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# Organizational Structure Scale – University Version

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**Abstract:** This study aims to conduct validity and reliability analysis of Organizational Structure Scale-University version (OSS-U) that enables us to determine organizational structures of universities. The scale was developed based on the Axiomatic Theory by Hage, literature review and expert opinions. The sample of the study consisted of a total of 655 faculty members working at state universities in Turkey. Psychometric features of the scale were tested with three different models. The content validity of the suggested models was tested with Lawshe Analysis; the construct validity with Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) while the reliability was tested with Cronbach alpha which is a measure of internal consistency. As a result of the analyses conducted, all of these three models were determined to be valid and reliable with the relevant sample. It was also revealed that OSS-U can be used as model 1 in which nine dimensions (number of occupational specialties, professional training, professional activities, participation in decisions, hierarchy of authority, standardization, professional latitude, difference in rewards and difference in status) describe one single concept (University Structure), or model 2 in which four subscales (Complexity Scale, Centralization Scale, Formalization Scale and Stratification Scale) are independent pieces of an umbrella term (University Structure) or model 3, as a combination of these two models (model 1 + model 2), where combined subscales that have dimensions in itself describe a hypernym (University).

**Keywords:** *Organizational structure, scale development, mechanical organization, organic organization.*

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## Introduction

Today, as economic and technological development accelerates social change and makes individual and organizational competition even more important, organizations must build an effective organizational structure based on their aims and constantly update this structure in a way that adapts to environmental variables. From this aspect, by affecting individual and group behavior of employees, organizational structure plays a primary role in accomplishing the organizational goals. Based on the assumption that many problems in the organization are related to the organizational structure, administrators can be said to have a great responsibility in this sense. Structural characteristics have effects that can not be ignored on individual, group and organizational effectiveness (Gibson, Ivancevich and Donnelly, 1997). As a result, administrators should consider the structural characteristics of the organization when designing their organizations.

### *Theoretical Framework of Organizational Structure*

When the literature is examined, various definitions have been presented about organizational structure. Child (1972a) defined organizational structure as an administrative mechanism that maintains the formal allocation of the work roles and controls and integrates task-related activities. Likewise, Bishop and George (1973), while describing the structure, emphasized the relationship between different roles that are created for the organization to attain its goals and define the responsibilities of different roles in the hierarchy objectively. Mintzberg (1983), on the other hand, defined organizational structure as a process in which the work that is aimed to be completed is divided into discrete tasks, qualified people are assigned for these tasks and by maintaining coordination between different tasks the integration of the work is achieved again. Based on these definitions, it can be said that organizational structure is a combination of relationships in which the work is divided through tasks and roles and then coordinated with communication and management processes.

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Organizational structure functions as a system that manages the relationship between different roles that different individuals undertake within the organization (Kaynova-Emsen, 2010 cited in Johns and Saks, 2008). Organizational structure serves three basic functions. These can be described as follows: the production of outcomes and the attainment of organizational goals, i.e. ensuring effectiveness; the reducing the negative effects of individual differences on the organization, i.e. the formation of an organizational culture; the determination of the positions that have priority, i.e. the regulation of the flow of information and creating space for organizational activities (Hall, 1999). In order for these functions to take place, the right organizational structure must be designed. A well-designed structure also ensures the clear definition of authority and responsibility channels and enables managers to achieve coordination. It also makes it possible to keep up with technical growth and follow innovations closely. It helps establish a close relationship among employees in the same organization, and makes superior-subordinate relationships and responsibilities clearer. It is an essential guidance for employees' success and organizational productivity (Can, 1992; Tortop, Isbir, Aykac, Yayman and Ozer, 2007).

*Research into Organizational Structure and the Dimensions of the Structure*

In order to comprehend the structure of an organization clearly, it is first necessary to define the dimensions that constitute the structure and the relationships between these dimensions (Sucu, 2000). It is seen in the literature that organizational structure is handled in different dimensions by the authors. Hage (1965) dealt with the structure within the scope of methods that actualise the organizational objective namely as complexity, centralization, formalization and stratification. Pugh, Hickson, Hinings and Turner (1968) divides the structure into five dimensions as centralization, formalization, standardization, specialization and configuration while Burns and Stalker (1968) asserted that it consisted of the dimensions namely centralization, formalization, hierarchy, supervision area, specialization based on division of labor, relationships in chain of command and communication, and based on these dimensions they classified the organizational structures as mechanical and organic.

Reimann (1973), on the other hand, examined the organizational structure in terms of decentralization, formalization, specialization and administrative intensity whereas Daft (1992) classified the structural dimensions as complexity, centralization, formalization, specialization, standardization, hierarchy of authority, professionalism and personnel rates. Robbins (1994) and Hall (1999) studied organizational structure in three basic dimensions as complexity, centralization and formalization. Mintzberg (1983) examined the structure in nine dimensions as vertical and horizontal centralization, behavioral formalization, task specialization, planning and control systems, education, contact tools, unit grouping, unit size. In this study, organizational structure is aimed to be described based on the Axiomatic Theory by Hage (1965) with the most frequently encountered dimensions in the literature specifically complexity, centralization, formalization (Gibson et al., 1997) and stratification.

*Complexity.* Complexity is the structural dimension that is recognized most quickly (Hall, 1999). Complexity, a natural outcome of the labor division based on the specialization, is expressed by the number of differentiated tasks within the organization and the number of professional units that fulfill these tasks (Gibson et al., 1997). Hage and Aiken (1967) examined complexity in three dimensions as "the number of occupational specialties", "the range of professional training" and "the number of professional activities".

One of the criteria of complexity is how many different occupational specialties are required for any job in the organization. Complexity, in this sense, is the number of specific structural parts (tasks) that can be distinguished in a formal way in the organization (Blau, 1970). As the number of different tasks that require specialized knowledge and skills in the organization increases, complexity of the organization increases. For instance, a job in a gas station or market requires a low degree of complexity, while jobs in a hospital or university require a high degree of complexity (Robbins, 1994). This aspect of the complexity can be measured either by job titles linked to different tasks or by calculating unit numbers (Hall, 1999). Complexity also depends on the specificity of any job and the length of training required by professional specialization needed to accomplish this job. This training can be maintained formally through schools or informally with work experience. In some cases, complexity levels may not be the same even though the objectives of two different organizations and the number of different tasks required to achieve them are the same. To illustrate this situation, it can be argued that the complexity level of a college seeking experience and master's degree for recruitment is higher than that of a college seeking a central appointment score and bachelor degree, as in the public sector. The third criterion of complexity is the extent to which the people fulfilling the job that requires specialization participate in activities related to their professions, that is, employees attempt to obtain information related to their jobs or the activities of their organizations. For example, a university having academicians engaged in continuous research, taking active part in profession-related communities and doing research-development studies, is more complex than a university consisting of academicians who work like civil servants and who see themselves only as lecturers (Hage and Aiken, 1970).

*Centralization.* Centralization is explained by the position and intensity of the hierarchical levels in which organizational decisions such as the distribution of resources, the setting of rules and procedures are taken (Pugh et al. 1968; Andersen, 2002). According to the concentration point in the hierarchy of the decision-making authority, organizations are divided into two as centralized or decentralized. The fact that positions in the higher levels of an

organization make decisions independently of the employees in the lower level positions makes the organization centralized while including the lower levels in the decision making process makes it decentralized. To clarify the distinction between these two points of centralization; the decision-making authority in a centralized organization concentrates on the top of the organization, with very few authorities being assigned to the lower levels. These types of organizations often have an extremely bureaucratic structure, in which the division of labor is well-defined. Every employee knows his/her task, the requirements of the task and what is expected from him/her. In such organizations, all business rules, procedures and detailed control systems are defined (Mintzberg, 1983). In contrast, decision-making authorities in a decentralized organization are distributed to the lower levels of their hierarchy. Such organizations have their own control and coordination styles based on limited number of formal rules. This means that depending on the power of speciality, the employee has a high level of initiative on his / her job (Ferrell, Ferrell and Fraedrich, 2009).

According to Hage and Aiken (1970), depending on how power is distributed in the organization, the level of centralization can be examined in two dimensions as "participation in decisions" and "hierarchy of authority". Participation in decisions is related to from how many different positions employees participate in making decisions that affect distribution of resources such as recruitment, promotion or agenda setting and organizational policies. On the other hand, hierarchy of authority is the degree of employees' taking initiatives on their jobs, ie. individual decisions related to their jobs. As the degree of initiative use rises, the authority hierarchy decreases; on the other hand, if all decisions about tasks cannot be made without the approval from an upper level in the hierarchy, then it means the existence of authority of hierarchy in that organization is certain (Hage and Aiken, 1967).

*Formalization.* Formalization, which is regarded as the result of the complexity caused by the centralization related to distribution of power and specialization related to division labor (Kumar and Sharma, 2000), is related to the extent to which rules and procedures for the roles and behaviors of employees supervised in an organization are written (Pugh et al., 1968; Boyne, Brewer and Walker, 2010). Some organizations define each task to be performed in a detailed way and systematize it (eg. military organizations). In this way, a harmony that facilitates the coordination of the tasks appears. In some organizations, however, tasks are defined in a loosely manner in which tasks are not achieved with standard procedures, employees are given a high level of initiative and their behaviors related to the tasks are not controlled rigorously (eg. fashion-design organizations).

Formalization is measured by "standardization" which is the proportion of codified jobs and "professional latitude" which is the degree to tolerate the rules defining the jobs (Hage, 1965). While standardization is measured with the number of the procedures for accomplishing the tasks, i.e. the number of task directives (Hall, Johnson and Haas, 1967), and the elaboration level of these directives; professional latitude is related to the extent to which codified task standards are supervised. In other words, professional latitude is the degree of flexibility of the rules and procedures depending on the situation and job. While systematization of tasks refers to the degree of standardization of jobs (Pugh et al., 1968); professional latitude represents the behaviours that are tolerable from these standards and the range of the employee's free behaviors (Graubner, 2006). As the number of codified tasks in the organization increases and the rate of flexibility in the rules decreases, the formalization degree of the organization increases (Hage, 1965; Hage and Aiken, 1967). In the organizations and positions where formalization is absent or at a very low level, role ambiguity increases, a situation which can affect employees' behavior and performance (eg. office-boy position). High level of formalization, on the other hand, can cause job monotony, poor performance, alienation and increased work turnover (eg. document recorder) (Dalton, Todor, Spendolini, Fielding and Porter, 1980).

*Stratification.* Stratification is related to the importance assigned to the tasks within the organization by the employees and the allocation of the tasks regarded to belong to a high status to the employees and how valuable the rewards are seen by the employees (Hage and Aiken, 1970). Organizations offer their employees a number of rewards such as salaries and prestige, and the distribution of these rewards in each organization is different. However, as in similar organizations sharing the same objectives, even within the same organization, the importance given to these rewards or the distribution of the rewards according to the tasks and between employees may not be the same. As Caplow (1964) stated while in some organizations status in hierarchy are made distinct by obvious differences, some organizations reduce the differences between status in order to be more equalitarian and make them closer to each other. Similarly, in some organizations it is easy and incentive to go up from the lower levels of the hierarchy to the top levels, while some may have formal or informal barriers that make it impossible to reach certain status (Hage, 1965).

The level of stratification, also called status system, is measured by calculating the rate of *rewards* deserved as a result of accomplishing different tasks within the organization or *difference in status* that organizational roles required to accomplish the relevant tasks have (Hage, 1965). As the difference in the salary (reward) between higher and lower status in the hierarchy gets bigger in favor of the higher one and /or the probability of mobility from the lower levels to the upper status is reduced, the organization becomes more stratified (Yildirim, 2014).

*Mechanical and Organic Organizational Structures*

The approach by Burns and Stalker (1968), describing the organizational structures at two extremes as mechanical and organic, is still widely used by researchers since it reveals the basic features of organizations. Although the concepts of

mechanical and organic organization structures as ideal types are used metaphorically to represent organizational characteristics, there is virtually no organization in the real world with a completely mechanical or organic structure (Robbins, 1994). Therefore, it would be a more correct approach to say that as organizations move to the left side of the scale below, they become more mechanical, while moving to the right side they show organic features.

***Mechanical*** ⟷ ***Organic***

Mechanical organizations at one end of the scale are defined by rigid environmental variables, detailed guidelines for routine tasks, standardized behaviors of employees, concentration of decision-making authority on the top levels of the hierarchy, tight control, formal communication and difficulty of mobility in hierarchy (Robbins, 1994). Organic organizational structures, on the other hand, are defined as less standardized job and behaviors of employees (Hunt, 1970). All relevant employees in organic organizations will be included in the decision-making process so that organizations become more decentralized, rather than maintaining hierarchical control from the top to bottom. However, in order to provide competitive superiority in organic organizations running in a medium with unsteady environmental factors, the fact that tasks are assigned to those expected to have a high level of knowledge increases the complexity of the organization (Courtright, Fairhurst and Rogers, 1989).

