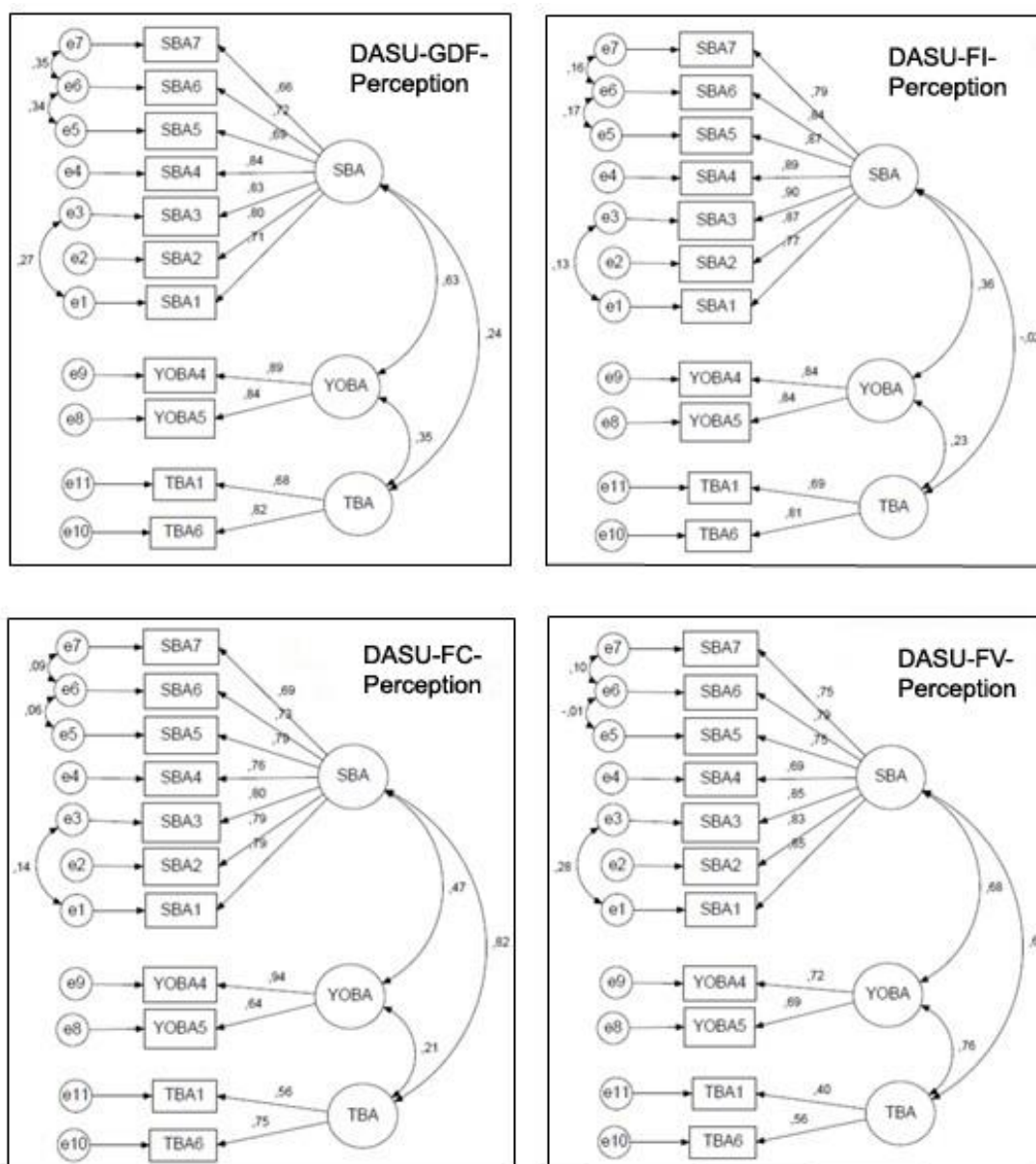
FIGURE 4
Path diagrams of comparisons of the stakeholder groups for measurement model, DASU-Perception

There are four SEM models for each stakeholder group; named DASU-GDF-Perception, DASU-FI-Perception, DASU-FC-Perception and DASU-FV-Perception measurement models and path diagrams can be seen in Figure 4. Group comparisons in the perception models were made using AMOS 16.0 by 1st order factor analysis. The research hypothesis, H(7) is statistically confirmed ($\chi2$= 984,413, df=152, p<0.001, CFI=0,91, GFI=0,90, RMSEA=0,06). It is statistically confirmed that there are significant differences between stakeholder groups' perceptions.

