Development of Organizational Agility Scale in Higher Education: A Validity and Reliability Study

Yükseköğretimde Örgütsel Çeviklik Ölçeğinin Geliştirilmesi: Geçerlik ve Güvenirlik Çalışması

Feride Öksüz-Gül[1] (ID), Münevver Çetin[2] (ID)

[1]Faculty of Educational Sciences, İstanbul Medeniyet University, İstanbul, Türkiye
[2]Atatürk Faculty of Education, Marmara University, İstanbul, Türkiye

Özet

Üçüncü kuşak üniversite olma yolunda ilerlerken üniversiteler rekabet etmek, tüm paydaşları için değer yaratmak ve kendi bağlamında değişen piyasalara uyum sağlamak durumunda kalmaktadır. Değişim ve inovasyon yönetiminin artık tek başına yeterli olmadığı gözlemlenmekte ve vasatın üzerinde bir performansın sürekli hale gelmesi beklenmektedir. Bu sürekliliği sağlama potansiyelini irdeleyen örgütsel çeviklik kavramı, içsel ve dışsal sebeplerle ihtiyaç duyulan değişimi sezebilen, değişimi rutin olarak uygulayabilen ve sürekli öğrenme kapasitesine sahip, dinamik bir örgüt tasarımını ifade eder. Bu kavramdan hareketle, bu araştırmada akademik ve idari çalışanların örgütsel çeviklik bağlamında üniversiteye ilişkin algılarını keşfetmeye yönelik bir ölçek geliştirmek amaçlanmıştır. Bu ölçek için oluşturulan model sayesinde, Türkiye'deki kamu yükseköğretim kurumları için örgütsel çeviklik çerçevesi oluşturulmuştur. Geçerlik ve güvenirlik çalışmaları kapsamında Yükseköğretimde Örgütsel Çeviklik Ölçeği; İstanbul'daki 10 devlet üniversitesinde, pilot çalışma dahil, 893 akademik ve idari çalışana uygulanmıştır. Açımlayıcı faktör analizi sonucunda dört faktörlü bir yapı elde edilmiş ve ölçek *strateji ve çalışan odaklı örgüt tasarımı, iç paydaş yönelimi, dış paydaşlarla iş birliği ve inovasyonu destekleme* boyutlarından oluşmuştur. Doğrulayıcı faktör analizi sonucunda model uyum indekslerinin iyi uyum gösterdiği ya da kabul edilebilir seviyede olduğu görülmüştür. Kamu üniversiteleri bağlamında oluşturulan örgütsel çeviklik çerçevesinde üniversitenin insani yönüne eğilim olduğu görülmüştür. Bu sebeple üniversitenin iç ve dış paydaşlarını belirlemeye ve bu paydaşların ihtiyaçlarının tespit etmeye odaklanılması önerilmektedir. Yükseköğretim sistemimizin ulusal ve uluslararası bağlamda nasıl daha çevik ve esnek olabileceğini keşfetmek ve Türkiye yükseköğretimine ilişkin daha bütüncül bir anlayış elde etmek için vakıf üniversiteleri için de bir çeviklik çerçevesi oluşturulması faydalı olacaktır.

Anahtar sözcükler: İnovasyon, örgütsel çeviklik, paydaş yönelimi, strateji, yükseköğretim.

Abstract

To become third generation university, higher education (HE) institutions must compete, create value for internal and external stakeholders, and adapt to changing market conditions. The concept of organizational agility (OA) refers to a dynamic organization that can sense the change imposed by internal and external elements, routinely implement change, and has the capacity to learn continuously. Based on this concept, this research aims to develop a scale to discover the perceptional evaluations of academic and administrative staff of public universities in the context of OA, and thereby to establish an OA framework for public universities. The research was carried out in psychometric design. The resulting Organizational Agility Scale in Higher Education was pilot tested and administered to 893 academic and administrative staff from 10 public universities in Istanbul. The principal components analysis with varimax rotation supported four dimensions. Through confirmatory factor analysis, four-factor structure was found to be at acceptable level. Four dimensions of the scale (*strategy and staff-oriented organizational design, internal stakeholder orientation, cooperation with external stakeholders, support for innovation*) focus more on human side of higher education institutions and less on change management and responsiveness, compared to business agility. The findings imply that institutional and national efforts are needed to form a strategy and stakeholder-oriented organization design for universities. A separate OA framework should be constructed for private universities to reach a more holistic understanding of Turkish HE and to compare public and private higher education institutions and to discover how Turkish HE system can be more agile and responsive in national and international contexts.

Keywords: Higher education, innovation, organizational agility, stakeholder orientation, strategy.

A complex, competitive, and constantly changing global environment forces all kinds of organizations to survive in uncertainty. Particularly, big enterprises whose structures are highly hierarchical and traditional seem to struggle to adapt this fluid and digital world. As Zerfaß,

Dühring, Berger and Brockhaus (2018) note, digital transformation is another force leading organization to adapt and change "in the domains of strategy, structure, product development and service delivery" (p. 6). Likewise, higher education (HE) institutions have faced a great deal of pressure for

change and sustainability due to global effects of massification, explosion in student enrollments, increase in interdisciplinary studies, entrepreneurship, and enormous costs of ground-breaking research. To become a third generation university, as Wissema (2009) proposed, HE institutions must adapt to their national and global environments and quickly respond to constant change. Agility is among the key concepts giving an opportunity to understand the challenges that organizations have been facing since concepts such as change management, innovation management, and flexibility are not sufficient to explain this transformation.