Hage (1965) matched eight variables consisting of four organizational methods and outcomes in Axiomatic Theory with the mechanical and organic organization structures of Burns and Stalker (1968). In mechanical structure, tasks and roles are defined in detail with high level of formalization, and authority and communication process are hierarchically structured as an outcome of extreme centralization. However, in organic structures, tasks and roles are redefined situationally as a requirement of low level formalization. The distribution of authority and the direction of communication in the organization becomes more decentralized, being strucrualized as a network rather than a hierarchical one.

*Table 1. Two ideal types of organizations predicted by the Axiomatic Theory* (Hage, 1965)

| Organic Model (Emphasis on adaptiveness) | Mechanistic Model (Emphasis on production) |
|---|---|
| High complexity | Low complexity |
| Low centralization | High centralization |
| Low formalization | High formalization |
| Low stratification | High stratification |
| High adaptiveness | Low adaptiveness |
| Low production | High production |
| Low efficiency | High efficiency |
| High job satisfaction | Low job satisfaction |

Universities, one of the driving forces of social dynamics, have a number of characteristics that distinguish them from other organizations, such as the intellectual accumulation of the institutions, the relations with the policy institutions, the functioning of the organizational mechanisms, and the diversity of the environment that is influenced and influence. To reveal these characteristics can be accomplished with reference to common concepts used to describe all organizations. In this way, it is aimed to develop a measuring instrument that is capable of measure the organizational structure of universities, framed by the dimensions of complexity, formalization, centralization and stratification in the context of Hage's (1965) Axiomatic Theory, focusing on the perceptions of academicians' towards their organizations and the specific characteristics of the university organization.

## Methodology

In this study where the aim is to conduct reliability and validity studies of Organizational Structure Scale – University version (OSS-U), scale development process was carried out in three stages and ten steps based on the model suggested by Slavec and Drnovsek (2012):

*1. Stage: Theoretical Formation of the Structure:* A theoretical framework is established by specifying the theoretical importance of the desired structure to be formed in this stage consisting of three sequential steps.

- *Step 1:* In this step, the scope of the scale that has been developed with literature review and expert opinion is defined. In this study, based on the Axiomatic Theory by Hage, literature review on organizational structure variables was conducted, and expert opinions were referred to.
- *Step 2*: This is the step in which an item pool is created. In this study, as a result of the literature review performed by the researchers, an item pool consisting of 73 statements written separately for each dimension was created.
- *Step 3:* In this step, the content validity of the prospective scale is tested. 73 statements in the item pool are presented to expert opinions and the experts were asked to evaluate the suitability of the statements. Content validity indices were calculated by applying Lawshe Analysis to expert opinions.

*2. Stage: Date collection and representability:* This stage consists of four steps, in which the prospective scale is constituted and preliminary evaluations are made, a sample that can represent the population is created, and the data is collected.

- *Step 4:* In this step, the prospective scale whose validity and reliability will be tested is formed. 29 statements generated as a result of CVR and CVI values calculated in the third step were written in the form of a five-point Likert type and trial form was created.
- *Step 5:* In this step, the translation and re-translation steps used in the scale adaptation studies from the original language to the target language are performed. This step was skipped since this study is an original scale development work.
- *Step 6:* The piloting study is conducted in this step. Before the actual data collection process is started to assess the psychometric properties of the new construct, it is important to conduct a preliminary study on a small sample selected from the population. In this study, 25 academicians were included in the piloting process, the prospective scale was examined in terms of language and appearance, it was seen that there was no problem, and the study was continued without any change on candidate scale.
- *Step 7: T*his is the step where a sample with a high level of representation quality is created, and the data is collected. In the study, this step consisted of two subsequent parts. In the first part, the data was collected for EFA and while in the second part it was collected again for CFA.

*3. Stage: Statistical Analysis and Evidence of the Structure:* This is the last stage consisting of three steps, where the validity and reliability analysis of the prospective scale was conducted.

- *Step 8:* In this step, the dimensions of the theoretical structure created was revealed. Exploratory factor *analysis* was used to determine the dimensions of the prospective scale in the study.
- *Step 9:* In this step, reliability analysis was carried out. In this study, reliability was evaluated by the Cronbach Alpha coefficient, a kind of internal consistency analysis.
- *Step 10:* This is the step in which the generated theoretical model is evaluated for compatibility with the data set. With this aim, theoretical structures (models) obtained as a result of EFA were tested with level 1, level 2 and level 3 CFA.

*Data Collection Tool*

Creating an item pool. While creating an item pool, by taking into consideration the structural dimensions (complexity, centralization, formalization and stratification) stated by Hage in his Axiomatic Theory, the literature, expert opinions and the items of the scales that Scott (1975) and Murphy, Bishop and George (1975) used in their studies were benefited. When the literature is reviewed, it can be seen that a great number of researchers have made use of Structural Properties Questionnaire - SPQ developed by Bishop and George (1973) and/or revised by Murphy, Bishop and George (1975) (Miskel, 1979; Miskel, Fevurly and Stewart, 1979; Williams, 1981; Beckman, 1992; Goldfarb, 1995; Steaffens, 2001; Jackson, 2007; Ordu, 2011; Alan and Fidanboy, 2013; Toker, Cetin, Guven and Aksu, 2017).

However, since the scale developed was an original study, and because many items in SPQ were not suitable for the sample of the study, only some items from the SPQ were included into the item pool with some changes. The rest of the items was written by researchers in the light of literature based on Hage's theory.

Determining the final items in the pool. With two-round interviews, 10 academicians from the field of educational administration and 15 academicians from management and organization graded the items in the pool as "item measures the construct and is essential -3", "item is related with the construct but redundant -2", " item doesn't measure the structure -1". Rater points obtained at the end of the second tour were applied Lawshe Analysis, and CVI were calculated.

*Sample of the Study*

Although there is no consensus on the number of samples in the literature, the generally accepted rule is that 10 or 15 participants per item are sufficient in the scale development studies (Field, 2005). As the minimum limit, Bryman and Cramer (2001) report that at least 5 participants per item should be included in the analysis. The following strategies were used to form the data set to be used in factorizing the trial form:

1. The data for OSS-U was collected from the faculty members working in state universities in Turkey via email.
2. By random sampling, it is preferred to collect as much data as possible to represent the population.
3. As suggested by Brown (2015) and Erkus (2012), the data was collected for EFA and CFA separately for each. Considering the rule that participant number should be ten times more than item number for EFA (Kline, 1994; Field, 2005), 525 academicians working at different universities and faculties were sent e-mail and reached 420 (80%) participants. In the second part, in order to apply CFA to the scale that appeared as a resut of EFA, considering the rule that participant number should be five times more than item number, another 300

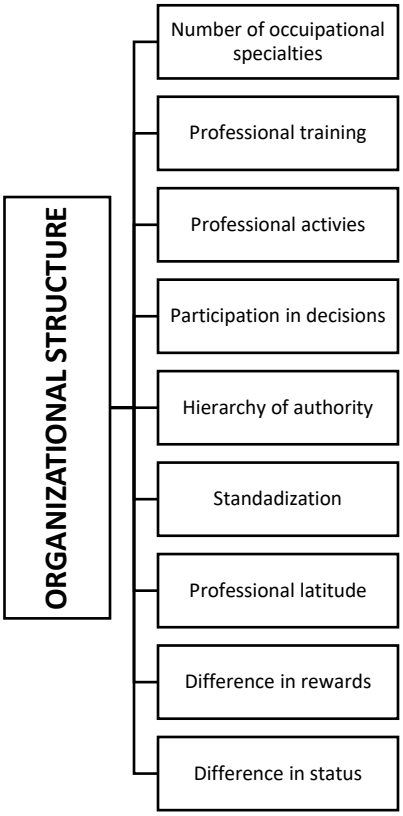
academicians working at different universities and faculties were sent e-mail and reached 235 (78%) participants.

*Data Analysis*

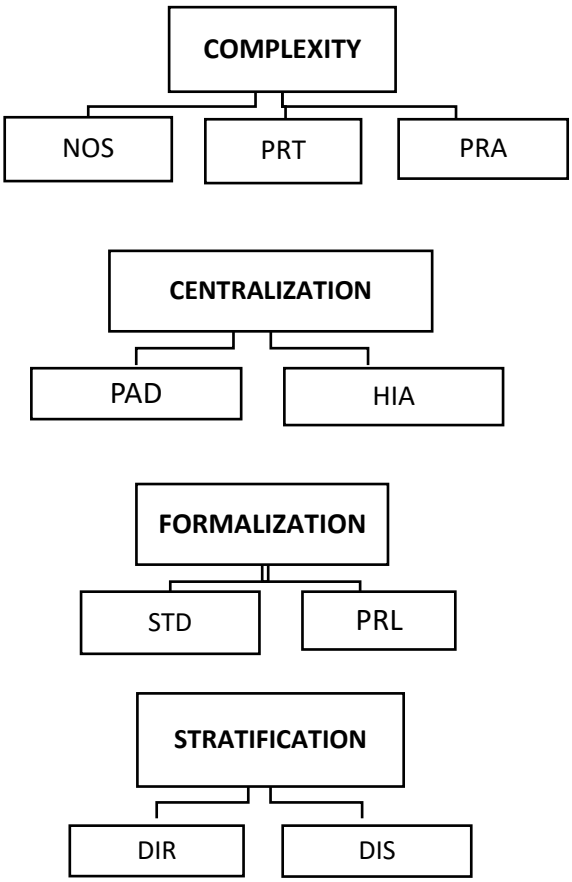
Establishing Measurement Models. Before starting the factorization studies (EFA, CFA), three different measurement models were developed in this study because OSS-U, which was developed on the basis of Hage's Axiomatic Theory, consisted of subscales theoretically and these subscales consist of sub dimensions within themselves. At this stage of the study, measurement models that have been analyzed are defined:

- *Model 1*: One single concept (Organizational Structure) consisting of 9 sub dimensions (number of occupational specialties, professional training, professional activities, participation in decisions, hierarchy of authority, standardization, professional latitude, difference in rewards and difference in status)
- *Model 2:* An umbrella term (Organizational Structure) composed of 4 subscales (complexity, centralization, formalization and stratification) that are not correlated with each other/unrelated or have low correlation, in other words, that can be used independently of each other. The subscales and the dimensions of these scales are as follows:
  i. *Complexity Scale consists of the dimensions of* number of occupational specialties (3 items), professional training (3 items) and professional activities (3 items).
  ii. *Centralization Scale consists of the dimensions of Participation* in decisions (3 items) and hierarchy of authority (3 items).
  iii. *Formalization Scale consists of the dimensions* standardization (4 items) and Professional latitude (3 items).
  iv. *Stratification Scale consists of the dimensions* difference in rewards (3 items) and difference in status (4 items).
- *Model 3:* A single concept (organizational structure) consisting of 4 subscales that have dimensions within themselves. In other words, the combination of the first two models constitutes Model 3 (Model 1 + Model 2 = Model 3). Schematic demonstration of the models is presented in Figure 1.

**MODEL 1**




**MODEL 2**




**MODEL 3**

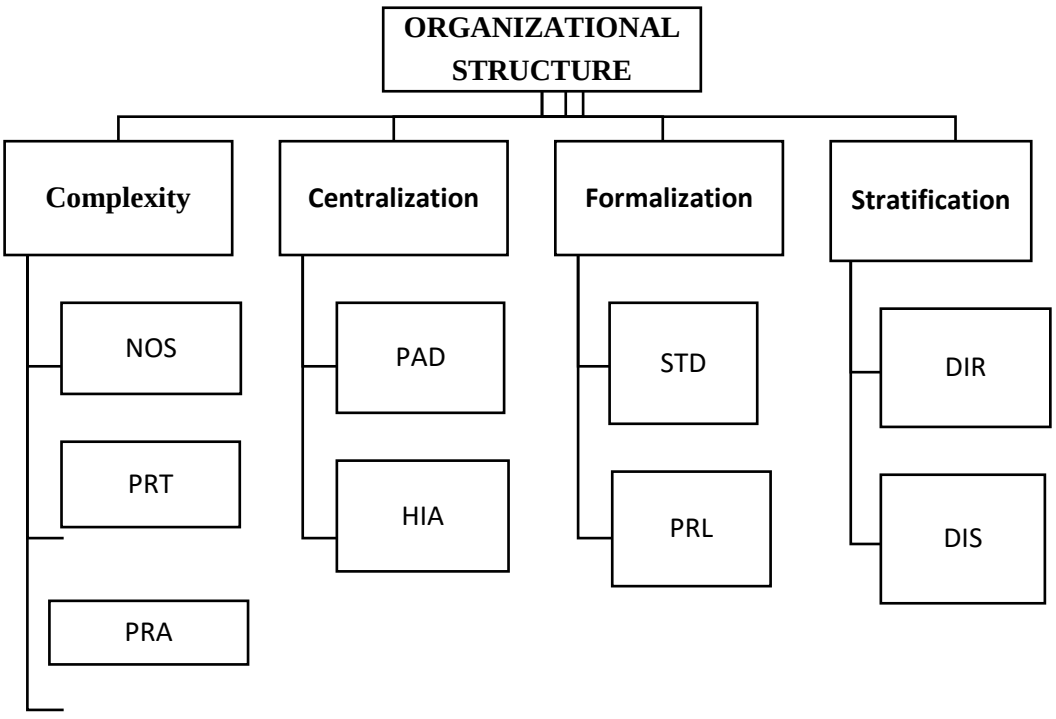


*Figure 1. Measurements Models*

*Determination of Validity and Factorization Strategy*

In this study, since this study aims both to develop measurement models and test these models, by using EFA and CFA successively, a more valid measurement tool was tried to be created. The construct validity for Model 1 and Model 2 was tested with EFA first followed by Level 1 CFA and Level 2 CFA. Model 3 was tested with level 2 CFA and level 3 CFA. The analysis of Model 3 was also used to investigate the general attitude of academicians towards the organizational structure of the university.

