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RESEARCH ARTICLE

Development of Workforce Agility Scale for Academic Staff: Validity and Reliability Studies

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Abstract

Higher educational institutions need agile academic staff to respond to environmental changes and transformations proactively. However, the literature lacks studies that tend to examine the agility levels of academic staff or develop a data collection tool for the agility levels of academic staff. In this regard, this study aims to develop a workforce agility scale specific to academic staff by considering Turkish culture and structure of higher educational institutions in Turkey. The literature on workforce agility and opinions of academic staff guided the scale's item writing process. Validity and reliability studies of the scale were conducted on a sample of 590 academic staff. The results of the exploratory factor analysis revealed that the workforce agility scale consists of 5 dimensions (adaptability, growth orientation, competence, future orientation, and resilience) and 32 items. Then, this five-dimensional structure of the scale was tested with confirmatory factor analysis and confirmed. Lastly, McDonald's omega (ω) and Cronbach's alpha (α) coefficients were calculated to investigate the scale's reliability. The McDonald's omega was found to be 0.967 and the Cronbach's alpha was found to be 0.964. As a result of these calculations, it was decided that the workforce agility scale, which was developed in this study, is a valid and reliable scale.

Keywords: Higher educational institutions, scale development, validity and reliability studies, workforce agility

Introduction

Agility for organizations includes anticipating environmental changes, interpreting them, and responding to them appropriately (Zhang & Sharifi, 2000). Organizational agility has three dimensions. The first dimension comprises interorganizational collaboration and interactions. The second dimension comprises technical features such as information technologies and flexible production systems. The third dimension, on the other, is about the workforce of the organization (Hopp & Van Oyenn, 2004). Inıtially, organizational agility studies emphasized the importance of technology to achieve agility (Breu et al., 2001; Crocitto & Youssef, 2003). However, research conducted in the later years has indicated that a good way to develop such a response on time is by transforming to an agile organization. Conversely, this transformation is almost impossible without an agile workforce (Alavi & Wahab, 2013; Housein & Yousefi, 2012). Intelligence, experience, knowledge, competencies, and capabilities of people are some of the resources of an organization which are difficult to be replaced and copied by other organizations. Therefore, researchers state that agility for an organization depends mostly on utilizing the capabilities of human resources rather than mechanical systems (Meredith & Francis, 2000, p. 142). This growing interest in the agility of human resources especially makes the agility of "knowledge workers" an indispensable value for organizations (Breu et al., 2001; Chonko & Jones, 2005; Gunasekaran & Yusuf, 2002). This implies that higher educational institutions that mostly depend on knowledge workers in production processes should give prominence to workforce agility to achieve organizational agility.

Responsibilities of higher educational institutions are constantly increasing, and the contents of these responsibilities are enriching day by day. This situation necessitates higher educational institutions to lead environmental changes and transformations, which have accelerated in the 21st century, proactively beyond passively copying them. Educational reforms, volatility in production and service sectors, anywhere anytime learning strategy which moves the learning beyond school campuses, and pressures that arise from innovative technologies also make the need for "an inclusive respond to environmental changes and uncertainties" more visible (Khavari et al., 2016; Mukerjee, 2014). This need brings the need for agile workforce for such organizations. Besides, demands of stakeholders from higher educational institutions like responding to changes in the educational process and national and international collaboration and competition processes are also among the factors which show the centrality of workforce agility for these organizations.

Workforce Agility

Workforce agility means the adaptation of the workforce to environmental changes in an appropriate way and on time. Besides, workforce agility includes capabilities such as taking the benefits of these changes for the organization (Chonko & Jones, 2005). It necessitates skills such as responding to environmental changes, interpreting and anticipating these changes, and predicting possible consequences of them (Bosco, 2007). Therefore, workforce agility necessitates the need to have a comprehensive vision for turning environmental changes into an opportunity (Zhang & Sharifi, 2000). In this regard, developing a comprehensive

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vision internalized by workers helps organizations stay dynamic and develop themselves constantly. Workforce agility could be summarized as the flexibility and speed of acting in the face of change (Breu et al., 2001; Ganguly et al., 2009). Hence, workforce agility does not mean a random adaptation to environmental changes; it includes responding to changes appropriately and on time (Chonko & Jones, 2005, p. 372). Actually, anticipating and responding to environmental changes appropriately and on time are core features that make agility an effective capability for organizations. These agility features indicate that the workforce's agility capabilities are improvable.

Workforce agility is accepted as an organizational strategy that contributes to the organization's profitability and effectiveness (Sohrabi et al., 2014). Hence, it includes exhibiting appropriate knowledge and skills at the appropriate time by considering the internal and external needs of the organization (Muduli, 2013). Studies in the literature emphasize the positive results of workforce agility, which include increasing performance and quality, improving organization–environ ment relations, and contributing to the organization's effectiveness (Detollenaere, 2017; Hopp & Van Oyen, 2004). Besides, studies show that workforce agility provides a competitive advantage (Al-Mahmeed, 2018) and flexibility (Alavi, 2016) to the organization. Based on these studies, it is possible to infer that workforce agility is one the organization's most central capabilities and strategies to anticipate environmental changes and respond to them on time.