As a concept, agility emerged in business literature approximately two decades ago to answer the question of 'how will organizations survive in a constantly changing world?' In the 1990s, researchers began to argue that through the concept of agility, organizations can develop strategies for coping with uncertainty and competition. Gunasekaran (1999) defined agility in production as the ability to respond to the markets shaped by customer-oriented services quickly and effectively and to enrich in the ever-changing and unpredictable competitive conditions. Yusuf, Sarhadi and Gunasekaran (1999) stated that agility is the successful application of competitive elements such as speed, flexibility, innovation, and quality through the integration of reconfigurable resources and the environment required to produce customer-oriented products and services in constantly changing markets. During these early years of literature, speed and flexibility were perhaps the most emphasized aspects of agility (Yusuf et al., 1999; Gunasekaran, 1999; Sharifi & Zhang, 2001). Despite this tendency, Youssef (1994) objected to associating agility with speed at getting things done (as cited in Ganguly, Nilchiani, & Farr, 2009) because agility means massive structural change beyond simple speed. Therefore, accepting agility as the speed to respond to the market results in a restrictive perspective. Another important feature attributed to agility is to deliver high quality and customer-oriented products (Sherehiy, Karwowski, & Layer, 2007; Tsourveloudis & Valavanis, 2002).

These early theoretical efforts have contributed to the conceptual and empirical issues such as what dimensions organizational agility has for businesses in various sectors, which resulted in the birth of the concept of organizational agility (OA). Weber and Tarba (2014) defined OA as the ability to act flexibly in the face of new developments. The definitions of many researchers who produce work in this field are almost identical to this definition. Worley, Williams and Lawler (2014) defined OA as a timely, effective and sustainable organizational change. Teece, Peteraf and Leih (2016) identified flexibility and organizational change in the context of agility as

"the capacity of an organization to use/redirect its resources efficiently and effectively to preserve higher-efficiency activities and create value, as required by internal and external conditions" (p. 17). The question of what is required for this capacity and/or how to reach this capacity has led to the determination of the dimensions of OA and performance indicators for the agile organization.

There are various conceptual frameworks for OA for different contexts. Goldman, Nagel and Priess (1995) created four strategic dimensions for agile manufacturing: 'enriching the customers, organizing to master change and uncertainty, co-operating to enhance competitiveness and leveraging the impact of people and information'. Jackson and Johansson (2003) were inspired by early theories of agility and proposed four-dimension for OA: product-related change capabilities, change competency within operations, cooperation internally and externally, people, knowledge, and creativity. Harraf, Wanasika, Tate and Talbott (2015) listed pillars of an agile organization as 'culture of innovation, empowerment, tolerance for ambiguity, vision, strategic direction, change management, communication, market analysis and response, operations management, structural fluidity, development of learning organization'. Baskarada and Koronios' (2017) more recent conceptual framework focused on five capabilities of OA: *(i)* sensing, *(ii)* searching, *(iii)* seizing, *(iv)* shifting, and *(v)* shaping. Based on agility literature, some researchers developed empirical models for measuring OA. Some of these models consist of uni-dimensional scales (Chung, Lee, & Kim, 2014; Inman, Sale, Green Jr, & Whitten, 2011; Tallon & Pinsonneault, 2011; Yusuf & Adeleye, 2002; Zelbst, Sower, Green Jr, & Abshire, 2011) whereas some of them are multi-dimensional models (Alzoubi, Al-otoum, & Albatainh, 2011; Gligor, Holcomb, & Stank, 2013; Sambamurthy, Bharadwaj, & Grover, 2003; Vázquez-Bustelo, Avella, & Fernández, 2007; Worley & Lawler, 2010). These models and conceptual frameworks were developed for business enterprises from various fields such as manufacturing and supply-chain.

Considering their close relationships with industries as well as their positions in today's world, HE institutions also need to benefit from OA literature to survive, adapt, and compete. By analyzing the business dimensions of agility, and translating them into agile educational institutions, universities may be able to better respond to highly competitive and innovation-driven HE systems. Having sensed this need, Menon and Suresh (2021) have recently reviewed the literature, identified eight factors that can enhance *agility in higher education* and examined the interrelationship between these factors, namely, "ability to sense the environment, organizational structure, adaption of information and communication technology, orga-

nizational learning, human resource strategies, leadership, readiness to change, collaboration with stakeholders". With similar concerns, Araza (2015) developed a measurement tool with the following dimensions for HE institutions in Türkiye: proactiveness orientation, responsive orientation, strategic flexibility orientation, speed orientation, and internal and external stakeholder orientation. This tool only evaluates the attitudes of university managers. Although these studies offer a general framework for OA of HE institutions, they lack cultural and regional elements and also perspectives of university employees. This study developed a tool to evaluate university employees' perceptions regarding their workplace OA.

Due to highly centralized structure of Turkish HE system, universities have limited capabilities in terms of autonomy and flexibility. The presence of Council of Higher Education (CoHE) in Türkiye with its current authority weakens institutional authority. Therefore, an idealized OA framework adapted directly from business literature cannot be practical for Turkish universities. So, in this study, an extensive item pool was created according to several OA frameworks (Goldman et al., 1995; Gunesekaran, 2015; Worley & Lawler, 2010), and five experts checked the items in terms of appropriateness to the culture, unique nature of HE institutions, and pedagogy. Therefore, creating a culture sensitive multi-dimensional OA framework for HE institutions in Türkiye is the focus of this study. We excluded private universities on the grounds that they can act like business enterprises although they are also affiliated with the council. As a result, this research aimed at contributing the literature by developing a measurement tool for evaluating the perceptions of academic and administrative staff, and thus creating a unique and pedagogy-based management framework for public universities. To achieve this aim, we proposed the following research question:

– What are the psychometric properties of Organizational Agility Scale in Higher Education (OASHE)?