*Reliability*

In order to determine the reliability level of the models in the study, the Cronbach alpha coefficient, which is used as a kind of internal consistency measure (Tavsancil, 2002), is calculated separately for the EFA and CFA data sets.

## Findings

*Findings related to Validity*

Validity study - I (Content validity). In this study, Lawshe's (1975) content validity analysis was employed to determine the content validity of the item pool with 73 statements developed based on the literature. In this technique, 5 to 40 experts are asked to rate each item in the item pool as "the item measures the construct and is essential - 3", "the item is related to the construct but redundant - 2" and "the item does not measure the construct and is redundant - 1", and the content validity ratios (CVR) are identified by summing item rates. The CVR for any item is calculated by dividing the number of experts who perceived the item as essential by half of the total number of experts, and subtracting one from the number found (CVR = (NE / (N / 2)) - 1). In case of equality, NE stands for the number of experts who rate the item as "it measures the construct and is essential", and N symbolizes the total number of experts who rate the item. In order to measure the significance of any item through statistical criteria, more than half of the experts need to rate "essential" for that item; that is CVR needs to be greater than zero. The content validity index (CVI) is measured by taking the average CVR of the items with CVR significance of .05 ((CVR1 + CVR2 + CVRK) / k). If the developed construct is unidimensional, only one CVI is calculated, but if the feature to be assessed is gathered under more than one dimension, only the items in the dimension are taken into consideration, and a separate CVI is obtained for each dimension (Yurdugul, 2005). What is important here is how to determine the lowest CVI that any item should have. The minimum values that CVI needs to take according to the number of experts are given in Table 2. As shown in Table 3, after the Lawshe analysis, a trial form with high CVI value and consisting of 4 subscales, 9 dimensions and 29 items were formed.

*Table 2. Minimum Values of CVR (Lawshe, 1975)*

| Number of Experts | Minimum Value | Number of Experts | Minimum Value |
|---|---|---|---|
| **5** | 0.99 | 13 | 0.54 |
| **6** | 0.99 | 14 | 0.51 |
| **7** | 0.99 | ***15*** | ***0.49*** |
| **8** | 0.78 | 20 | 0.42 |
| **9** | 0.75 | 25 | 0.37 |
| **10** | 0.62 | 30 | 0.33 |
| **11** | 0.59 | 35 | 0.31 |
| **12** | 0.56 | 40+ | 0.29 |

*Table 3. CVI and CVR values of pilot form*

| Subscale | Dimension | Item Code | Item No | Item CVR $N_E/(N/2)-1 > (0,37)$ | Dimension CVI | Subscale CVI |
|---|---|---|---|---|---|---|
| **Complexity** | *Number of occupational specialties* | NOS1 | Q1 | 0,760 | 0,707 | 0,689 |
| | | NOS2 | Q2 | 0,680 | | |
| | | NOS3 | Q3 | 0,680 | | |
| | *Professional training* | PRT1 | Q4 | 0,600 | 0,653 | |
| | | PRT2 | Q5 | 0,760 | | |
| | | PRT3 | Q6 | 0,600 | | |
| | *Professional activities* | PRA1 | Q7 | 0,760 | 0,707 | |
| | | PRA2 | Q8 | 0,680 | | |
| | | PRA3 | Q9 | 0,680 | | |
| **Centralization** | *Participation in decisions* | PAD1 | Q10 | 0,680 | 0,707 | 0,693 |
| | | PAD2 | Q11 | 0,760 | | |
| | | PAD3 | Q12 | 0,680 | | |
| | *Hierarchy of authority* | HIA1 | Q13 | 0,680 | 0,680 | |
| | | HIA2 | Q14 | 0,600 | | |
| | | HIA3 | Q15 | 0,760 | | |
| **Formalization** | *Standardization* | STD1 | Q16 | 0,680 | 0,680 | 0,693 |
| | | STD2 | Q17 | 0,760 | | |
| | | STD3 | Q18 | 0,600 | | |
| | | STD4 | Q19 | 0,680 | | |
| | *Professional latitude* | PRL1 | Q20 | 0,680 | 0,707 | |
| | | PRL2 | Q21 | 0,760 | | |
| | | PRL3 | Q22 | 0,680 | | |
| **Stratification** | *Difference in rewards* | DIR1 | Q23 | 0,600 | 0,707 | 0,713 |
| | | DIR2 | Q24 | 0,760 | | |
| | | DIR3 | Q25 | 0,760 | | |
| | *Difference in status* | DIS1 | Q26 | 0,760 | 0,720 | |
| | | DIS2 | Q27 | 0,680 | | |
| | | DIS3 | Q28 | 0,680 | | |
| | | DIS4 | Q29 | 0,760 | | |

Validity study – II (Item analysis and fitness of the data set). Skewness and Kurtosis values were analysed to examine the multivariate normality of the data set prior to the factor analysis performed to determine the construct validity of the OSS-U. According to the literature, the fact that the ratio of skewness and kurtosis values to their standard deviation is between ∓1.5 (Tabachnick and Fidell, 2013) or ∓2.0 (George and Mallery, 2010) is shown as evidence to the normal distribution of the data set. In this study, skewness and kurtosis values of each dimension were found to be between +1.3 and -1.1. Total item correlations were examined in order to reveal whether the items on the prospective scale really conformed to the intended psychological construct. It is acknowledged that the items with a total correlation of .30 and higher can be included in the scale when the total item correlation is used in scale development studies (Sencan, 2005; Buyukozturk, 2014). Because of the theoretical structure of the OSS-U, when the total item correlations are measured, the total scores of the dimensions, not the scale, were examined with the score from each item, and it was seen that all the items had a value above .30. Then, Kaiser Mayer Olkin and Barlett Sphericity tests were performed to determine whether the two data sets (EFA and CFA) were suitable for factorization. In order to determine the fitness of the data set for factor analysis, it is essential that the KMO be greater than .60 and the Barlett test be significant (Buyukozturk, 2014; Tavsancil, 2002). In the study, KMO values were found to be between .77 and .90, and Barlett tests were significant. As a result of the analyses made, the data sets were determined to be suitable for factorization.

Validity study - III (EFA). In this study, Maximum likelihood (ML) method was employed as the Extraction Method for the EFA. ML is one of the factorization techniques that give the best match for normally distributed data. Direct Oblimin technique, which is an oblique rotation method, was determined as the rotation method because of the fact that the factors bear close meanings and factor structures are partially related in social sciences researches (Sencan, 2005). In the study, determining the number of factors based on eigenvalue was the strategy to ascertain the number of factors (Buyukozturk, 2004).

EFA analyses carried out for Model 1 showed that 29 items gathered in 9 dimensions with high factor loadings. The values related to the analysis (dimensions, factor loadings, item total correlations, explained variance and eigenvalues) are presented in Table 4.

*Table 4. Model 1 - EFA*

| Organizational Structure Scale | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Factor No | | | | | | | | | Item Total Correlation |
| **Item No** | **Item Code** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | |
| **Q14** | HIA2 | .997 | | | | | | | | | .859 |
| **Q13** | HIA1 | .863 | | | | | | | | | .786 |
| **Q15** | HIA3 | .661 | | | | | | | | | .659 |
| **Q3** | NOS3 | | .947 | | | | | | | | .775 |
| **Q2** | NOS2 | | .791 | | | | | | | | .685 |
| **Q1** | NOS1 | | .623 | | | | | | | | .607 |
| **Q11** | PAD2 | | | .952 | | | | | | | .801 |
| **Q12** | PAD3 | | | .900 | | | | | | | .783 |
| **Q10** | PAD1 | | | .557 | | | | | | | .543 |
| **Q20** | PRL1 | | | | .928 | | | | | | .778 |
| **Q22** | PRL3 | | | | .814 | | | | | | .735 |
| **Q21** | PRL2 | | | | .652 | | | | | | .605 |
| **Q27** | DIS2 | | | | | .839 | | | | | .711 |
| **Q26** | DIS1 | | | | | .811 | | | | | .685 |
| **Q28** | DIS3 | | | | | .771 | | | | | .743 |
| **Q29** | DIS4 | | | | | .608 | | | | | .592 |
| **Q8** | PRA2 | | | | | | .863 | | | | .701 |
| **Q7** | PRA1 | | | | | | .754 | | | | .666 |
| **Q9** | PRA3 | | | | | | .644 | | | | .631 |
| **Q24** | DIR2 | | | | | | | .834 | | | .676 |
| **Q25** | DIR3 | | | | | | | .740 | | | .668 |
| **Q23** | DIR1 | | | | | | | .703 | | | .631 |
| **Q19** | STD4 | | | | | | | | .791 | | .571 |
| **Q18** | STD3 | | | | | | | | .762 | | .566 |
| **Q17** | STD2 | | | | | | | | .501 | | .450 |
| **Q16** | STD1 | | | | | | | | .439 | | .393 |
| **Q6** | PRT3 | | | | | | | | | .855 | .709 |
| **Q4** | PRT1 | | | | | | | | | .751 | .672 |
| **Q5** | PRT2 | | | | | | | | | .690 | .630 |
| **(Rotated) Eigenvalues** | | 2.36 | 2.52 | 2.22 | 2.14 | 2.71 | 2.29 | 2.36 | 1.89 | 2.37 | |
| **(Rotated) Explained variance (%)** | | 8.42 | 11.24 | 6.78 | 7.64 | 9.61 | 5.22 | 4.63 | 4.37 | 3.42 | |
| **Total explained variance (%)** | | 8.42 | 19.67 | 26.45 | 34.10 | 43.71 | 48.94 | 53.57 | 57.95 | 61.37 | |

Four separate EFA were conducted for Model 2. As a result of these analyses, the Complexity scale consists of the dimensions of the number of occupational specialties (3 items), professional training (3 items) and professional activities (3 items). Centralization scale comprises the dimensions of participation in decisions (3 items) and hierarchy of authority (3 items). Formalization scale includes the dimensions of standardization (4 items) and professional latitude (3 items). Stratification scale consists of the dimensions of difference in rewards (3 items) and difference in status (4 items). The values related to the analyses (total item correlation, variance explained, eigenvalues, etc.) are given in Table 5, Table 6, Table 7 and Table 8.