Dimensions of Workforce Agility

There are some classifications for dimensions of workforce agility or features of agile workforce in the literature. These classifications contribute to conducting applied studies (Muduli, 2013). In examining these classifications, it is clear that workforce agility consists of a set of interrelated capabilities, skills, behaviors, and thought patterns (Dyer & Shafer, 2003; Muduli, 2013; Sherehiy, Karwowski & Layer, 2007). Existing theoretical and applied research may refer to these dimensions or characteristics by different names, but the majority of them establish a general framework to define, measure, and differentiate workforce agility. One of the studies which categorize workforce agility and guide studies that would be conducted afterward is the study of Dyer and Shafer (2003). This study states that to contribute to organizational agility, workforce should be proactive, adaptive, and generative. *Proactivity* means searching for environmental opportunities constantly and utilizing them for the benefit of the organization. Besides, it includes capabilities like developing innovative and creative ways while searching for opportunities and avoiding threats. Proactive people examine the environment to lead changes by recognizing opportunities, exhibiting entrepreneur behavior, acting, and struggling till they bring the change (Bateman & Crant, 1993, p. 105). *Adaptivity* means having different roles in organizational environment, transitioning easily from one role to another, and working collaboratively with different teams. Besides, the adaptive behaviors of the workforce include taking various roles simultaneously, working with new people and new teams, and adjusting to cultural diversities. *Generativity* means avoiding overspecialization, developing professionally in various fields, and sharing knowledge effectively across the organizations (Dyer & Shafer, 2003). This study facilitated distinguishing an agile workforce from others and developing agile behaviors in employees to achieve agility for the entire organization.

One of the most cited classifications of workforce agility dimensions in the literature is the one made by Sherehiy et al. (2007). Dyer and Shafer (2003) categorized the workforce characteristics that contribute to organizational agility as proactivity, adaptability, and generativity; and Griffin and Hesketh (2003) categorized the workforce's adaptive behaviors as proactivity, adaptability, and resilience. Consequently, Sherehiy et al. (2007) classified workforce agility according to the dimensions of proactivity, adaptability, and resilience. They explain the first two dimensions in line with the explanations made by Dyer and Shafer (2003) for proactivity and adaptivity. *Resiliency,* on the hand, includes positive attitudes toward changes, tolerance to uncertainty and ambiguities, and coping with stress (Sherehiy et al., 2003). Resiliency is accepted as a personality trait that helps survive against uncertain conditions and changing environments and decreases stress (Wagnild & Young, 1993). These dimensions emphasize the importance of the workforce's adaptive behaviors and sustainability in changing environments. Dimensions of workforce agility constitute the characteristics of agile people who can observe and interpret the environmental changes to respond to them proactively.

Workforce Agility in Higher Educational Institutions

Workforce agility in higher educational institutions refers to capabilities of academic staff such as following recent studies in their fields and utilizing them for themselves and their organizations. Within the context of higher educational institutions, workforce agility includes the openness of academic staff to learn and use innovative teaching methods and materials and to work in coordination and collaboration with their colleagues during both educational processes and research processes (Dove & Wills, 1996). Other characteristics of agile academic staff include a willingness to collaborate with different teams and organizations, participation in seminars, conferences, and other events related to their study fields, keeping up with technology, possessing 21st-century skills such as critical thinking, creative thinking, and problem-solving and passing these skills on to their students, and keeping abreast of technological advancements (Paul et al., 2020). Although these features tend to embody agile behaviors of academic staff, they are generally theoretical and not connected with the practice.

When the agility literature is examined specifically with respect to higher educational institutions, it is seen that there are only a few studies on agility in higher educational institutions. These studies generally examine the organizational agility of higher educational institutions (Khavari et al., 2016; Mukerjee, 2014; Razzaghi et al., 2015). It is also seen that most of these studies were conducted in other countries other than Turkey. This shows that the agility of higher educational institutions in terms of both organizational agility and workforce agility is neglected, especially in Turkey. Therefore, this study plays a leading role since it examines the concept of workforce agility at higher educational institutions in Turkey and develops a scale for academic staff.