Method

Data Research Design

The study was conducted in psychometric design.

Research Sample

The population of this psychometric study consists of the academic and administrative staff working in 12 state universities in Istanbul. The data were collected from 10 state universities researchers could reach through online and/or hard-copied scale forms. The field study is composed of two samples for exploratory factor analysis (EFA) and confirmatory factor analysis consecutively. In the first phase 451 forms were used for the EFA, and 406 forms were included in the CFA. Most of the participants were academics 628 (73.3%). The ages of the 857 participants ranged from 22 to 66 ($\bar{x}$=38.4, SD=9.5). More than half of the participants were female (53.3%), and more than half (52.5%) had doctorate degree. 23.1% of the participants had a master's degree, 16.8% had a bachelor's degree, 6.2% had associate's degree, and 1.4% had high school degree. Professional experience of the participants was categorized as 1–5 years (22.8 %), 6–10 years (32.4%), 11–15 years (12.6%), 16–20 years (10.6%), 21–25 years (8.2%), and 25+ years (13.3%). The participants were professors (9.1%), associate professors (8.3%), assistant professors (15.6%), research assistants (34.1%), lecturers (5.6%), specialists (0.6%), and administrative staff (26.7%) who worked in various positions. The convenient sampling method was preferred due to the hectic working conditions of academic and administrative staff. Besides, since the research population includes a large variety of units, it is harder to collect data via a more systematic sampling method.

Data Collection Tool and Data Analysis

Item Pool and Expert Opinion

The scale items were created via a systematic review of the existing models and theoretical frameworks of OA in business and management fields. Worley and Lawler's (2010) OA model for business enterprises was used as the main framework for the item creation process. In addition, considering the leading study of Goldman et al. (1995) and the updated review of Dubey and Gunesekaran (2015), we felt a need to add a stakeholder dimension to cover what these researchers emphasized as 'creating value for the customer' and 'customer focus' respectively. Due to unique organizational nature of HE institutions, we included items depicting the relations with internal and external stakeholders instead of a customer focus. Five experts examined the items and reported their suggestions and ideas to create better items to measure OA perceptions of academic and administrative staff.

Content Validity

Lawshe (1975) states that a minimum of 5 and maximum of 40 expert opinions are required for content validity index. We reached 18 experts from various fields (business, education, and educational administration). The initial form of the OASHE was evaluated by 11 experts and its content validity rate was calculated. Considering the values, 9 items below 0.59 were discarded. However, some items were separated and rewritten in line with expert opinions on the grounds that these items were

expressed to measure two qualities. Therefore, 5 items were added. As a result, the final form before the construct validity analyses consisted of 64 items.

Construct Validity and Reliability Analyses

Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted for construct validity. Cronbach's alpha (α) coefficient was calculated for the internal consistency reliability of the scale. Item total correlations were examined for item discriminations. IBM SPSS Statistics 20.0 program was used for EFA, Cronbach's alpha and item discriminations, and AMOS program was preferred for CFA.

Results

Content Validity

OASHE was evaluated by 11 experts and its content validity rate was calculated. Accordingly, the content validity ratio took values varying between 1 and -0.45. In addition, content validity index was calculated for the whole scale (CVI=0.83). Since this value is greater than the value determined for the minimum content validity ratio (CVR=0.59), the content validity of the scale was found to be statistically significant (CVI>CVR). As a result, it can be said that OASHE provides a solid inter-rater agreement for scale items and yields an overall content validity index.

Construct Validity

To test construct validity, the EFA and CFA were conducted with separate samples.

Exploratory Factor Analysis (EFA)

For the construct validity of the OASHE, we initially conducted an EFA with a separate sample (451 forms) to determine the factor structure. The goal is to discover the nature of the factors and to create a descriptive model. To measure sampling adequacy and correlation between variables, we calculated KMO and Bartlett values before the EFA. KMO value was found as .956. Bartlett's sphericity test was found to be statistically significant (χ^2=6597.227, df=406, p<.001), which indicated that our data had normal distribution in a multivariate structure.

Then, we conducted principal component analysis by Varimax Rotation method. The EFA was started with a total of 64 items. In the first analysis, the eigen value was taken as 1 and a structure with 10 factors emerged and no rotation was performed. These factors explained 60.89% of the total variance. After this process, Varimax rotation technique was performed. During the Varimax rotation process, it was observed that

some items did not have the expected load values, and some items were loaded from two factors. Items with a load value below .50 were discarded to make the tool stronger. The following items were removed, respectively: 7, 12, 14, 35, 53, 24, 20, 21, 25, 34, 36, 42, 43, 54, 9, 27, 6, 44, 31, 23, 30, 26, 49, 16, 64, 55, 57, 50, 61, 45, 47, 52, 48, 62, 1. The items were removed one by one, and the analysis was repeated, yielding a 29-item scale with 4 factors (■ Appendix 1).

This new model of 4 factors explained 56.655% of the total variance. The first factor explained 20.861%, the second factor explained 16.961%, the third factor explained 10.659%, and the fourth factor explained 8.174% of the total variance. In addition, the Scree Plot graph was examined, the graph became horizontal after the fourth vertical line, and it was concluded that the scale was four-dimensional (■ Figure 1). In general, the high variance rates explained in factor analysis are directly related to the strong factor structure. However, since it is not possible to reach high values in social sciences, variance rates between 40% and 60% are considered reasonable (Çokluk, Şekercioğlu, & Büyüköztürk, 2014).