*Table 5. Model 2 – Complexity Scale (COS) - EFA*

| Complexity Scale | | | | | |
|---|---|---|---|---|---|
| | | Factor No | | | Item Total Correlation |
| **Item No** | Item Code | 1 | 2 | 3 | |
| **Q3** | NOS3 | .931 | | | .591 |
| **Q2** | NOS2 | .801 | | | .460 |
| **Q1** | NOS1 | .644 | | | .459 |
| **Q6** | PRT3 | | .840 | | .516 |
| **Q4** | PRT1 | | .749 | | .541 |
| **Q5** | PRT2 | | .730 | | .431 |
| **Q8** | PRA2 | | | .857 | .473 |
| **Q7** | PRA1 | | | .775 | .465 |
| **Q9** | PRA3 | | | .666 | .544 |
| **(Rotated) Eigenvalues** | | 2.38 | 2.282 | 2.27 | |
| **(Rotated) Explained variance (%)** | | 33.36 | 15.85 | 12.62 | |
| **Total explained variance (%)** | | 33.36 | 49.21 | 61.83 | |

*Table 6. Model 2 – Centralization Scale (CES) – EFA*

| Centralization Scale | | | | |
|---|---|---|---|---|
| | | **Factor No** | | **Item Total Correlation** |
| **Item No** | Item Code | 1 | 2 | |
| **Q14** | HIA2 | .998 | | .530 |
| **Q13** | HIA1 | .867 | | .497 |
| **Q15** | HIA3 | .664 | | .578 |
| **Q11** | PAD2 | | .959 | .572 |
| **Q12** | PAD3 | | .897 | .592 |
| **Q10** | PAD1 | | .556 | .495 |
| **(Rotated) Eigenvalues** | | 2.33 | 2.21 | |
| **(Rotated) Explained variance (%)** | | 40.24 | 30.10 | |
| **Total explained variance (%)** | | 40.24 | 70.34 | |

*Table 7. Model 2 – Formalization Scale (FOS) – EFA*

| Formalization Scale | | | | |
|---|---|---|---|---|
| | | Factor No | | **Item Total Correlation** |
| **Item No** | Item Code | 1 | 2 | |
| **Q20** | PRL1 | .927 | | .560 |
| **Q22** | PRL3 | .820 | | .580 |
| **Q21** | PRL2 | .654 | | .434 |
| **Q19** | STD4 | | .791 | .471 |
| **Q18** | STD3 | | .763 | .446 |
| **Q17** | STD2 | | .502 | .353 |
| **Q16** | STD1 | | .441 | .324 |
| **(Rotated) Eigenvalues** | | 2.10 | 1.83 | |
| **(Rotated) Explained variance (%)** | | 31.95 | 19.83 | |
| **Total explained variance (%)** | | 31.95 | 51.78 | |

*Table 8. Model 2 – Stratification Scale (STS) – EFA*

| | | ***Stratification Scale*** | | |
|---|---|---|---|---|
| | | **Factor No** | | **Item Total Correlation** |
| **Item No** | **Item Code** | **1** | **2** | |
| **Q27** | DIS2 | .848 | | .562 |
| **Q26** | DIS1 | .800 | | .607 |
| **Q28** | DIS3 | .759 | | .546 |
| **Q29** | DIS4 | .620 | | .414 |
| **Q24** | DIR2 | | .824 | .517 |
| **Q25** | DIR3 | | .749 | .611 |
| **Q23** | DIR1 | | .721 | .505 |
| **(Rotated) Eigenvalues** | | 2.60 | 2.12 | |
| **(Rotated) Explained variance (%)** | | 41.60 | 17.55 | |
| **Total explained variance (%)** | | 41.60 | 59.15 | |

Validity study - IV (CFA). In the CFA analyses, standardized regression coefficients and chi-square/sd values as well as GFI, RMSEA, CFI and NFI model fit indices were employed.

Standardized regression coefficients are considered excellent for .71 and over, very good for .63, good for .55, acceptable for .45 and weak for .32 (Comrey and Lee, 1992, cited in Tabachnick and Fidell, 2013). The fact that the ratio of $\chi 2/sd$ attained by dividing the value of $\chi 2$ by the number of degrees of freedom is between 2 and 3 is acceptable in terms of fitness (Schermelleh-Engel, Moosbrugger and Muller, 2003). The GFI value varies from 0 to 1, and it can be stated that the model fits well with the data to the extent it is above .90 and approaching 1 (Sencan, 2005). For RMSEA, the value between .05 and .08 is acceptable (Schermelleh-Engel, Moosbrugger and Muller, 2003). The CFI value ranges from 0 to 1 and is acceptable from .90 to .95 (Kline, 2011, Tabachnick and Fidell, 2013). The NFI value also varies from 0 to 1, like CFI, and is an acceptable value from 90 to .95 (Tabachnick and Fidell, 2013).

As a result of the EFA performed for Model 1, the construct validity of OSS-U comprising 9 sub-dimensions was tested again with First level and Second level CFA. The standardized regression coefficients (factor loadings) and model fit indices were examined in the evaluation of the model through CFA, and the CFA models created are shown in Figure 2 and Figure 3, and the goodness of fit values are displayed in Table 9 and Table 10.

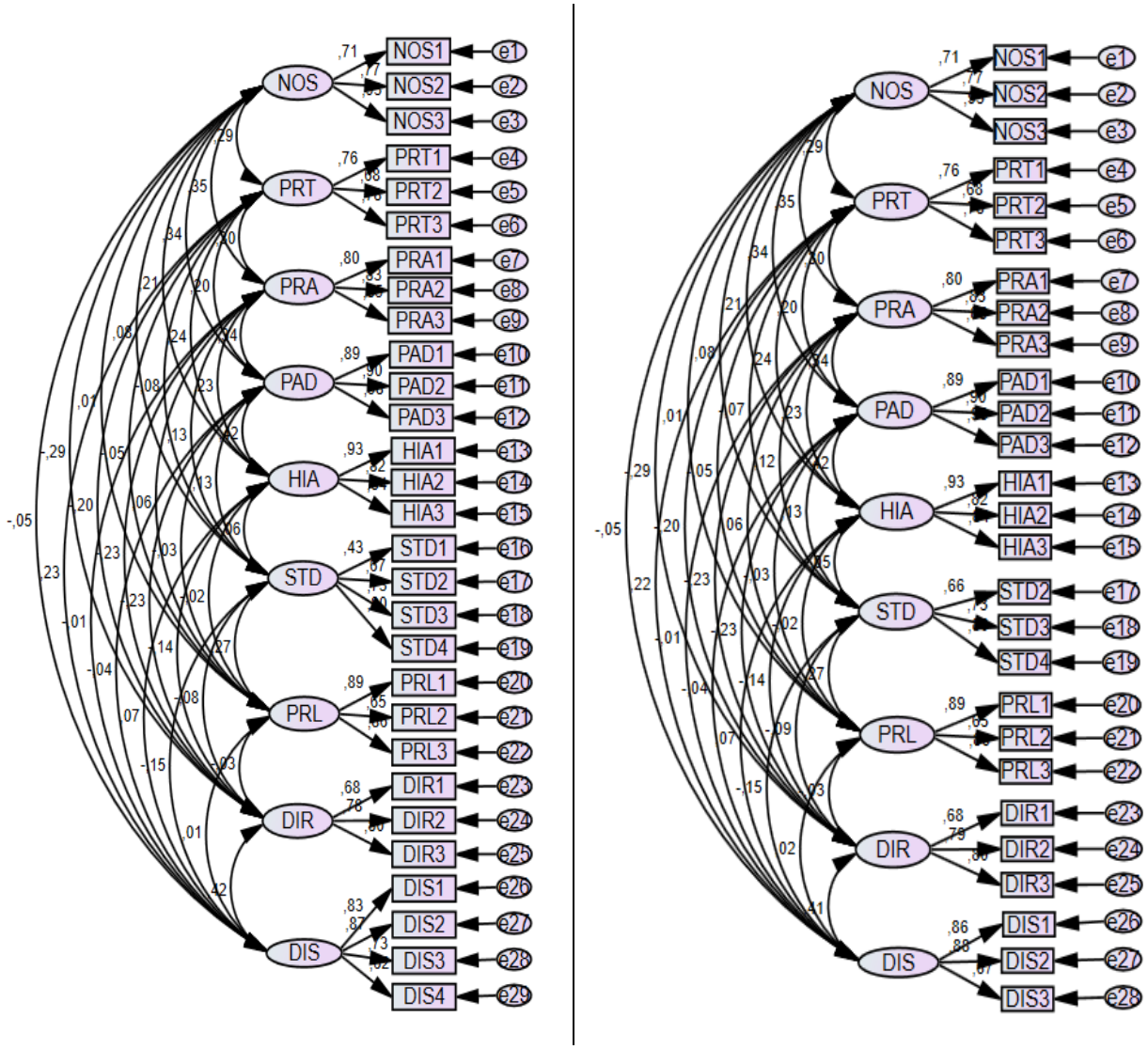



*Figure 2. Model 1 - First level CFA (Stage 1 and Stage 2)*

As can be seen in Figure 2, in which the factor loadings for the Amos model obtained from the first level CFA (stage I and stage II) for model 1, the factor loadings of the items in the scale dimensions are within the ranges of .43 and .93 in stage I, it ranges from .66 to .93 in stage II. In the first level CFA (stage I) conducted for model 1, the first item of the dimension of standardization and the fourth item of the difference in status dimension of the scale were removed from the model because they gave low factor loadings and high error modification and worsened the goodness of fit of the model, and CFA (stage II) was performed again. The fit index values obtained from the first level CFA (Stage II) for Model 1 were found to be $\chi 2$ / sd = 1.22, GFI = .90, NFI = .90, CFI = .98 and RMSEA = .031 (table 9). According to this finding, the fit indices obtained from the first level CFA (stage II) show that the model demonstrates a good fit.

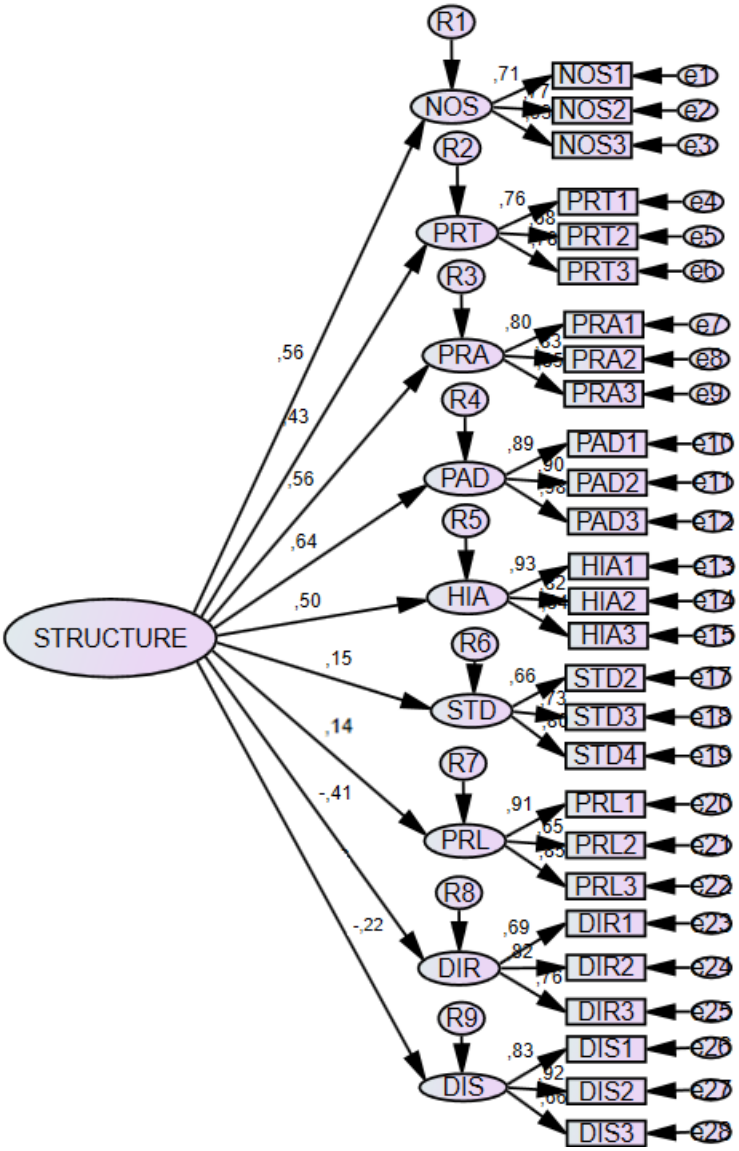



*Figure 3. Model 1 – Second level CFA*

Level 2 CFA was performed to determine the goodness of fit with the latent variable "Organizational Structure", which was defined as a hypernym of the sub-dimensions in Model 1, whose factorial structure was confirmed by with the level 1 CFA. As can be seen in figure 3, which depicts the factor loadings for the Amos model obtained from the second level CFA conducted for model 1, the factor loadings for the sub-dimensions varied between .66 and .93. The fitness index values obtained for the second level CFA were found as χ2 / sd = 1.36, GFI = .90, NFI = .90, CFI = .96, and RMSEA = .039 (table 10). As shown in Figure 3, the most important component of organizational structure (model 1) was observed to be the sub-dimension of participation in decisions (β = 0,64; p <0,05), depending on the study sample. This dimension was followed by the sub-dimensions called number of occupational specialties (β = 0.56, p <0.05), professional activities (β = 0.56, p <0,05), hierarchy of authority (β = 0.50, p < ), professional education (β = 0,43, p <0,05), difference in rewards (β = 0,41, p <0,05), difference in status (β = 0,22, p < , standardization (β = 0,15, p <0,05) and professional latitude (β = 0,64, p <0,05). Accordingly, the findings from the first level and second level CFA indicate that the model 1 has construct validity.