In conclusion, higher educational institutions have a mission that includes leading to environmental changes and transformations proactively beyond passively adapting to these changes and transformations. To achieve this mission, higher educational institutions need agile academic staff who are at the center of these institutions' educational and academic processes. Although some studies examine organizational agility in higher educational institutions (Khavari et al., 2016; Mukerjee, 2014; Razzaghi et al., 2015), studies focusing on workforce agility in these institutions are rare (Suofi et al., 2014). However, conducting a study examining workforce agility levels could also contribute to the agility of higher educational institutions. One of the reliable ways of examining agility levels of academic staff is to conduct studies with valid and reliable data collection tools specific for academic staff. Developing such a tool can contribute to the workforce agility literature since it embodies workforce agility's complex and latent structure. This tool also helps researchers who aim to examine agility particularly for higher educational institutions. In addition to these contributions to the literature, such a data collection tool can provide guidance for implementers and policymakers seeking to develop an agile mindset in higher educational institutions. Dimensions of the scale can provide information barriers of academic staff in reaching agile workforce standards, and this information can be used to transform higher educational

institutions to learning communities. In this regard, this study aims to develop an original workforce agility scale for academic staff by considering Turkish culture, the Turkish education system, and the structure of higher educational institutions.

Methods

This study was conducted to develop a workforce agility scale for academic staff. During scale development process, both qualitative and quantitative methods were used. The qualitative part of the study was used to generate an item pool and consisted of two phases. The first phase was deductive item writing, which included a detailed literature review on workforce agility and models of this concept. The second phase was the inductive writing method, which included semistructured interviews with 10 academic staff, which was conducted to generate an item pool of the scale. Quantitative methods were used to ensure validity and reliability of the scale with exploratory factor analysis (EFA), confirmatory factor analysis (CFA), McDonald's omega coefficient, and the Cronbach's alpha coefficient.

Participants

While generating the item pool, the literature on workforce agility was examined in detail. Then, semistructured interviews were conducted with an interview form that was prepared according to the literature. Participants in semistructured interviews consisted of 10 academic staff working at a Faculty of Education of a university. A maximum variation sampling technique was utilized to choose participants. This sampling method helps to reflect variations in perspectives of members or stakeholders on the examined subjects in a small group (Yıldırım & Şimşek, 2008). Demographic information about academic staff who participated in semistructured interviews is presented in Table 1.

As seen in Table 1, variation of participants in terms of gender, title, seniority, and department was considered to reveal workforce agility which is complex and related to latent variables. As a result, participants in semistructured interviews consisted of five female and five male academic staff. Their ages vary between 28 and 63 years, and their seniority varies between 7 and 37. There are two academic staff in each title category: research assistant, lecturer, assistant professors, associated professors, and professors. Four participants work at the department of educational sciences, three of them work at the department of foreign language teaching, two of them work at the department of primary education, and one of them works at the department of computer teaching and instructional technologies.

An item pool was generated based on the results obtained from the analysis of semistructured interviews. Then, a pilot study was conducted to ensure the validity and reliability of the scale. Within pilot studies, academic staff, who work at Akdeniz University, Bursa Uludağ University, Dicle University, Dokuz Eylül University, Dicle University, İnönü University, Karadeniz Technical University, Sakarya university, Selçuk University, and Süleyman Demirel University, were chosen randomly. These universities ranked between 15th and 30th in URAP (University Ranking by Academic Performance) 2018–2019. Besides, academic staff selected randomly from Konya Technical University and Isparta University of Applied Sciences were included in the pilot study sample. These two universities were included to represent the universities not placed in the URAP 2018–2019 state universities list since they were established in 2018.[1]

1 *This study is part of a doctoral dissertation and the main aim of this dissertation includes another data collection phase apart from data collection phase of pilot study. Therefore, to determine the universities which were included in pilot study, characteristics of universities which would be included in main data collection phase of the study were considered.*

Table 1.
Demographic Information About Participants

Participant	Gender	Title	Age	Seniority	Department
1	Male	Research Assistant	28	7	Primary Education
2	Female	Research Assistant	29	8	Educational Sciences
3	Male	Lecturer	45	22	Foreign Language Education
4	Female	Lecturer	37	17	Foreign Language Education
5	Male	Assistant Prof. Dr	33	10	Educational Sciences
6	Female	Assistant Prof. Dr	35	14	Primary Education
7	Male	Associated Prof. Dr	39	14	Computer Education and Instructional Technology
8	Female	Associated Prof. Dr	41	19	Foreign Language Education
9	Male	Prof. Dr	63	37	Educational Sciences
10	Female	Prof. Dr	59	36	Educational Sciences

To ensure structural validity of the scale factor analysis, one of the most preferred ways of ensuring structural validity (Hayton et al., 2004) was used. Factor analysis studies included two phases. Firstly, EFA was conducted, and then CFA was conducted. It was made with data from a sample of 330 academic staff. Demographic information about participants is presented in Table 2.