The EFA analyses revealed that the 4-factor scale consisted of items with acceptable factor loads. The lowest factor load was detected as .519, whereas the highest was .759 (■ Table 1). The first factor was named as 'strategy and staff-oriented organization design (13 items)', the second factor as 'internal stakeholder orientation (9 items)', the third factor as 'cooperation with external stakeholders (4 items)', and the final factor, including items related to innovation, was named as 'supporting innovation (3 items).'

Confirmatory Factor Analysis (CFA)

We also tested the 4-factor model consisting of 29 items with CFA by using the SPSS Amos program after the EFA. The sample group of the CFA consists of 406 academic and administrative staff from various universities in Istanbul. The fit index values of the OASHE were calculated as seen in ■ Table 2.

Based on the CFA results, the fit index values were examined, and modification suggestions were taken into consideration to improve the model. As a result of the modifications suggested, fit index values were calculated as χ^2=830.437, χ^2/df=2.260, GFI=.871, IFI=.925, TLI=.916, CFI=.924, RMSEA=.056, SRMR=.0493, and RMR=.055, respectively. The factor loads of all items vary between .36 and .80. The path diagram is shown in ■ Figure 2.

Reliability Analyses

A pilot study consisting of 50 people with similar characteristics to the sample group was conducted to examine whether the
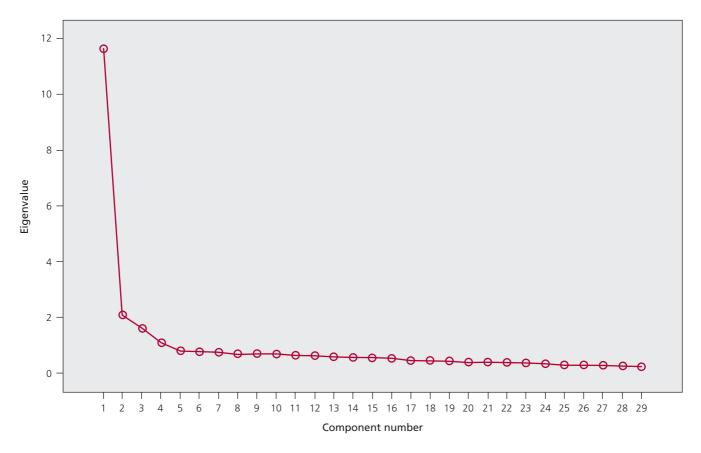
Figure 1. Scree plot.

OASHE is reliable against time. Test-retest phase was applied to the same people with a two-week interval, but 36 of them completed the scale. The difference and relationship between the averages of the scores obtained from the first application and the second application was analyzed by paired groups t-test and Pearson correlation analysis. No significant difference was observed (t=.642, p=.525) and there was a statistically positive, strong and significant relationship (r=.47, p<.001) between the mean scores obtained from the first and second measurements.

The Cronbach's alpha value of the total scale was found to be α=.949. Upon examining Cronbach's alpha value of each sub-scale, all reliability values were found to be higher than .70. Cronbach's alpha coefficients of the sub-scales are listed respectively: strategy and employee-oriented organization design= .924; internal stakeholder orientation= .880; cooperation with external stakeholders= .783; and supporting innovation= .719.

The corrected item-subscale coefficients of the items varied between .37 and .78 for the first factor (strategy and staff-oriented organization design), .57 and.73 for the second factor (internal stakeholder orientation), .53 and.65 for the third factor (cooperation with external stakeholders), and .51 and .56 for the fourth factor (supporting innovation). Corrected item-scale total correlation values of all items ranged between .28 and .72 (Table 3).

Discussion

The issue of how HE institutions will survive and operate in the future is a hotly debated topic. There are many conceptual and empirical studies conducted to anticipate the future of universities and to make suggestions accordingly. This study aimed to create a framework for universities through OA concept. No measurement instrument evaluating the OA features of universities through the perceptions of academic and administrative staff could be found in our literature review. This study provides the evidence about the validity and reliability of the OASHE.

Table 1. Factors loads of Organizational Agility Scale in Higher Education.

Item	Factors				New items
	1	**2**	**3**	**4**	
Item 2	.746				Item 1
Item 4	.738				Item 3
Item 37	.664				Item 17
Item 3	.650				Item 21
Item 17	.640				Item 15
Item 13	.619				Item 29
Item 39	.617				Item 19
Item 5	.610				Item 14
Item 38	.598				Item 7
Item 41	-.587				Item 27
Item 32	.578				Item 26
Item 11	.571				Item 6
Item 15	.519				Item 8
Item 60		.759			Item 28
Item 58		.694			Item 16
Item 59		.693			Item 5
Item 40		.671			Item 20
Item 46		.627			Item 22
Item 28		.627			Item 13
Item 63		.620			Item 23
Item 56		.617			Item 25
Item 19		.564			Item 11
Item 33			.758		Item 2
Item 22			.669		Item 12
Item 51			.624		Item 24
Item 29			.592		Item 9
Item 8				.649	Item 4
Item 10				.631	Item 18
Item 18				.552	Item 10

Table 2. Fit index values of Organizational Agility Scale in Higher Education.