Initially, level 1 CFA and then second level CFA were performed on the subscales (COS, CES, FOS, STS) that emerged as a result of four different EFA conducted for Model 2. Standardized regression coefficients (factor loadings) and model fit indices were examined in the evaluation of the model through CFA; and first level and second level CFA performed on the scales are illustrated in Figure 4, Figure 5, Figure 6, Figure 7, Figure 8 and Figure 9, and goodness of fit values are presented in Table 9 and Table 10.

As can be seen in figure 4, which depicts the factor loadings for the Amos model obtained from first level CFA carried out for the complexity scale, the factor loadings of the items in the dimensions of the complexity scale ranged from .70 to .93. The fit index values were found to be χ2 / sd = 1.16, GFI = .97, NFI = .97, CFI = .99 and RMSEA = .026 (table 9).

Based on this finding, fit indices obtained from the first level CFA indicate that the model demonstrates good fit. The second level CFA was conducted to determine the extent to which the sub dimensions of the complexity scale, whose factorial structure was confirmed, fit into the latent variable “complexity”, which is featured as a hypernym. The factor loadings for the Amos model obtained from the second level CFA are shown in Figure 4.

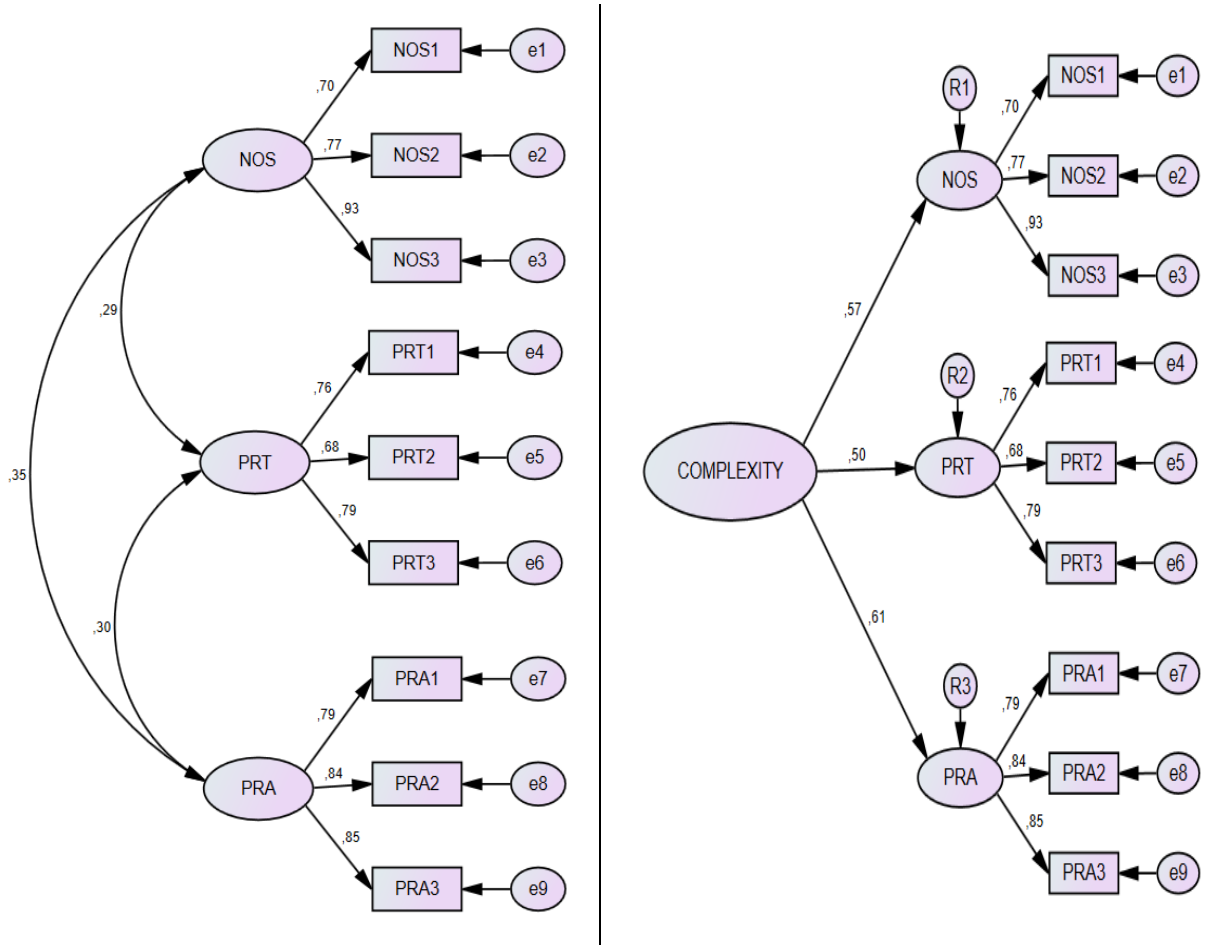



*Figure 4. Model 2 - Complexity Scale (COS) level 1 and level 2 CFA*

As can be seen in Figure 4, the factor loadings of the items of the sub-dimensions ranged from .70 to .93. The fit index values were found as χ2 / sd = 1.64, GFI = .97, NFI = .97, CFI = .99 and RMSEA = .026 (table 10). Accordingly, it was revealed that the error variance, factor loadings and estimated values calculated in the first level and second level CFA were identical. This means that the sub-dimensions fit into the hypernym "Complexity", and that second-level relationships had no impact on the parameter values and the fit indices of the model. In addition, figure 4 illustrates that the most important component of the complexity scale was the sub dimension of professional activities (β=0,61; p<0,05). This dimension was followed by the sub-dimensions of number of occupational specialties (β = 0.57, p <0.05) and professional training (β = 0.50, p <0.05), respectively. When these findings are considered altogether, they indicate that the construct validity of complexity scale was ensured.

Figure 5 illustrates the factor loadings for the Amos model obtained from the first level CFA conducted for the Centralization scale, and the factor loadings of the items varied from .81 to .93. The fit index values were found to be χ2/sd=2.06, GFI= .97, NFI=.98, CFI=.99, and RMSEA=.067 (table 9). Based on this finding, it can be stated that the fit indices obtained from the first level CFA indicate that the model demonstrates a good fit.

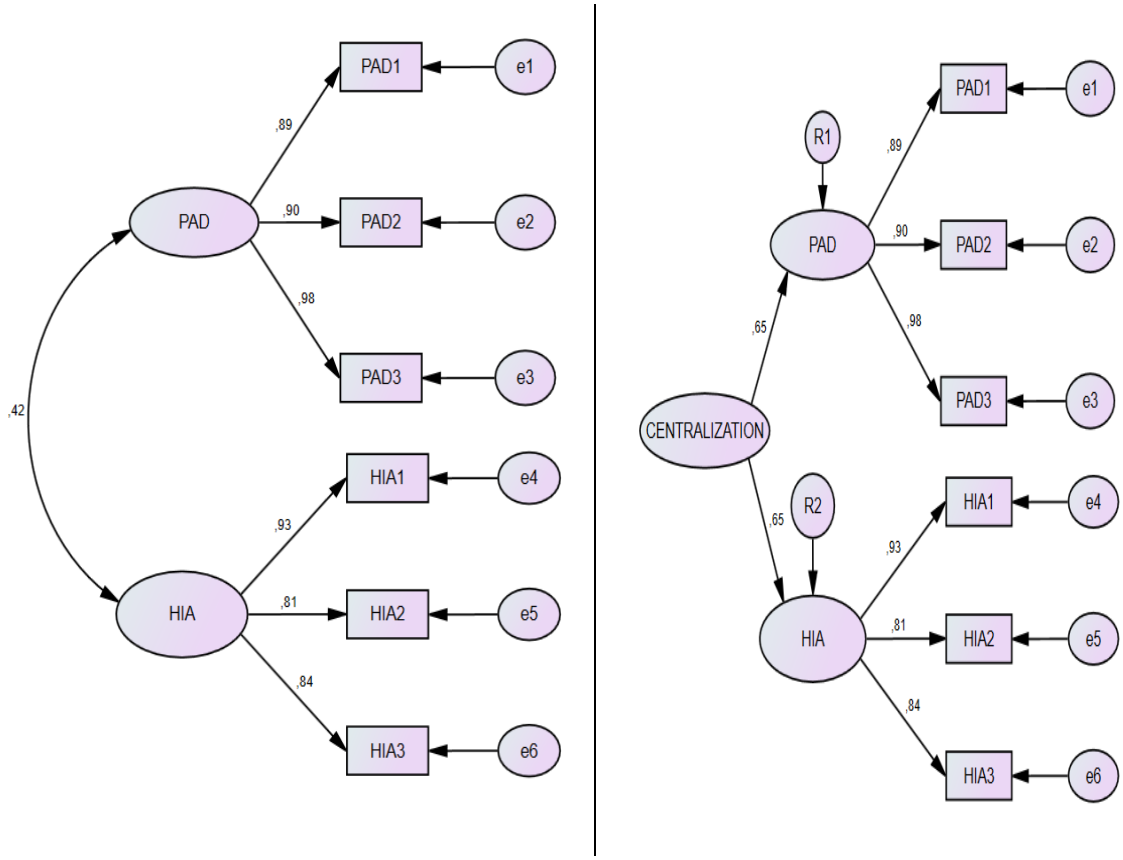



*Figure 5. Model 2 - Centralization Scale (CES) Level 1 and Level 2 CFA*

Second level CFA was performed to determine whether the sub-dimensions fit into the latent variable "Centralization", which was further structured as a hypernym, after the first level CFA which was performed to determine if the Centralization scale was confirmed or not. The factor loadings for the Amos model obtained from the second level CFA are shown in Figure 5. As can be seen in Figure 5, the factor loadings of the items in the dimensions of the Centralization scale varied between .81 and .93. The fit index values were found as $\chi 2/sd=2.06$, GFI= .97, NFI=.98, CFI=.99, and RMSEA=.067 (table 10). Accordingly, it was revealed that the error variance, factor loadings and estimated values calculated in the first level and second level CFA were identical. This means that the sub-dimensions fit into the hypernym "Centralization", and that second level relationships had no impact on the parameter values and the fit indices of the model. In addition, figure 5 shows that the sub dimensions of participation in decisions and hierarchy of authority explained the centralization scale at the same rate ($\beta=0,65$; $p<0,05$). When these findings are considered altogether, they indicate that the construct validity of centralization scale was ensured.

In the first level CFA (stage I) conducted for the formalization scale, the first item of the standardization dimension of the scale was removed from the model because it gave low factor loading and high error modification and worsened the goodness of fit values of the model; and CFA (stage II) was performed again. The factor loadings for the Amos model obtained from the first level CFA (stage I and stage II) carried out for the formalization scale are shown in Figure 6.