Table 2 shows that 140 (42.4%) of participants are female and 190 (57.6%) of them are male. Looking at the distribution by title, we find that 59 participants (17.9%) are professors, 46 participants (13.9%) are

Table 2.
Demographic Information About the Sample Who Participated in EFA Study of the Workforce Agility Scale

Feature	Variable	*f*	%
Gender	Female	140	42.4
	Male	190	57.6
Title	Prof. Dr	59	17.9
	Associated Prof. Dr	46	13.9
	Assistant Prof. Dr	51	15.5
	Lecturer	73	222
	Research Assistant	101	30.6
Age	23–31	75	22.7
	32–40	115	34.8
	41–49	66	20.0
	50–58	51	15.5
	59–67	23	7.0
University	Bursa Uludağ University	43	13.0
	Dicle University	18	5.5
	Isparta University of Applied Sciences	30	9.1
	İnönü University	39	11.8
	Karadeniz Technical University	85	25.8
	Konya Technical University	10	3.0
	Sakarya University	27	8.2
	Selçuk University	35	10.6
	Süleyman Demirel University	39	11.8
	Non-respondents	4	1.2
Total		330	100.0

Note: EFA = exploratory factor analysis.

associate professors, 51 participants (15.5%) are assistant professors, 73 participants (22.2%) are lecturers, and 101 participants (30.6%) are research assistants. In terms of age ranges, 75 participants (22.7%) are in the range of 23–31 years, 115 participants (34.8%) are in the range of 32–40 years, 66 participants (20.0%) are in the range of 41–49 years, 51 participants (15.5%) are in the range of 50–58 years, and 23 participants (7.0%) are in the range of 59–67 years. In terms of universities, 43 participants (13.0%) work at Bursa Uludağ University, 18 participants (5.5%) work at Dicle University, 30 participants (9.1%) work at Isparta University of Applied Sciences, 39 participants (11.8%) work at İnönü University, 85 participants (25.8%) work at Karadeniz Technical University, 10 participants (3.0%) work at Konya Technical University, 27 participants (8.2%) work at Sakarya University, 35 participants (10.6%) work at Selçuk University, and 39 participants (11.8%) work at Süleyman Demirel University. Four participants, on the other hand, did not respond this question.

After the first phase (EFA) of structural validity studies was completed, DFA was applied as the second phase of the factor analysis process. It was conducted with a new sample group consisting of 260 participants. Demographic information about participants is presented in Table 3.

Table 3 shows that 108 (41.5%) of participants are female and 152 (58.5%) of them are male. Looking at the distribution of participants by their titles, we find that 37 participants (14.2%) are professors, 40 participants (15.4%) are associate professors, 51 participants (19.6%) are assistant professors, 54 participants (20.8%) are lecturers, and 78 participants (30.0%) are research assistants. In terms of age ranges, 59 participants (27.7%) are in the range of 23–31 years, 86 participants (33.1%) are in the range of 32–40 years, 56 participants (21.5%) are in the range of 41–49 years, 34 participants (13.1%) are in the range of 50–58 years, and 22 participants (8.5%) of them are in the range of 59–67 years. In terms of universities, 18 participants (6.9%) work at Akdeniz University, 41 participants (15.8%) work at Bursa Uludağ University, 15 participants (5.8%) work at Dicle University, 18 participants (6.9%) work at Isparta University of Applied Sciences, 40 participants (15.4%) work at İnönü University, 19 participants (7.3%) work at Karadeniz Technical University, 23 participants (8.8%) work at Konya Technical University, 23 participants (8.8%) work at Sakarya University, 36 participants (13.8%) work at Selçuk University, and 25 participants (9.6%) work at Süleyman Demirel University. Six participants, on the other hand, did not respond to this question.

Table 3.
Demographic Information About Sample Who Participated in CFA Study of Workforce Agility Scale

Feature	Variable	*f*	%
Gender	Female	108	41.5
	Male	152	58.5
Title	Prof. Dr	Title	14.2
	Assoc. Prof. Dr	40	15.4
	Assist. Prof. Dr	51	19.6
	Lecturer	54	20.8
	Research Assistant	78	30.0
Age	23–31	59	22.7
	32–40	86	33.1
	41–49	56	21.5
	50–58	34	13.1
	59–67	22	8.5
	Non-respondents	3	1.2
University	Akdeniz University	18	6.9
	Bursa Uludağ University	41	15.8
	Dicle University	15	5.8
	Isparta Applied Sciences University	18	6.9
	İnönü University	40	15.4
	Karadeniz Technical University	19	7.3
	Konya Technical University	23	8.8
	Sakarya University	23	8.8
	Selçuk University	36	13.8
	Süleyman Demirel University	25	9.6
	Non-respondents	2	0.8
Total		260	100.0

Note: CFA = confirmatory factor analysis.

Data Collection Tool

Item pool generation process included both the deductive method, in which items are written according to literature, and the inductive method, in which items are written according to the opinions of the target population (Hinkin, 2005; Mogrado, 2018). Firstly, the literature on workforce agility dimensions and features was examined in detail (Dyer & Shafer, 2003; Muduli, 2013; Sherehiy et al., 2007; Qin & Nembhard, 2015). Then, semistructured interviews were conducted with 10 participants. Seven open-ended questions were asked during interviews. This qualitative part was used to inform item writing process (Rowan & Wulf, 2007), and it was crucial for the items appropriate for Turkish higher education system. Responses of participants were analyzed, and 79 items were written based on the findings of these analyses. To ensure content validity, expert opinions were taken about the item pool consisting of these 79 items. These experts consisted of two professors, one assistant professor, one doctor, and two research assistants from the department of educational administration, one assistant professor from the department of primary education, one assistant professor from the department of management and organization, and one professor from the department of measurement and evaluation in education. The item pool was revised according to the experts' feedback, and a draft scale form consisting of 47 items was structured.