	χ^2	χ^2/df	GFI	IFI	TLI	CFI	RMSEA	SRMR	RMR
Initial result	928.202	2.502	.855	.909	.900	.909	.061	.0507	.057
1. Modification (e1–e2)	872.476	2.358	.863	.918	.910	.918	.058	.0499	.056
2. Modification (e20–e21)	846.767	2.295	.869	.922	.914	.922	.057	.0495	.055
3. Modification (e19–e22)	**830.437**	**2.257**	**.871**	**.925**	**.916**	**.924**	**.056**	**.0492**	**.055**
Acceptable values		<5	>0.85	>0.90	>0.90	>0.90	<0.08	<0.08	<0.08
Good fit index values		<3	>0.90	>0.95	>0.95	>0.95	<0.05	<0.05	<0.05

The OASHE's Psychometric Properties

The standard steps recommended to develop a new scale were performed in this study. As recommended by various authors (Schmitt, 2011; Worthington & Whittaker, 2006), EFA and CFA were performed, respectively. The results confirmed that the four-factor structure of the scale was sufficient. The EFA and CFA results proved that the OASHE was a valid measurement instrument. The KMO coefficient and Bartlett significance test results, which were used to test the data suitability, were quite acceptable. The KMO value of the scale was within the range classified by Kaiser (1974) as perfect. The result of the Bartlett test and KMO value showed that the scale formed a multivariate structure and displayed normal distribution. Eigen value and scree plot were used respectively in defining the number of factors. As a result, it was revealed that the OASHE has a four-factor structure. The ratio of explaining the total variance of the obtained four factors is in the range of 40–60% (Çokluk et al., 2014), which is considered reasonable in social sciences.

In the factor analysis, items with a factor load of less than .30 are considered insufficient and it is suggested that items with a factor load above .40 should be kept (Boateng, Neilands, Frongillo, Melgar-Quinonez, & Young, 2018). These values suggested in this study were taken into consideration, and the value of .50 was determined as the lower limit to make the items stronger. Confirmatory factor analysis is used to test the factor structures in scale development studies. Through this analysis, the relationship between items, error rates, the compatibility of factor structure with the theoretical framework and improvement suggestions for the scale are determined (Brown, 2015). Fit indices reveal to what extent the analysis complies with the collected data (McDonald & Ho, 2002). Good fit values between the targeted model and the data are observed when the SRMR value is close to or below .08, RMSEA value is close to and below .06, and CFI value is close to .95 or greater (Byrne, 2016; Hu & Bentler, 1999). Brown (2015) states that Hu and Bentler (1999) did not accidentally use the expression 'close' for these fit index values because the limits of good fit ranges may fluctuate in some cases. For this reason, some methodologists have determined "acceptable" and "good" value ranges for fit indices. For example, Browne and Cudeck (1993) considered values below .08 for the RMSEA value as acceptable, and values below .05 as a good fit. Brown (2015) states that according to some method experts, a CFI value below .90 is unacceptable. Bentler (1990) asserts that a CFI value in the range of .90–.95 indicates an acceptable model fit. When the model fit values fall within acceptable ranges, different types of fit index values should be considered together with other related aspects of the solution. Brown (2015) collected these values under three groups: absolute fit, parsimony correction, and comparative
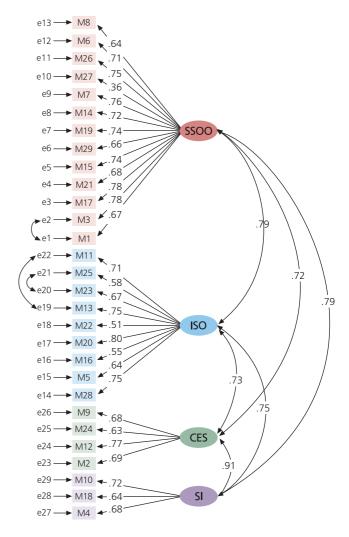

Figure 2. Path diagram.

fit. The researcher recommends researchers to use a value from each group in CFA. In this study, SRMR (.049), RMSEA (.056) and CFI (,924) values were included, respectively. Since SRMR value is less than .05, it is considered as good fit and since RMSEA value is less than .08, it shows an acceptable fit. CFI is widely accepted as one of the most effective values because it is the fit index that is least affected by the sample value (Fan et al., 1999). The CFI value (.924) in this study is within the accepted limits with its proximity to .95. Apart from the CFI, the TLI and IFI values of the scale were calculated as .916 and .925, which are in acceptable range as stated by Sümer (2000) and Tabachnick and Fidell (2000).

In addition to these values, GFI (goodness-of-fit statistics) value, which is one of the absolute fit values, was also taken into

Table 3. Reliability results of Organizational Agility Scale in Higher Education.