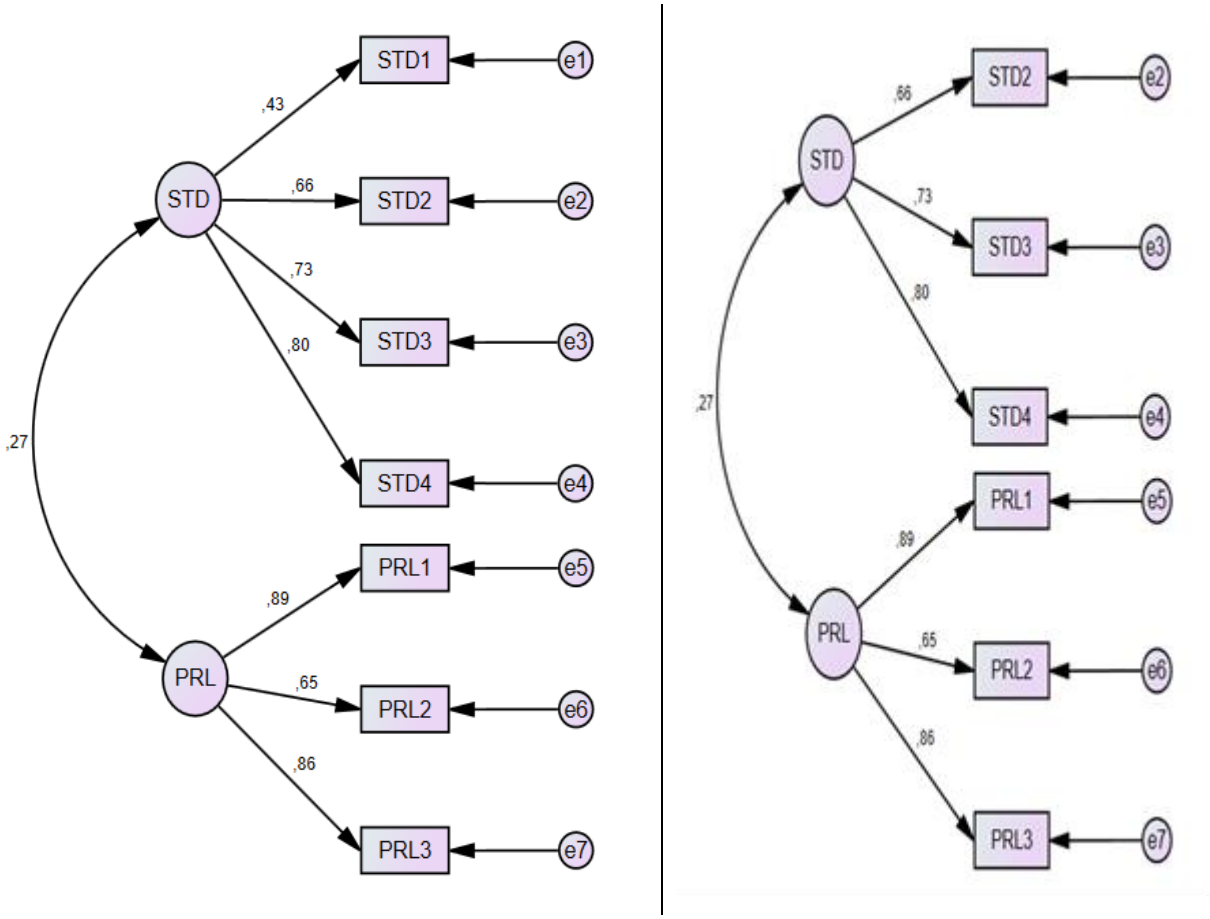



*Figure 6. Model 2 - Formalization Scale (FOS) first level CFA (Stage I and Stage II)*

As can be seen in Figure 6, the factor loadings of the items in the scale dimensions varied from .43 to .89 in stage I while they were within the ranges of .65 and .89 in stage II. The fit index values obtained from the first level CFA (stage II) conducted for the formalization scale were found as $\chi 2/sd=1.32$, GFI= .98, NFI=.98, CFI=.99, and RMSEA=.037 (table 9). Based on this finding, it can be stated that the fit indices obtained from the first level CFA (stage II) indicate that the model demonstrates a good fit.

Second level CFA was conducted to determine the fit level of the sub-dimensions in the formalization scale whose factorial structure was confirmed by first level CFA into the latent variable "Formalization", described as a hypernym. The factor loadings for the Amos model obtained from the second level CFA are shown in Figure 7.

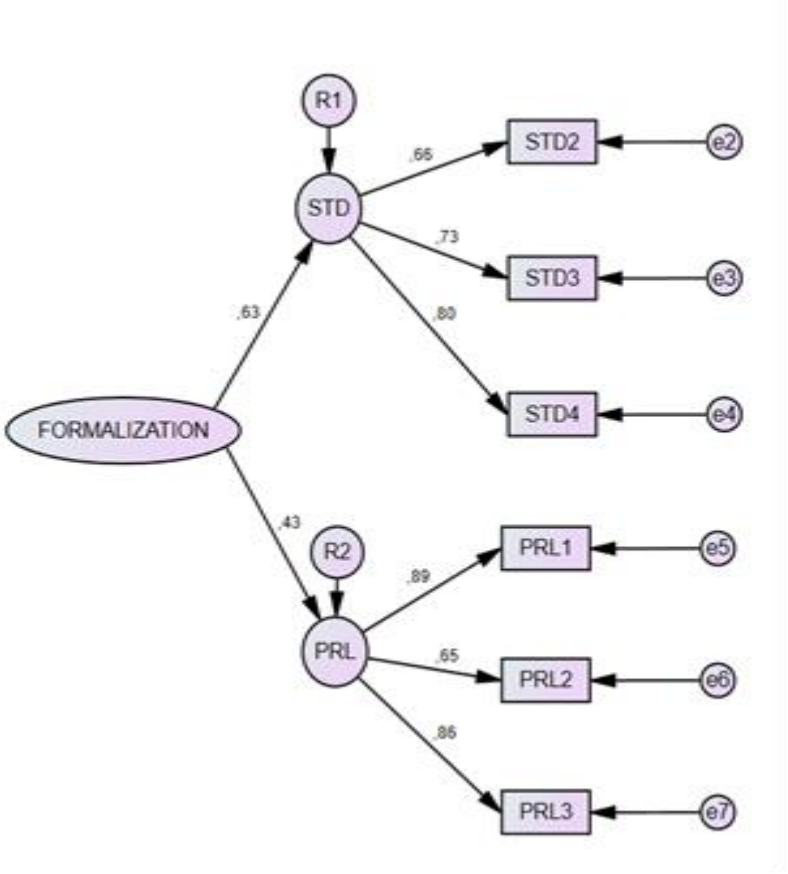



*Figure 7. Model 2 – Formalization Scale (FOS) level 2 CFA*

As can be seen in Figure 7, the factor loadings of the items of the sub-dimensions ranged from .65 to .89. The fit index values obtained for the second level CFA were found as $\chi 2/sd=1.32$, GFI= .98, NFI=.98, CFI=.99, and RMSEA=.037 (table 10). Accordingly, it was revealed that the error variance, factor loadings and estimated values calculated in the first level (stage II) and second level CFA were identical. This means that the sub-dimensions fit into the hypernym "Formalization", but that second level relationships had no impact on the parameter values and the fit indices of the model. In addition, figure 7 depicts that the most important component which explained the formalization scale was the standardization sub dimension ($\beta=0,63$; $p<0,05$), and that this dimension was followed by the sub-dimension of professional latitude ($\beta=0,43$; $p<0,05$). When these findings are considered altogether, they indicate that the construct validity of formalization scale was ensured.

In the first level CFA (stage I) conducted for the stratification scale, the fourth item of the difference in status dimension of the scale was removed from the model because it gave low factor loading and high error modification and worsened the goodness of fit values of the model; and CFA (stage II) was conducted again. The factor loadings for the Amos model obtained from the first level CFA (stage I and stage II) for the stratification scale are shown in Figure 8.

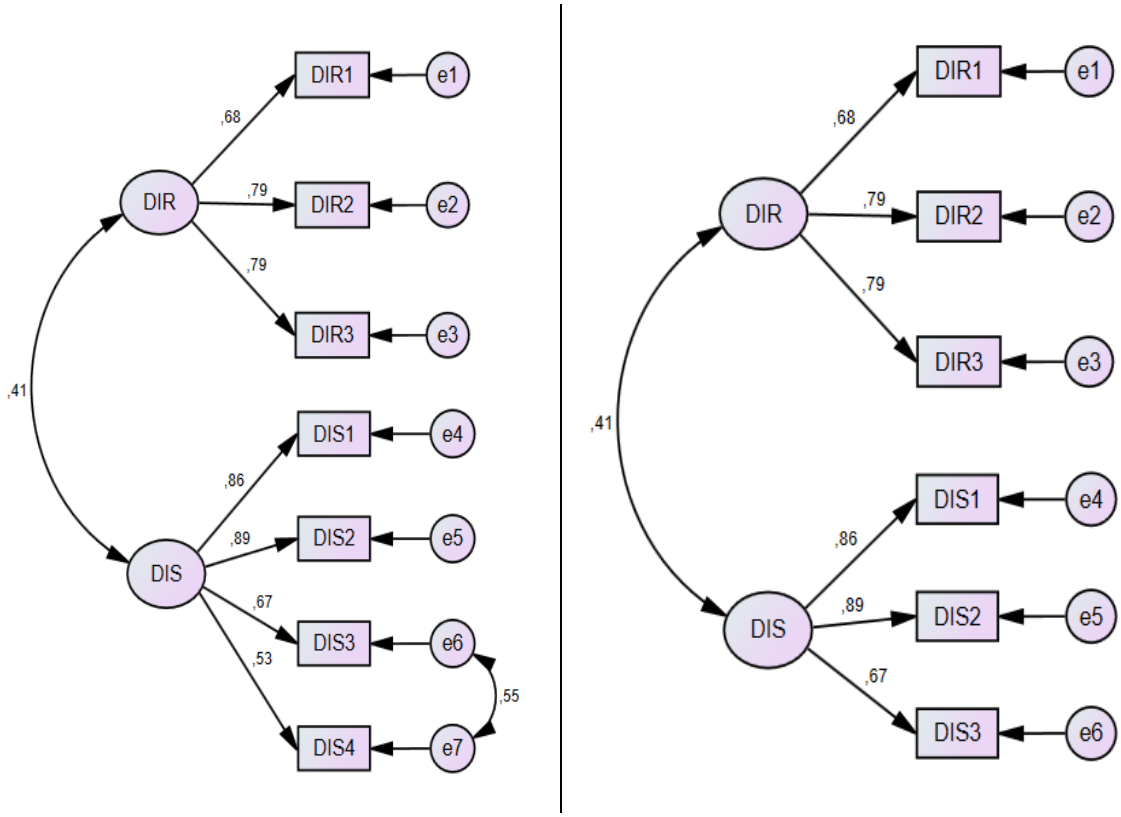



*Figure 8. Model 2 - Stratification Scale (STS) level 1 CFA (Stage I and Stage II)*

As illustrated in figure 8, the factor loadings of the items in the scale dimensions ranged from .53 to .89 in stage I while they were within the ranges of .67 and .89 in stage II. The fit index values obtained from the first level CFA (stage II) conducted for the stratification scale were found to be $\chi 2/sd=2.56$, GFI= .97, NFI=.96, CFI=.97, and RMSEA=.072 (table 9). Based on this finding, it can be stated that the fit indices obtained from the first level CFA indicate that the model demonstrates a good fit.

Second level CFA was performed to determine whether the sub-dimensions fit into the latent variable "*Stratification*", which was further structured as a hypernym, after the first level CFA, which was performed to determine if the Stratification scale was confirmed or not. The factor loadings for the Amos model obtained from the second level CFA are displayed in Figure 9.

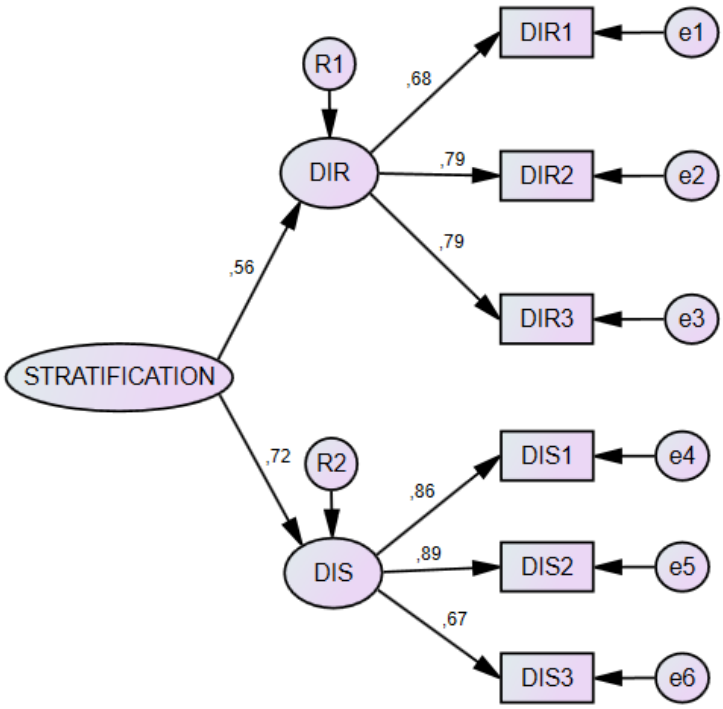



*Figure 9. Model 2 - Stratification Scale (STS) level 2 CFA*

As can be seen in Figure 9, the factor loadings of the items of the sub-dimensions varied between .67 and .89. The fit index values were found to be χ2/sd=2.56, GFI= .97, NFI=.96, CFI=.97, and RMSEA=.072 (table 10). Accordingly, it was revealed that the error variance, factor loadings and estimated values calculated in the first level (stage II) and second level CFA were identical. This means that the sub-dimensions fit into the hypernym "*Stratification*", but that second level relationships had no impact on the parameter values and the fit indices of the model. In addition, figure 9 shows that the most important component which explained the Stratification scale was the sub dimension of difference in status (β=0,72; p<0,05), and that this dimension was followed by the sub-dimension of difference in rewards (β=0,56; p<0,05). When these findings are considered altogether, they indicate that the construct validity of Stratification scale was ensured.