After expert opinions, the draft form was sent to the participants to collect data for validity and reliability studies of the "workforce agility scale." Exploratory factor analysis and CFA were conducted to ensure the structural validity of the scale, respectively. While EFA is used to determine the latent variables in the scale and which items these variables comprise (Brown, 2006), CFA is used to confirm the structure obtained from the results of EFA (Jöreskog et al., 2016). Exploratory factor analysis resulted in a scale structure consisting of five dimensions (adaptability, growth mindset, competence, future orientation, and resilience) and 32 items. The development process of the "workforce agility scale" is represented in Figure 1.

Data Analysis

Qualitative data were analyzed via content analysis method which was used to constitute meaningful, systematic, and related patterns from big qualitative data (Patton, 2014) with the help of Nvivo 10 package program. In the analysis of quantitative data, validity and reliability of scale were tested. Exploratory factor analysis and CFA were used to ensure the validity of the scale, while the McDonald's omega and the Cronbach's alpha coefficients were used to ensure reliability.

Before the quantitative data analysis process, data were coded via Excel 2019 program and then transferred to Statistical Package for the Social Sciences (SPSS) 21.0, Analysis of a Moment Structures (AMOS) Graphics 21.0, and Jamovi 2.2.5.0 package programs. Normality tests and EFA were performed with SPSS 21.0, CFA was performed with AMOS Graphics 21.0, and the McDonald's omega and the Cronbach's alpha coefficients were calculated with Jamovi 2.2.5.0.

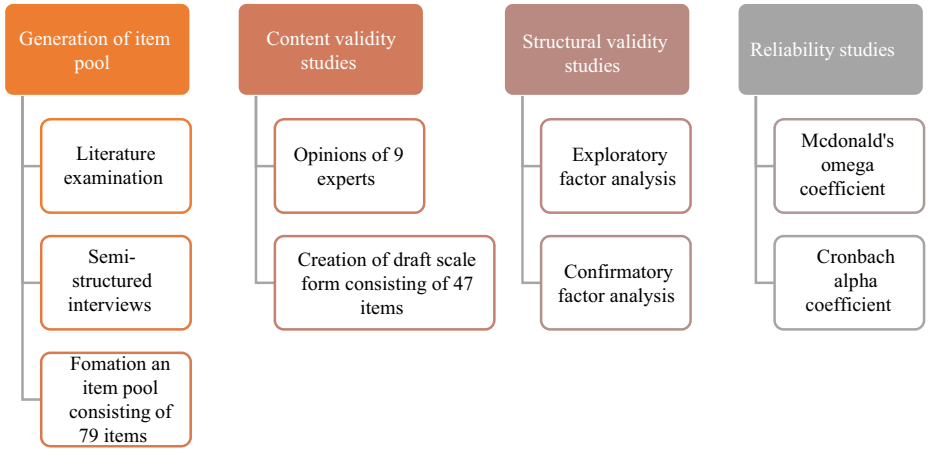

Figure 1.
The Development Process of the Workforce Agility Scale.

Results

Results of the qualitative data analysis that were used to create item pool were presented in this section, firstly. Then, the results of the EFA, CFA, and reliability analyses are presented.

Qualitative Data Analysis

To collect qualitative data, semistructured interviews, which enable researchers to both focus on the main subjects and make configurations on the flow of the interview, were conducted with 10 academic staff to generate an item pool of the workforce agility scale. Their responses to questions were analyzed with the content analysis method. As a result of these analyses, four main themes were reached. These are proactivity, adaptivity, resilience, and competence. The pattern of findings is represented in Figure 2.

The first component of workforce agility is proactivity. Participants cited traits such as forward-thinking, anticipating change, problem-solving and decision-making skills, openness to innovation and development, and critical thinking. Within the context of proactivity, one of the participants (P-3) stated that: "There are people who have foresight, can read the future better and predict the future better. There are people having such personality traits. There are also people who can accurately predict what will happen one step ahead. They judge the current social structure and can calculate all the possibilities, and they have such a strength…."

The second component of workforce agility is adaptivity. In the context of adaptability, participants mentioned traits such as being collaborative, communicating effectively, internalizing organizational culture, acting flexibly, and adapting to diversity. Statement of one of the participants (P-5) about this component is as follows: "Education and training processes have changed so drastically that it is now a requirement for us to understand visual content and other things, to be able to teach online courses and do other things, etc… And in the end, I could be able to conduct that course on my own."