Subscales	Item	Corrected item-subscale total correlation	Subscale Cronbach's alpha if item deleted	Corrected item-scale total correlation	Total scale Cronbach's alpha if item deleted	Cronbach's alfa coefficient
Strategy and staff-oriented organization design	Item 1	.676	.918	.618	.947	.924
	Item 3	.780	.914	.728	.946	
	Item 6	.661	.918	.690	.947	
	Item 7	.724	.916	.716	.946	
	Item 8	.608	.920	.615	.947	
	Item 14	.684	.918	.697	.947	
	Item 15	.718	.916	.677	.947	
	Item 17	.753	.915	.711	.946	
	Item 19	.704	.917	.706	.946	
	Item 21	.652	.919	.607	.947	
	Item 26	.714	.916	.714	.946	
	Item 27	.368	.929	.284	.951	
	Item 29	.642	.919	.595	.948	
Internal stakeholder orientation	Item 5	.586	.586	.587	.948	.880
	Item 11	.662	.662	.639	.947	
	Item 13	.683	.683	.676	.947	
	Item 16	.530	.530	.458	.949	
	Item 20	.732	.732	.700	.947	
	Item 22	.522	.522	.474	.949	
	Item 23	.645	.645	.606	.947	
	Item 25	.572	.572	.539	.948	
	Item 28	.702	.702	.655	.947	
Cooperation with external stakeholders	Item 2	.624	.714	.549	.948	.783
	Item 9	.564	.743	.531	.948	
	Item 12	.646	.701	.619	.947	
	Item 24	.532	.763	.549	.948	
Supporting innovation	Item 4	.553	.616	.536	.948	.719
	Item 10	.555	.610	.616	.947	
	Item 18	.513	.667	.590	.948	
	Scale total					.949

consideration. If the GFI value is above .90, it is considered acceptable. However, there are also studies reporting the GFI value above .85 as acceptable (Anderson & Gerbing, 1984; Marsh, Balla, & McDonald, 1988). The GFI value was found to be .87. Considering these authors, it can be considered as an acceptable value. However, it should be noted that in recent studies, the GFI value is not used on the grounds that it may give biased results depending on the sample size. As a matter of fact, Sharma, Mukherjee, Kumar and Dillon (2005) emphasize that this index should not be used because it is not sensitive enough to detect incorrectly determined models. In short, our

findings can be interpreted that our model fits to the factor structure obtained with the EFA.

Scale Contents

The OASHE, which was developed to evaluate the perceptions of academic and administrative staff regarding their universities' OA, consisted of four dimensions: strategy and staff-oriented organization design, internal stakeholder orientation, cooperation with external stakeholders, and supporting innovation. This scale reflects a framework for HE institutions to

become more agile. After a systematic review of the literature, we preferred to use existing models offered in business literature and develop items through a pedagogical point of view. With the emphasis on business and management, the model created by Worley and Lawler (2010) was taken as the main model. Other models have also been used to express the 'stakeholder-orientation' dimension, which is thought to be important for HE institutions. In addition, Goldman and other's (1995) framework and Dubey and Gunesekaran's (2015) revised review were mainly used during the item creation process for the following dimensions: 'creating value for the customer' and 'customer focus'. Worley and Lawler's (2010) framework consist of the following dimensions: robust strategies, adaptable designs, shared leadership, value-creating capabilities (Worley et al., 2014). The EFA analysis indicated that our items merged differently from these frameworks.

The first factor was labelled as *strategy and staff-oriented organizational design* because it emphasizes strategy development in HE institutions and staff-orientation. Some features suggested by Worley and Lawler (2010) for organization design, shared leadership and value-creating capabilities merged under the first factor and created a staff-oriented aspect. The combination of these dimensions is quite understandable since it is recommended that strategy development include employees to create a shared vision (Senge, 2013). The following three items are chosen to illustrate how these two features come together:

- The university develops strategies by regarding the views of the staff.
- The university organizes in-house events to regularly discuss possible future changes HE institutions will face.
- The university is run by values that guide actions of the staff.

The importance of human resources has been widely stressed in OA literature since the pioneers such as Goldman and others (1995). These authors' framework includes knowledge orientation which focuses on the distribution of authority within the institution and internalization of human resources. Similarly, Sharifi and Zhang (1999) considers knowledgeable, skilled, and autonomous employees as one of the important characteristics of OA. Some features that Yusuf and others (1999) attributed to agile organizations include empowerment of employees, de-centralization of decision-making processes, flexible and talented employees. Also, among more recent studies, Menon and Suresh's (2021) theoretical agility framework for universities includes empowerment of academics and other supporting staff, organizational learning and leadership. In parallel with these studies, some items of the OASHE's first factor emphasize career development of employees, support given by unit managers, and their participation in decision-making processes:

- The university creates budgetary opportunities that support the professional development of its employees.
- The university transparently allocates the surplus of resources for the development of its academic and administrative staff.
- The university encourages senior management and academic and administrative managers to share leadership.

Our initial item pool included various stakeholders of the university such as students, employees, suppliers, industry, and families etc. Items related to academic and administrative staff came together under 'strategy and staff-oriented organizational design' and items focusing on students formed a different factor. There are various views about the categorization of stakeholders. Freeman (2010) defines a stakeholder as both affecting and being affected by an organization's achievement of its goals. Amaral and Magalhes (2002) use internal stakeholder as a term to refer to the academic community and external stakeholder to those outside the institution. Benneworth and Jongbloed (2010) accepted top management, employees (academic and administrative) and customers (students, parents/spouses, credit providers etc.) as internal stakeholders. In this study, items considering the development of academic programs, facilities, and activities according to the needs of students and the facilitative attitudes of academic and administrative staff towards students gathered under the same factor. Based on Benneworth and Jongbloed's (2010) categorization, this group of items were named as 'internal stakeholder orientation':

- The university renews the facilities (laboratories, workshops, etc.) specific to science fields according to the needs of the students.
- The university updates its academic programs according to the needs of the students.
- The academic and administrative units work collaboratively focusing on the needs of the students.