As a result of the first level and second level CFA conducted for Model 2, in parallel with the analyses made for Model 1, the first item of the dimension of standardization in the Formalization scale and the fourth item of the dimension of difference in status in the Stratification scale were removed from the scales because they gave low factor loading and high error modification and worsened the goodness of fit values of the scales. When these analyses are considered altogether, it was seen that the construct validity of the scales was ensured.

For Model 3, the construct validity of OSS-U was measured via second level and third level CFA. When Model 3 was being developed, analysis was performed by considering the modifications in Model 1 and Model 2 (e.g., when one item from the FOS and one item from the STS were excluded). The regression coefficients (factor loadings) and model fit indices were examined in the evaluation of the model through CFA, and the developed CFA models are displayed in figure 10 and the fitness values are illustrated in table 9 and table 10. As can be seen in Figure 10, which presents the factor loadings for the Amos model obtained from the second level CFA conducted for model 3, factor loadings of the items in the subscale dimensions ranged from .65 to .93 while these dimensions explained the subscales at a ratio between .42 and .79 (p<0,05). The fit index values obtained for the second level CFA were found to be χ2/sd=1.28, GFI= .90, NFI=.90, CFI=.93, and RMSEA=.035 (table 9). Based on this finding, it can be stated that the fit indices obtained from the second level CFA indicate that the model demonstrates a good fit.

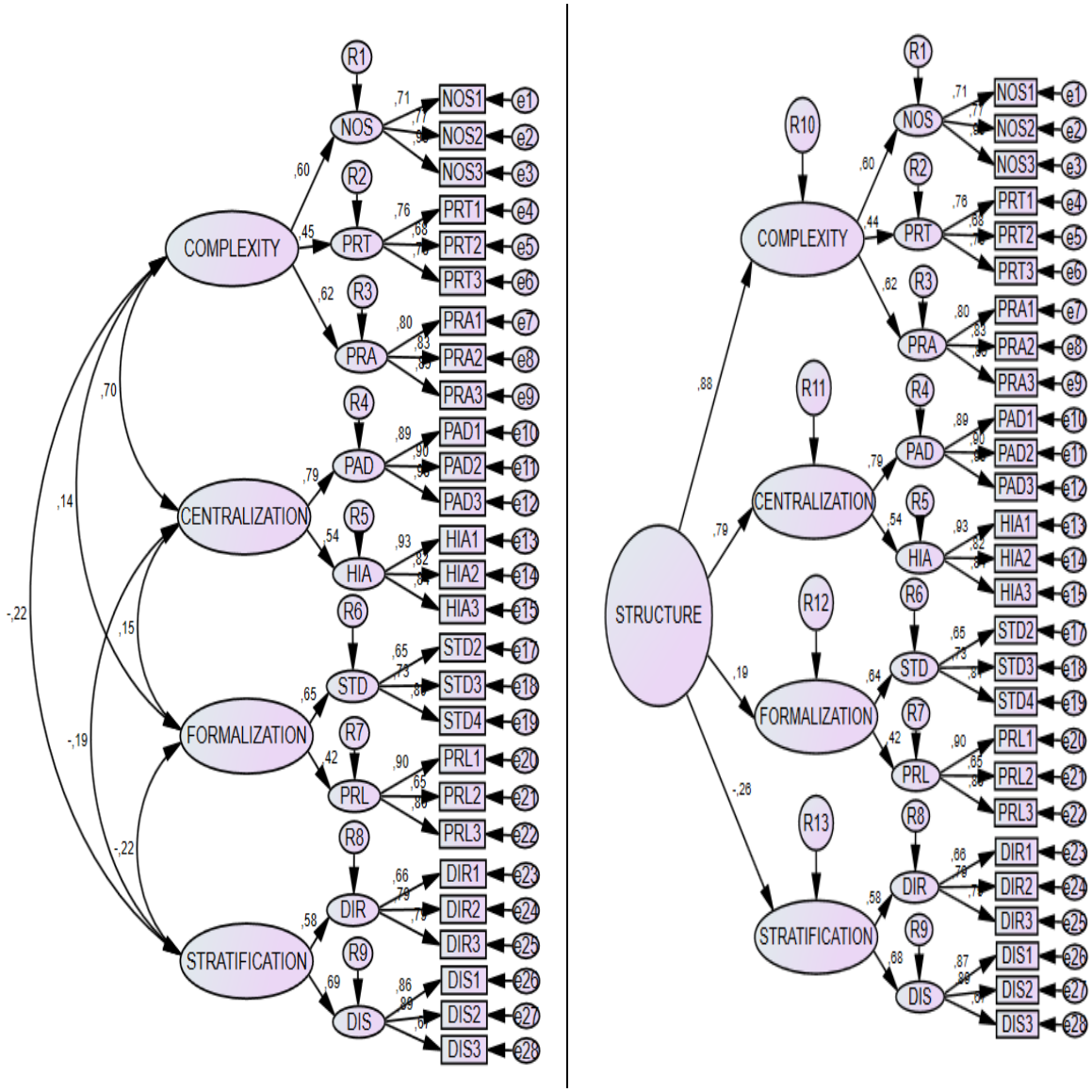



*Figure 10. Model 3 –level 2 and level 3 CFA*

Level 3 CFA was conducted to determine the fit level of the sub-scales in model 3 whose factorial structure was confirmed by second level CFA into the latent variable "*Organizatinal structure*", described as a hypernym. In other words, third level CFA was conducted to determine whether the sub-scales, which were structured as relatively independent but relevant basic components in the second level CFA, were really a component of the "*Organizational Structure*", which is a hypernym. The factor loadings for the Amos model obtained from the third level CFA performed for model 3 are shown in Figure 10. As can be seen in Figure 10, the factor loadings of the items in the subscale dimensions ranged from .65 to .93, and these dimensions explained the subscales at a rate between .42 and .79 ($p<0,05$). The fit index values obtained for third level CFA were found to be $\chi 2/sd=1.28$, GFI= .90, NFI=.90, CFI=.93, and RMSEA=.035 (table 10). Accordingly, it was revealed that the fit indices and parameters calculated in the second level and third level were the same. This means that the subscales fit into the hypernym "*Organizational Structure*", and that third level relationships had no impact on the parameter values and the fit indices of the model. In addition, figure 10 displays that the most important component of the organizational structure is the complexity subscale ($\beta=0,88$; $p<0,05$). This was followed by the centralization subscale ($\beta=0,79$; $p<0,05$), stratification subscale ($\beta=0,26$; $p<0,05$) and formalization subscale ($\beta=0,19$; $p<0,05$), respectively. When these findings are considered altogether, they indicate that the construct validity of model 3 was ensured.

*Table 9. Goodness of fit indices for first and second (Model 3) level CFA*

| Fit indicates | Model 1 | Model 2 COS | Model 2 CES | Model 2 FOS | Model 2 STS | Model 3* | Excellent Fit | Acceptable Fit |
|---|---|---|---|---|---|---|---|---|
| **χ 2/sd** | 1,218 | 1,164 | 2,063 | 1,320 | 2,569 | 1,284 | 0 ≤χ 2/sd≤ 2 | 2 ≤χ 2/sd≤ 3 |
| **GFI** | 0,904 | 0,975 | 0,978 | 0,985 | 0,971 | 0,903 | .95 ≤GFI ≤ 1.00 | .90 ≤GFI ≤ .95 |
| **NFI** | 0,902 | 0,970 | 0,986 | 0,980 | 0,965 | 0,900 | .95 ≤NFI ≤ 1.00 | .90 ≤NFI ≤ .95 |
| **CFI** | 0,981 | 0,996 | 0,993 | 0,995 | 0,978 | 0,930 | .95 ≤CFI ≤ 1.00 | .90 ≤CFI ≤ .95 |
| **RMSEA** | 0,031 | 0,026 | 0,067 | 0,037 | 0,072 | 0,035 | .00 ≤RMSEA≤ .05 | .05 ≤RMSEA≤ .08 |

*Model 3 – level 2 CFA

*Table 10. Goodness of fit indices for second and third (Model 3) level CFA*

| Fit indicates | Model 1 | Model 2 COS | Model 2 CES | Model 2 FOS | Model 2 STS | Model 3* | Excellent Fit | Acceptable Fit |
|---|---|---|---|---|---|---|---|---|
| **χ 2/sd** | 1,364 | 1,164 | 2,063 | 1,320 | 2,569 | 1,284 | 0 ≤χ 2/sd≤ 2 | 2 ≤χ 2/sd≤ 3 |
| **GFI** | 0,901 | 0,975 | 0,978 | 0,985 | 0,971 | 0,902 | .95 ≤GFI ≤ 1.00 | .90 ≤GFI ≤ .95 |
| **NFI** | 0,902 | 0,970 | 0,986 | 0,980 | 0,965 | 0,900 | .95 ≤NFI ≤ 1.00 | .90 ≤NFI ≤ .95 |
| **CFI** | 0,965 | 0,996 | 0,993 | 0,995 | 0,978 | 0,930 | .95 ≤CFI ≤ 1.00 | .90 ≤CFI ≤ .95 |
| **RMSEA** | 0,039 | 0,026 | 0,067 | 0,037 | 0,072 | 0,035 | .00 ≤RMSEA≤ .05 | .05 ≤RMSEA≤ .08 |

*Model 3 – level 3 CFA

*Findings related to Reliability*

The most frequently used criterion to determine the reliability in the literature is "*Cronbach Alfa*" coefficient, which measures the internal consistency reliability. Cronbach alpha coefficients for model 1 and model 2 were calculated separately for this study (Kline, 2011). An Alpha coefficient of about .90 is regarded as "*excellent*", .80 as "*very good*" and .70 as "*adequate*" (Kline, 2011). In this study, Cronbach Alfa coefficients were calculated separately for model 1 and model 2.

As a result of the reliability analysis for Model 1, the Cronbach alpha coefficient for the overall scale was found to be .76. The Cronbach Alpha reliability coefficients of the subscales were; *NOS*.83; *PRT*.82; *PRA*.81; *PAD*.84; *HIA*.88; *STD*.70; *PRL*.84; *DIR*.81 and *DIS*.84, respectively. Considering the findings, it can be stated that the general structure and subdimensions of model 1 has high internal consistency, and therefore are reliable (Table 11).

As a result of the reliability analysis for Model 2, Cronbach alpha reliability coefficients of the independent scales and the subdimensions of these scales were found as "Complexity Scale" .80 and NOS .83; PRT .82; PRA .81; "Centralization Scale" .79 and PAD .84; HIA .88; "Formalization Scale" .73 and STD .70, PRL .84; "Stratification Scale" .79 and DIR .81; DIS .84, respectively. Based on these findings, it can be stated that the general structure of model 2, that is, the independent scales and subdimensions of these scales has high internal consistency and are therefore reliable (Table 12).

*Table 11. Model 1 – Reliability analysis (Cronbach Alfa - α)*

| **Scale** | **Overall Scale** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **α** | 0.76 | | | | | | | | |
| **Subscales** | NOS | PRT | PRA | PAD | HIA | STD | PRL | DIR | DIS |
| **α** | 0.83 | 0.82 | 0.81 | 0.84 | 0.88 | 0.70 | 0.84 | 0.81 | 0.84 |

*Table 12. Model 2 – Reliability analysis (Cronbach Alfa - α)*

| **Scale** | **COS** | | | **CES** | | **FOS** | | **STS** | |
|---|---|---|---|---|---|---|---|---|---|
| **α** | 0.80 | | | 0.79 | | 0.73 | | 0.79 | |
| **Dimension** | NOS | PRT | PRA | PAD | HIA | STD | PRL | DIR | DIS |
| **α** | 0.83 | 0.82 | 0.81 | 0.84 | 0.88 | 0.70 | 0.84 | 0.81 | 0.84 |

## Discussion and Conclusion

According to Hage and Aiken (1970), a high level of complexity of organizational roles and functions depending on employees' specialization in their field leads to the emergence of administrative problems in coordination and supervision, and one way of overcoming these problems is to increase formalization. Blau and Schoenherr (1971) also

pointed out that higher-level specialization at the level of interdepartmental differentiation and hierarchy establishes more standardization, which means bureaucratization of the organizational structure. The level of formalization in an organization varies according to the complexity of the tasks, organizational levels and units (Hage and Aiken, 1969). For example, for outputs produced in the production units of a factory to be of a certain standard and quality, the fact that jobs are standardized so as to include simple repetitions requiring little skill increases the level of formalization whereas the level of formalization is relatively low in more complex and flexible jobs such as teaching a lecture because it requires professionalism.