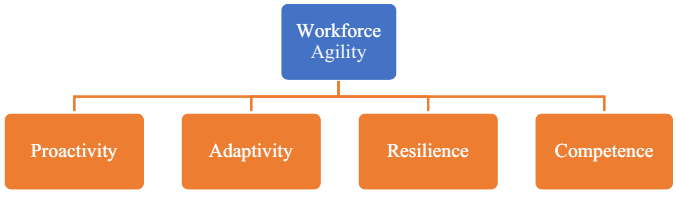

Figure 2.
Findings of Qualitative Data Analysis.

The third component of workforce agility is resilience. Participants mentioned acknowledging the change, coping with uncertainty, struggling against challenges, and working with motivation in the context of resilience. The statement of one of the participants (P-10) about this component is as follows: "Adapting to new technologies needs working hard to be prepared but they don't want to spend their time on it or they are not practical. For instance, they want to use that, but when it doesn't work, they say, 'what am I going to do now?' and give up."

The last component of workforce agility is competence. Participants mentioned about leading, acting professionally, and being open to learning in the context of competence. One of the participants (P-9) had the following to say about this component: "For instance, some problematic or undesirable behaviors occur in the classroom, and there may be many articles about what to do for these behaviors. Additionally, researchers have recently studied these types of things and have revealed the effects of something on these undesirable behaviors. Academic staff should follow these and master in their study fields and they need to aware that people can change in their education life."

Exploratory Factor Analysis

Before conducting EFA, some assumptions of this analysis were examined. One of these assumptions is about the sample size for EFA. There are some suggestions about an adequate sample size in the literature. For instance, while Tabachnick and Fidell (2013) and Field (2009) state that a sample consisting of at least 300 participants is adequate, Hair et al. (2014) state that a sample group consisting of at least five times of observed variables is needed. Considering these suggestions, it can be said that a sample group consisting of 330 participants is enough for EFA implementation of workforce agility scale draft form which includes 47 items (observed variables).

Another important assumption of EFA is to examine whether data have a normal distribution (Zygmont & Smith, 2014). Skewness and kurtosis values were examined to determine normality. Skewness value was found to be –0.735, and kurtosis value was found to be 0.859 for the dataset obtained from 330 participants. These values are between the suggested cut points –1 and +1 (Hair et al., 2014; Huck, 2012), which means the normal distribution assumption was met. After that, Kaiser–Meyer–Olkin (KMO) value which helps to determine the appropriateness of data for EFA (Hair et al., 2014) was calculated. A KMO value above 0.60 indicates the suitability of data for EFA (Huck,

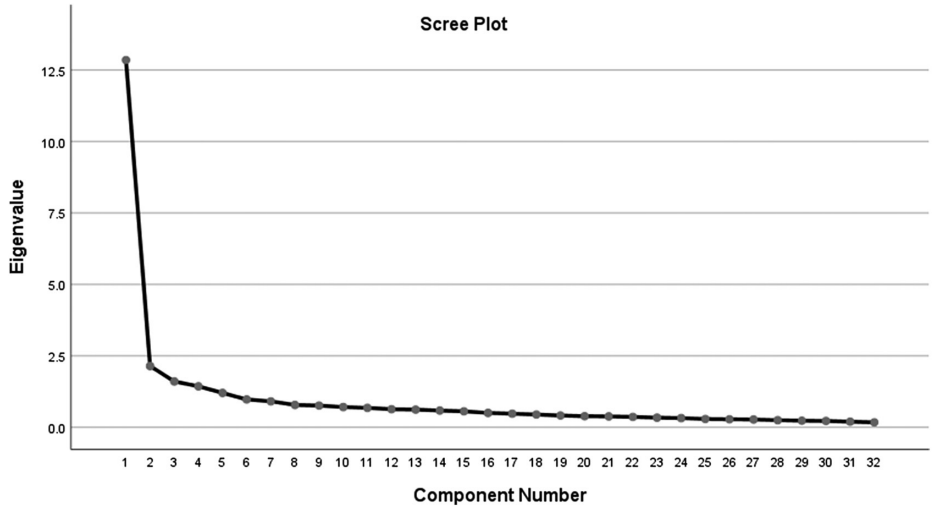

Figure 3.
Scree Plot Graph of Workforce Agility Scale.

Table 4.
Eigenvalues and Total Variance Explained for Five Factors of the Workforce Agility Scale

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Factor	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	12.844	40.137	40.137	12.844	40.137	40.137	5.607	**17.521**	17.521
2	2.143	6.698	46.835	2.143	6.698	46.835	4.548	**14.213**	31.734
3	1.605	5.014	51.849	1.605	5.014	51.849	4.243	**13.260**	44.994
4	1.433	4.480	56.328	1.433	4.480	56.328	2.500	**7.813**	52.807
5	1.204	3.763	60.091	1.204	3.763	60.091	2.331	**7.284**	60.091

Factor extraction method: principal component analysis.