DISCUSSION AND CONCLUSIONS

According to results, EFA was carried out in order to determine the factors effective in stumpage policy perceptions, displayed by stakeholder groups. Afterwards, EQS 6.2 was applied in order to determine whether latent variables defined by CFA showed an integral conformity. As a result of the exploratory factor analysis, it was determined that 11 items of perceptions were present in three factors, which seemed to account for 70% of the total variance. The relevant variables regarding these factors seemed to measure the perceptions in the same direction. Also, these three dimensions were determined to significantly negative perceptions of stumpage policy in Western Black Sea

region in Turkey. There are some supportive articles about this negative situation of stumpage policy in Turkey [4-9, 27-34]. It is very important to develop and implement a more active inspection system by taking certain measures in the inspection mechanism in the context of eliminating the negative effects perceived by all stakeholder groups (preventing irregularities, having inspection weaknesses, etc.).

The model expected to have prior significance was determined to be statistically significant as a whole. The model was determined to show results in agreement with the results of other studies in the literature into stakeholder groups involved in stumpage policy in Turkey [4, 5, 31, 33]. When the model devised for perceptions was evaluated together with the average scores, given to stakeholders, in relation to the stumpage policy, it was assumed that negative perceptions acquired by whole stakeholder groups could have an indirect impact upon stumpage policy. We, therefore, hypothesized that these perceptions could have a prior effect upon stumpage policy and behavior to be displayed by stakeholders when they are considered as individuals within the stumpage policy in Turkey.

This paper uses SEM methodology that can handle a great level of detail of quantitative information and distil out the main factors. The resulting of stakeholder groups can be statistically confirmed to be precise and reliable. According to results stumpage perception models have good fits for each stakeholder groups. DASU-Perception models confirmed that the primary stakeholder groups have negative perception of technical, social and administrative aspects of the DASU. According to DASU-Perception models, DASU needs to be reorganized with a participatory approach. According to In light of the results, suggestions on the improvement of the DASU management model were presented, which may serve to provide decision-makers and interest groups with tangible information and policy options, in regards to DASU. It can be seen that some of the studies conducted also support these findings [35]. A new scale was developed and confirmed to measure stakeholder groups' perception in the study. This scale can be used for the other regional forest departments in Turkey.

Research models can be used to analyze the stakeholders' perception and attitude against to stumpage sales policies and strategies using SEM methodology. Results show that SEM can also be used to analyze different groups' perception and attitude against to stumpage sales policies and strategies. MIMIC models can also be used to compare inter-group relationships. In recent studies, also support this using modeling approach [33, 36].

This first attempt to address important socio-economic problems in Turkish forestry with structural equation modeling and other advanced multivariate statistical methodology is very important because relevant information and data have provided by reliable statistical methods for the discipline of forestry and forest economics.

Specifically, there are some negative perceptions (prevention of irregularities, easing of the control mechanisms, etc.) related to stumpage policy, especially by decision makers, GDF and the other stakeholder groups. To eliminate the negative perception of stumpage policy, measures in control mechanisms should be started and control systems should be improved. GDF has to take necessary changes for the internal audit instructions in order to prevent misappropriations in stumpage policy without delay. Essential studies should be conducted for the internal auditor in order to decrease and stop irregularities and to ease the control mechanisms. For instance, inspection and control activities can be done by other regions' forest engineers for stumpage sales areas. Thus, this will provide to reliability and prevent the conflict of interest in related forest directories [37].

The bid-based stumpage sales could be unreliable because of volume differences before measure and after harvest. To solve this problem the sale method of "A scaled volume sale/A shared volume sale" which is being applied in Canada, could be implemented by GDF for stumpage sales in Turkey [38, 39]. Decision makers in GDF must concern this method to provide for all stakeholder groups in stumpage sales. Buyers and GDF can fairly compare under favor of this stumpage sales method. By this means all stakeholder groups could rely on each other and support the new stumpage policy.

GDF must gather all stakeholder groups to negotiate with the participatory approach and revise the stumpage policy which will be another step to solve stumpage sales problems [40-42]. According to study results gathering all stakeholders will provide advisable management mentality for GDF. Because of the low education level of forest villagers (FV) in Turkey they need to be consulted and taken into consideration with their expectations and needs [43].

Forest cooperatives (FC) have enough information and experience about the forest products production but they have not enough skills about the marketing of forest products because FC was working on just producing forest products and deliver to GDF. There is severe competition in forest products marketing and FC has not enough experience for the stumpage sales [44]. Therefore, forest villagers who are members of FC, start to increase concerns about the stumpage policy. FCs' head and management committee needs to lead their members to eliminate and decrease these concerns of FC and FV. For example, FCs' head and management committee could help their members to sell forest products to buyers. Government and self-employed forest engineers can also give the counselling to sell forest products for FC and FV [33-35, 41-46].

GDF has to increase the education and publication activities for FC and FV. FV needs to reorganize the utilization of forestry activities. GDF and FC must cooperate to educate and raise awareness to FV about the stumpage policy and other forestry activities. Finally, the NGOs' (TOBB, TORID, TEPAL and Association of Chipping-Fiberboard Industrials) from one of the stakeholder groups and the forest industry (FI) need to be sufficiently informed and educated in stumpage policy [33, 35].

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