This factor also included an item related to the needs of industry for which university provides workforce. Wissema (2009) states that university-industry partnerships and adding value to the society are now a necessity for new generation universities. In addition, Worley and Lawler (2010) included a feature that they call *maximum surface area* for OA. This feature requires employees to interact with the industry and society as much as possible. Although there were items related to societal and industrial impact in the first form of the scale, these items were eliminated. The fact that our study group did not prioritize this industrial and societal impact can be regarded as a cultural difference. There seems to be a lack of interaction with industries and society:

- Academic staff is constantly in search of gaining knowledge and skills for the needs of the industry for which they provide workforce.

The third factor of the scale is named as *cooperation with external stakeholders*. The items of this factor focus on collaborating with different educational institutions, non-governmental organizations (NGOs), and national structures such as Ministry of Education (MoE), CoHE, and Scientific and Technological Research Council of Türkiye (TUBITAK). The items of this factor are listed below:

- Administrative units of my university conduct multi-stakeholder projects with institutions such as MoE, NGOs, CoHE, and TUBITAK.
- The university conducts collaborative studies with NGOs.
- The university conducts collaborative studies with educational institutions at lower levels (primary school, secondary school, high school).
- Academic and administrative staff play an important role in collaborative works conducted with non-governmental organizations or other educational institutions.

According to Araza (2015), the OA of HE institutions consists of the following dimensions: proactiveness orientation, responsiveness orientation, strategic flexibility orientation and internal and external stakeholder orientation. In this study, different factors were created for customers, external stakeholders, and internal stakeholders separately. Similarly, internal and external stakeholders were grouped under different factors. However, our scale does not include customer dimension because it focuses on state universities. In addition, staff-orientation is separated from the internal stakeholder factor and grouped together with strategic orientation.

The last dimension of the scale is labelled as *supporting innovation*. In the first form of the scale, there were items related to value-creating capabilities as suggested by Worley and Lawler's (2010). Value-creating capabilities includes innovation, change and learning ability. However, items related to change and learning ability were eliminated and the final dimension consisted of 3 items focusing on innovation:

- The university makes the use of physical spaces (meeting rooms, workplaces, etc.) public to support innovation.
- The university tries to find financial support from its environment for innovative research.
- The university conducts partnerships with national and international HE institutions.

In the context of agility, these items indicate that the university is perceived as the place where innovation is produced, rather than as a dynamic structure that constantly produces innovation. According to this factor, the function of the university in terms of innovation is to create an environment that enables innovation. However, the university must be considered as a whole with its human power, technology and environment that constantly creates innovation (Wissema, 2009).

Limitations

Although this study carefully followed the steps recommended for developing a psychometrically strong scale, there are some limitations that should be addressed. The OASHE was developed with and confirmed on academics and administrative staff who actively work in Turkish HE system. This limits the generalizability of the results for other parts of the world. Since different results can be obtained in other cultures, The OASHE's psychometric properties should be evaluated in the international context in future studies. In addition, item pool was created through the literature review with the help of five experts. No in-depth interviews were conducted since agility is a complex concept that is hard to be directly observed and experienced in the daily lives of the university staff. Future research can focus on observable performance indicators to address this issue. Lastly, OASHE's four factor structure was tested on academic and administrative staff, who are accepted as one the main internal stakeholders of universities. Further research should be conducted on students' perceptions of an agile university to achieve deeper understanding.

Conclusion and Implications

The newly developed OASHE is a valid and reliable measurement instrument. The 29-item scale consists of four sub-dimensions, including *strategy and staff-oriented organization design* (13 items), *internal stakeholder orientation* (9 items), *cooperation with external stakeholders* (4 items), and *supporting innovation* (3 items). This scale, which has good psychometric properties, can be used to evaluate the academic and administrative staff's perceptions of HE institutions' OA characteristics. Although the basic features of this scale are robust, it is recommended that validation tests be performed on different stakeholders and bigger samples. This scale can be useful for detecting areas in which universities can improve their structures and processes to become more agile.

Theories of agility for business enterprises focus on responsiveness and flexibility in terms of product and customers. However, HE institutions must focus on students and other stakeholders such as academic and administrative staff, industry, suppliers, and other educational institutions. Parallel with the literature, our tool included items stressing autonomy and empowerment of the employees. To create an adaptable and flexible organization, leaders must create a space in which employees have an active role in organizational processes such as decision making and strategy. Our items imply that shared leadership, flexibility, and shared values are important aspects of an agile university. To understand how these concepts are related to each other and create responsiveness and adaptability, possible statistical models can be tested, and case studies can be conducted for deeper understanding. By focusing on human

side of the organization, academic and administrative leaders may have a chance to be responsive and adaptable to regional and global environment.

This scale reflects the perceptions of academics and administrative employees, which creates an opportunity to find out their thoughts about the current situation of the university. As mentioned in the discussion, the items related to societal impact and cooperation with industry were eliminated, which indicates a lack of interaction with industry and society. Although the literature of agility stresses this interaction for being responsive, our study group did not perceive this interaction as necessary for HE institutions. Future research may investigate the reasons underlying this perception.

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■ **Appendix 1.** Organizational Agility Scale in Higher Education (in Turkish: Yükseköğretimde Örgütsel Çeviklik Ölçeği).

	Demografik Bilgiler

Demografik Bilgiler
Görev alanı: Akademik Personel □ İdari Personel □
Çalıştığı birimin adı: (*Ör.* Edebiyat Fakültesi, Personel Daire Başkanlığı vs.): ....
Çalıştığınız pozisyon (Varsa unvanınız): ....
Kıdem: 0–5 yıl □ 6–10 yıl □ 11–15 yıl □ 16–20 yıl □ 21–25 yıl □ 25+ yıl □
Eğitim durumu: Lise □ Ön Lisans □ Lisans □ Yüksek Lisans □ Doktora □
Cinsiyet: □ Kadın □ Erkek
Yaş: ......