2012; Tabachnick & Fidell, 2013). The KMO value of data was found to be 0.940 in this study. This value is accepted as an excellent KMO value since it is between 0.90 and 1.0 (Field, 2009). Lastly, the Bartlett sphericity test indicates the statistical significance of EFA results. Since the Bartlett sphericity chi-square value ($\chi^2 = 5988.231$; SD = 496; $p = .000$) is statistically significant, this assumption of EFA was met, too. According to all of these examinations, it was decided that the dataset is suitable for EFA.

After determining the data's suitability for EFA, a principal component analysis–varimax rotation technique analysis was conducted. Varimax is a rotation technique used in EFA to maximize the variance of factor loadings (Tabachnick & Fidell, 2013). Some criteria were considered during the analysis process to determine which items would be retained and which would be eliminated. Eliminating items with a factor loading below 0.5% is one of them (Hair et al., 2014). The objective was to increase the representativeness of items meeting this criterion. Eliminating items whose factor loadings in multiple dimensions are close to one another is the second method. Accordingly, 0.1 was accepted as the criterion value (Büyükoztürk, 2018). This signifies that if the difference between the loadings of an item under different factors is less than 0.1, this item is removed. Exploratory factor analysis implementation was repeated four times by considering the criteria mentioned above. Items 10, 22, 24, 27, 28, 35, 39, and 47 were eliminated according to the results of the first rotation. Eight items were removed in the first rotation. Items 9, 29, 34, 40, and 41 were eliminated according to the results of the second rotation. Five items were removed in the second rotation. Items 8 and 30 were eliminated according to the results of the third rotation. Two items were removed in the third rotation. At the end of the fourth rotation, 32 items were retained in the scale with factor loadings above 0.50. The eigenvalues of the factors and the scree plot were examined to determine the number of factors for the scale. Factors having eigenvalues above 1 were identified. Scree plots display eigenvalues from highest to lowest. The point where a sudden drop is observed is found, and factors that are at the left side of this point are generally retained in the scale (Worthington & Whittaker, 2006). These examinations indicated that the scale could have five factors. The scree plot of EFA implementation is presented in Figure 3.

When Figure 3 is observed, a sudden drop could be observed after the fifth factor, and eigenvalues of other factors are below 1. This can be observed in Table 4, which displays the total variance explained. According to Table 4, after the fifth factor, eigenvalues drop below 1 and their contributions to total variance become insignificant. Eigenvalues and contributions of these factors to the total variance are presented in Table 4.

As seen in Table 4, the eigenvalue of the first factor is 12.844. Eigenvalues decrease from the first factor to the fifth factor. The eigenvalue of the last factor is 1.204. According to the results in Table 4, the total variance explained by these five factors is 60.091%. The literature states that values above 50% (Merenda, 1997) or 605 (Hair et al.) are acceptable for social sciences. Therefore, the total variance explained of the workforce agility scale is considered acceptable. In sum, EFA resulted in a scale structure consisting of five dimensions and 32 items. These five dimensions are named as adaptability, growth mindset, competence, future orientation, and resilience. Contributions of these five dimensions to the total variance are 17.521%, 14.213%, 13.260%, 7.813%, and 7.284%, respectively. These are shown with bold numbers in Table 4. Table 5[2] displays the item numbers, factors, and factor loadings of the workforce agility scale.

As seen in Table 5, the adaptivity dimension consists of ten items, the growth mindset dimension consists of eight items, the competence

2 *Since scale is in Turkish, Table 5 contains only item numbers. However, the table containing items is presented as Appendix 1 at the end of the article.*

Table 5.
Factor Loadings of the Workforce Agility Scale Items

Dimension and Item Numbers	Factor Loadings				
Adaptivity					
Item 19	**0.779**	0.107	0.179	0.057	0.164
Item 18	**0.688**	0.258	0.120	0.099	0.166
Item 21	**0.687**	0.168	0.257	0.138	0.094
Item 15	**0.681**	0.243	0.055	0.166	0.115
Item 26	**0.671**	0.175	0.358	0.124	0.065
Item 17	**0.650**	0.261	0.130	0.105	0.076
Item 25	**0.646**	0.122	0.436	0.077	0.068
Item 23	**0.641**	0.079	0.317	0.117	0.240
Item 20	**0.636**	0.284	0.212	–0.039	0.157
Item 6	**0.609**	0.355	–0.072	0.005	0.227
Growth mindset					
Item 6	0.219	**0.706**	0.267	0.096	0.004
Item 5	0.179	**0.690**	0.226	0.202	0.142
Item 13	0.228	**0.673**	0.285	0.143	0.224
Item 7	0.258	**0.648**	0.330	0.136	0.028
Item 14	0.222	**0.637**	0.270	0.040	0.264
Item 11	0.270	**0.630**	0.254	0.079	0.118
Item 4	0.299	**0.563**	0.103	0.352	0.142
Item 12	0.273	**0.520**	0.347	0.187	0.173
Competence					
Item 43	0.229	0.331	**0.692**	0.180	0.049
Item 45	0.220	0.417	**0.672**	–0.001	0212
Item 42	0.117	0.212	**0.629**	0.234	0.018
Item 46	0.281	0.270	**0.616**	–0.051	0.133
Item 37	0.127	0.173	**0.607**	0.127	0.328
Item 36	0.245	0.263	**0.599**	0.275	0.174
Item 44	0.290	0.298	**0.577**	0.093	0.179
Future orientation					
Item 2	0.106	0.189	0.110	**0.848**	0.068
Item 1	0.043	0.082	0.163	**0.834**	0.070
Item 3	0.286	0.320	0.168	**0.655**	0.130
Resilience					
Item 33	0.207	0.050	0.131	0.063	**0.727**
Item 32	0.240	0.186	0.321	0.198	**0.652**
Item 31	0.270	0.122	0.312	0.241	**0.593**
Item 38	0.084	0.182	0.019	–0.037	**0.577**
Total variance explained=60.091%					