There is an opposing relationship between centralization and complexity; high complexity causes low centralization (authority transfer / decentralization) (Hage and Aiken, 1967). As the organization produces more complex products such as information or high technology depending on environmental changes, it will be more dependent on expert knowledge to take an increasing number of organizational decisions, and experts who are expected to make decisions usually take part in the operational core in such cases (Mintzberg, 1983); from this point of view, it can be stated that the increased knowledge and complexity will lead to the transfer of power of decision more. Child (1972b), referring to Hage and Aiken, asserts that depending on organizational size, complexity is correlated positively with formalization and negatively with centralization.

Regarding the relationship between centralization and formalization, it is put forward that transfer of authority will increase bureaucratic control, that is, formalization (Child, 1972b; Donaldson, Child and Aldrich, 1975). However, the level of formalization depending on centralization can vary according to the employees' level of professionalism, as in formalization associated with complexity. In other words, more formalization and centralization are used to maintain control in an organization with a high number of non-professionals. In organizations where professional workers are high in number, the centralization and formalization levels can be expected to be lower due to the expectation of more decision-making on issues affecting the work of professionals. Similarly, the level of formalization will vary according to organizational levels (Hage and Aiken, 1967). For instance, due to the complexity and uncertainty involved, the level of formalization on management tasks that are at the higher levels of the hierarchical level will be lower than the formalization on routine operational tasks at the lower levels.

There is an opposite relationship between complexity and stratification, as in centralization. With employees' taking part in decision-making through specialization, differences in status among employees will be reduced in an organization with a more decentralized structure (Hage and Aiken, 1970). As in complexity, between formalization and stratification, the rules and procedures an employee is subjected to will get stricter and increase from the upper levels to lower levels and from professional works to simple, routine works depending on the level of specialization required by the job or on employee's being at the upper levels of the organizational hierarchy (Donaldson et al., 1975).

Knowledge of such relationships allows the impact of changes in the structure on the organizational design to be predicted. However, within the framework of contingency theory it must be kept in mind that the characteristics of the organization (sector, culture, climate etc.) and contextual variables (size, technology, environment and strategy) have an effect on the establishment of the structure and the design of the organization.

*Findings of the Analysis*

The psychometric properties of OSS-U were tested with three different models, and all three models gave valid and reliable results in the study sample. According to the analyses performed, it was found that OSS-U can be used as model 1 in which nine dimensions *(NOS, PRT, PRA, PAD, HIA, STD, PRL, DIR, DIS)* indicate a single concept (university structure), or as model 2 in which 4 subscales (Complexity Scale, Centralization Scale, Formalization Scale, and Stratification Scale) stand as independent parts of an umbrella term (University Structure) or as model 3 which is made up of the combination of both models (model 1 + model 2) and in which combined subscales with their own dimensions explain a higher concept (University Structure).

*Scoring of Models*

The OSS-U comprises a total of 27 items, and each dimension has 3 items, and all the items are rated as "1-completely disagree", "2-disagree", "3-undecided" and "4-agree, 5-completely agree". The dimensions of "professional latitude" and " participation in decisions" are reversely scored. The highest possible score for each dimension is 15 while the lowest score is 3. Measurements are used to measure the degree of participation or perception of the situation based on the department the academics work in. The increase in the total score from any dimension suggests that academicians participate more in that dimension, which indicates that these expressions have become norms for the organization.

It is not possible to get total scores in model 1. Statistical operations can be done on mean and standard deviation values of scale dimensions.

It is possible to attain separate total scores from the subscales in Model 2. In terms of ease of calculation and interpretation, the following formula was devised: The lowest and highest points that can be taken from the subscale to be used in the first stage are calculated and the median is found; and in the second stage, the interval between the lowest score and the median is regarded as low (recessive) for that scale whereas the interval between the median and

the highest score is considered high (dominant). The following part exemplifies the procedure to evaluate the complexity scale:

- Maximum score = (total score of the number of occupational specializations { 3 items } + total score of professional training { 3 items} + total score of professional activities { 3 items }) = (15 + 15 + 15) = 45,
- The lowest score = (the lowest score of the number of occupational specializations { 3 items } + the lowest score of professional training { 3 items } + the lowest score of professional activities { 3 items}) = (3 + 3 + 3) = 9,
- Median = (highest score / 2) = 45/2 = 22.5

According to this;

- *Complexity Scale* → 9 ≤ *low (recessive)* < 22.5 < *high (dominant)* ≤ 45
- *Centralization Scale* → 6 ≤ *low (recessive)* < 15 < *high (dominant)* ≤ 30
- *Formalization Scale* → 6 ≤ *low (recessive)* < 15 < *high (dominant)* ≤ 30
- *Stratification Scale* → 6 ≤ *low (recessive)* < 15 < *high (dominant)*≤ 30

By using the criteria of model 2, total score can be attained from Model 3, and 16 different measurement models can be achieved depending on the different variations that structural components generate together (Figure 11). As the scale proceeds from measurement model 1 to measurement model 16, organizational components follow a shift from mechanical to organic.

*Usage of the Scale/ Different Models of the Scale and Evaluation of Models*

The fact that OSS-U can be administered as different models means the following in practice: By using model 1, a researcher using the scale will be able to examine the organizational structure of the X University by creating an "organizational structure histogram" on a nine-dimension basis. With the help of the histogram, the researcher will be able to visualize which structural components are dominant or recessive at X university. This will make it easier to explain and interpret the findings by presenting visual models to the researcher while doing university comparisons such as X, Y, Z.

By using any or a few of the independent scales in Model 2, the researcher can examine the aspect or aspects of the X University that he is interested in. For example, if the researcher wants to study X university only in terms of stratification; will be able to suggest that the organizational structure at X university is heterogeneous (stratified) or homogeneous (not stratified), based on the points given by the academicians to the Stratification Scale in Model 2.

If the researcher uses model 3, which consists of subscales, he can comment on the approximate position of the X University within the “mechanical-organic organization scale”. In this part, it is first necessary to provide information on how measurement models (1-16) are constructed. Measurement models represent the ideal types that the different types of structural dimensions, which are the basic assumptions of the designing approach, are grouped under certain conditions. Because of the total score of each of the complexity, centralization, formalization and stratification dimensions that make up the organizational structure of Hage’s (1965) Axiomatic Theory; 16 different organizational structure type or measurement model (see figure 11) emerges when researchers consider the middle point as low / recessive (-) and the top as high / dominant (+) (see model 2). These measurement models are put in order from mechanic to organic on the basis of the organizational classification of Burns and Stalker (1968) according to the high (+) or low (-) scores of organizational structure components they contain (see Figure 11). For example, if the complexity score of an X university is low, but the centralization, formalization and stratification scores are high (measurement model 1), then based on Mintzberg's (1983) organizational classification, the structure of that university can be stated to be in the "bureaucratic organization structure". For instance, if the complexity score of a Y university is high, but the centralization, formalization and stratification scores are low (measurement model 15), then based on Mintzberg's (1983) organizational classification, the structure of that university/faculty can be stated to be in the "professional organization structure".

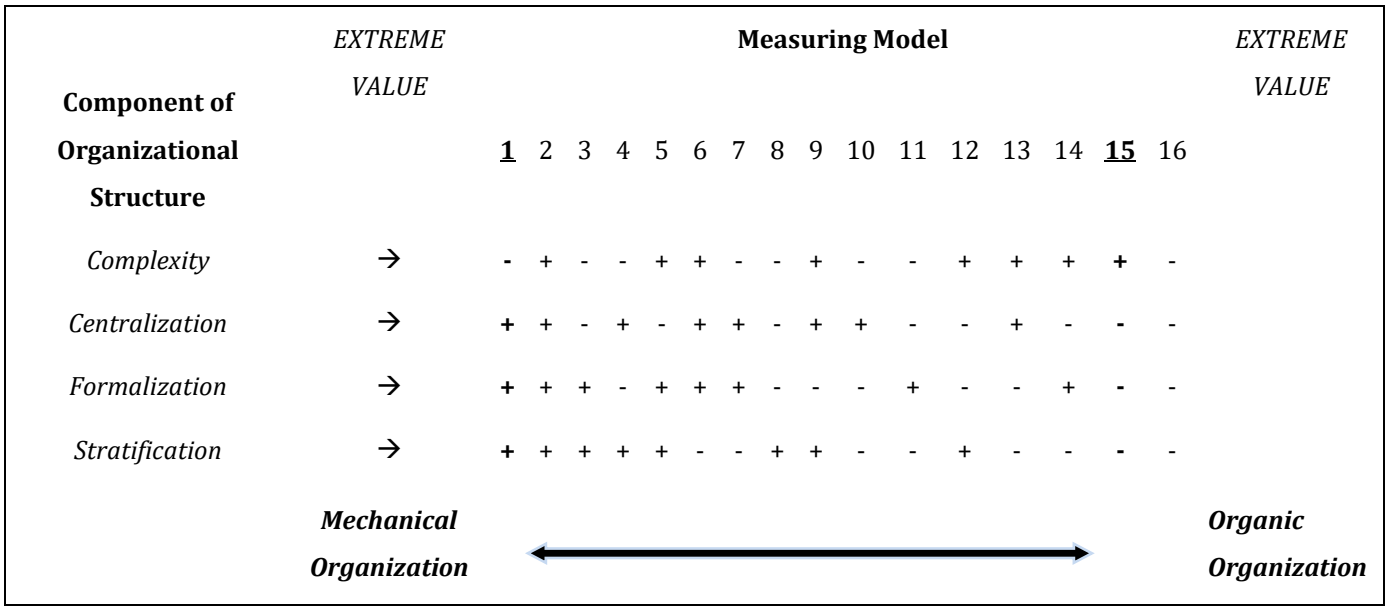



*Figure 11. Model 3 - Measurement models, variations in organizational structure and mechanical-organic organization scale*

This study was carried out within some limitations. The first limitation of the study is related to conceptual framework. The limitation based on the conceptual framework is that the structural features are evaluated in the context of the organizational designing approach. According to Ahlstrand, Lampel and Mintzberg (2001), designing approach aims to form ideal types by asking how different types of structural dimensions can be grouped together under certain conditions. That's why, the main concern in the study is not the relationship between the organizational structure and environment but how different designs were formed depending on the variations of structural variables as an internal process in the organization. The second limitation of the study is that only the structural variables of the organization are studied by excluding the contextual variables. Structural variables are also limited with complexity, formalization, centralization and stratification based on Axiomatic Theory by Hage (1965).

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**Appendix**

Organizational Structure Scale – University Version (OSS-U)

| Subscales | **Dimensions** | **Item** |
|---|---|---|
| Complexity | *Number of occupational specialties* | 1. Each course is given by a faculty member who is a specialized in that course. |
| | | 2. The number of academicians in each department is sufficient. |
| | | 3. Faculty members have professional competencies related to the courses they give. |
| | *Professional training* | 4. Faculty members who are engaged in conducting academic studies are supported. |
| | | 5. Academic title is an important factor in the distribution of faculty members' tasks and roles. |
| | | 6. Academic title is an important factor in faculty members' course distribution. |
| | *Professional activities* | 7. Faculty members participate in activities (congress-symposium) regarding their professional development throughout the year. |
| | | 8. Academic staff are also involved in academic studies outside faculty hours (e.g. weekends). |
| | | 9. Academicians belong to professional associations related to their field. |
| Centralization | *Participation in decisions* | 10. Academicians are asked to participate in decisions concerning themselves. |
| | | 11. Faculty members are asked for their opinions before a new procedure is implemented. |
| | | 12. Faculty members are asked for their opinions before new programs are implemented. |
| | *Hierarchy of authority* | 13. In the case that dean has to give non-routine decisions (not included in the regulation), S/he consults their superiors for final approval. |
| | | 14. In the case that the vice deans have to give non-routine decisions (not included in the regulation), they consult their superiors for final approval. |
| | | 15. In the case that faculty members have to give non-routine decisions (not included in the regulation), they consult their superiors for final approval. |
| Formalization | *Standardization* | 16. There are norms that determine who has to do what, where and when. |
| | | 17. Official correspondences are conducted in accordance with procedures. |
| | | 18. Disciplinary actions are done in accordance with the regulation. |
| | *Professional latitude* | 19. In the issues related to teaching, faculty members decide on their own, without needing the approval of their superiors |
| | | 20. Academicians set up their own rules regarding their work (lesson and exam plan and management, etc.). |
| | | 21. Faculty members feel free to choose the methods, techniques and materials they think are most appropriate for their courses |
| Stratification | *Difference in rewards* | 22. New technological products are distributed to the superiors first, then to the subordinates. |
| | | 23. The undergraduate course loads (Day time courses) of the superiors is less than that of subordinates |
| | | 24. The superiors are given the tasks that provide extra income such as counseling for graduates, formation, etc. more than the others. |
| | *Difference between status* | 25. Superiors have a right to comment about the faculty policy more. |
| | | 26. Superiors have more status than subordinates |
| | | 27. The relationship between superiors and the administration is closer. |