	Yükseköğretimde Örgütsel Çeviklik Ölçeği	1. Hiç katılmıyorum	2. Katılmıyorum	3. Kararsızım	4. Katılıyorum	5. Tamamen katılıyorum
1.	Görev yaptığım üniversite, stratejilerini geliştirirken çalışanlarının görüşlerini dikkate alır.	□	□	□	□	□
2.	Görev yaptığım üniversite, sivil toplum örgütleri ile ortak çalışmalar yürütür.	□	□	□	□	□
3.	Görev yaptığım üniversitede üst yönetim, akademik ve idari yöneticileri liderliği paylaşmaları hususunda teşvik eder.	□	□	□	□	□
4.	Görev yaptığım üniversite, diğer yükseköğretim kurumları ile ulusal ve uluslararası düzeyde ortak çalışmalar yürütür.	□	□	□	□	□
5.	Görev yaptığım üniversite, bilim dallarına özel tesisleri (laboratuvar, atölye vs.) öğrencilerin ihtiyaçlarına göre yeniden şekillendirir.	□	□	□	□	□
6.	Görev yaptığım üniversite, çalışanlarının davranışlarına rehberlik eden değerlere sahiptir.	□	□	□	□	□
7.	Görev yaptığım üniversitedeki akademik ve idari yöneticiler, çalışanların üniversiteyi geliştirme çabalarına destek verir.	□	□	□	□	□
8.	Görev yaptığım üniversite, kurumun akademik ve idari stratejilerine ilişkin bilgileri çalışanları ile paylaşır.	□	□	□	□	□
9.	Görev yaptığım üniversitenin idari birimleri, MEB, STK'lar, YÖK, TÜBİTAK gibi kurumlarla çok paydaşlı projeler yürütür.	□	□	□	□	□
10.	Görev yaptığım üniversite, çevresindeki kamu kuruluşlarından ve özel kuruluşlardan inovasyon çalışmalarına yönelik destek bulmaya çalışır.	□	□	□	□	□
11.	Görev yaptığım üniversite, stratejilerini geliştirirken öğrencilerinin görüşlerini dikkate alır.	□	□	□	□	□
12.	Görev yaptığım üniversitenin çalışanları, sivil toplum örgütleri ve diğer eğitim kurumları ile yürütülen ortak çalışmalarda önemli rol oynar.	□	□	□	□	□
13.	Görev yaptığım üniversitenin akademik ve idari etkinlikleri öğrencilerin ihtiyaçları esas alınarak tasarlanır ve yürütülür.	□	□	□	□	□
14.	Görev yaptığım üniversite, yükseköğretimin gelecekte geçireceği muhtemel değişimlerin düzenli olarak tartışıldığı kurum içi etkinlikler düzenler.	□	□	□	□	□
15.	Görev yaptığım üniversite, akademik ve idari çalışanlarının gelişimi için kaynak fazlalığını, şeffaflık ilkesi çerçevesinde, çalışanlarına tahsis eder.	□	□	□	□	□
16.	Görev yaptığım üniversitedeki öğrenciler, akademik ve idari çalışanlara kolayca ulaşır.	□	□	□	□	□
17.	Görev yaptığım üniversite, çalışanlarının kişisel ve mesleki gelişimini gündeminde tutar.	□	□	□	□	□
18.	Görev yaptığım üniversite, inovasyonu desteklemek için fiziksel alanların (toplantı salonları, çalışma alanları vs.) kullanımını herkese açar.	□	□	□	□	□
19.	Görev yaptığım üniversite, gerektiğinde risk almanın avantajlarını çalışanlarına aktarır.	□	□	□	□	□
20.	Görev yaptığım üniversitedeki akademik ve idari birimler, öğrencilerin ihtiyaçlarına odaklanan takımlar halinde çalışır.	□	□	□	□	□
21.	Görev yaptığım üniversite, çalışanlarının mesleki gelişimlerini destekleyen bütçe olanakları oluşturur.	□	□	□	□	□
22.	Görev yaptığım üniversitenin çalışanları, yöneticileri tarafından kendilerine sorumluluk verilmesini beklemeden sorumluluk üstlenir.	□	□	□	□	□
23.	Görev yaptığım üniversitenin akademik çalışanları, öğrenci yetiştirdikleri sektörün ihtiyaçlarına yönelik bilgi ve becerileri kazanmayı çalışır.	□	□	□	□	□
24.	Görev yaptığım üniversite, alt kademelerdeki (ilkokul, ortaokul, lise) eğitim kurumları ile ortak çalışmalar yürütür.	□	□	□	□	□
25.	Görev yaptığım üniversitenin çalışanları liderlik rolü üstlenmeye hazırdır.	□	□	□	□	□
26.	Görev yaptığım üniversitede üst yönetim, üniversite çalışanları ile etkileşim halinde olmak için çaba harcar.	□	□	□	□	□
27.	Görev yaptığım üniversitenin çalışanları karar alma süreçlerine etkin bir şekilde katılamaz.	□	□	□	□	□
28.	Görev yaptığım üniversite, akademik programları öğrencilerin ihtiyaçlarına göre yeniden düzenler.	□	□	□	□	□
29.	Görev yaptığım üniversitenin çalışanları, ortaklaşa belirlenen örgütsel hedeflere ulaşma derecesine göre ödüllendirilir.	□	□	□	□	□