dimension consists of seven items, the future orientation dimension consists of three items, and the resilience dimension consists of four items. Factor loadings of items under adaptivity range between 0.779 and 0.609, factor loadings of items under growth mindset range between 0.706 and 0.520, factor loadings of items under competence range between 0.692 and 0.577, factor loadings of items under future orientation range between 0.848 and 0.655, and lastly factor loadings under resilience range between 0.727 and 0.577. Factor loadings of items under each dimension are dipslayed with bold values in Table 5.

Confirmatory Factor Analysis

Before conducting CFA, some assumptions of this analysis were examined. One of these assumptions is that sample size is adequate for CFA. Studies indicate that small samples (below 50 or 100) and very large samples can mislead the results. Based on these studies, it is indicated in the literature that a sample consisting of approximately 200 participants (Ding et al., 1995) or a sample consisting of five or 10 times of observed variables (Bentler & Chou, 1987; Kline, 2011) is needed. Considering these suggestions, it can be said that a sample group consisting of 260 participants is enough for CFA study of workforce agility scale draft form which includes 32 items (observed variables). Another important assumption of CFA is to examine whether data has a normal distribution (Brown, 2006). Skewness and kurtosis values were examined to determine normality. The skewness value was found to be –0.872, and kurtosis value was found to be 1.01 for the dataset obtained from 260 participants. These values are between the suggested cut points –1 and +1 (Hair et al., 2014; Huck, 2012). After the suitability of data for CFA was determined, the analysis was conducted with AMOS Graphics 21.0 package program. The maximum likelihood prediction method was used for CFA. Figure 4 summarizes the results of this analysis. It contains standardized factor loadings of items based on CFA.

According to Figure 4, it can be said that observed variables explain latent variables adequately. Then, fit indices of the model were examined to see whether the five-dimensional model complies with data. There are various fit indices in the literature, and researchers' suggestions on which fit indices should be reported for CFA vary. The corrected chi-square (χ^2/df) value is the most frequently used and traditional fit index. However, this fit index is suggested to be supported by other fit indices since it is sensitive to sample size (Kline, 2011). For example, Brown (2006) suggests reporting Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI). Based on this suggestion, it was decided to report RMSEA, SRMR, CFI, and TLI with (χ^2/df). The acceptable values for these fit indices and the CFA study are shown in Table 6.

As seen in Table 6, suggestions in the literature for acceptable model fit are as follows: χ^2/SD=above 3 (Elia & Gagatsis, 2008), RMSEA and SRMR=above 0.08, and CFI and TLI=close to 1 (Hair et al., 2014). Fit index values of this scale based on CFA results, which are χ^2/df (2.19), RMSEA (0.068), SRMR (0.052), CFI (0.908), and TLI (0.899), indicated an acceptable model fit. According to these results, the "workforce agility scale" consisting of five dimensions and 32 items is proven to be a valid scale.

Reliability Studies of Workforce Agility Scale

Reliability studies included calculations of McDonald's omega and Cronbach's alpha reliability coefficients. These calculations were made with the same sample of CFA study. To ensure reliability, the Cronbach's alpha coefficient is preferred in most of the studies in the literature. However, the Cronbach's alpha has quite restrictive assumptions and gives reliable results when these assumptions are not met. A good alternative of the Cronbach's alpha is the McDonald's omega since it is more flexible in terms of assumptions such as equal item factor loadings (Dunn et al., 2014). Therefore, both of these coefficients were calculated for workforce agility scale. As a result of these reliability analyses, the McDonald's omega was found to be 0.967 and the Cronbach's alpha was found to be 0.964. Cronbach's alpha coefficients for dimensions were calculated as follows: 0.928 for the adaptability dimension, 0.920 for the growth mindset dimension, 0.910 for the competence dimension, 0.838 for the future orientation dimension, and 0.781 for the resilience dimension.

Discussion and Conclusion

In the face of unpredictability and uncertainty, one of the best options to survive for people and organizations is accepted as "agility" (Harraf et al., 2015; Prange & Heracleous, 2018). Like many other human-based organizations, the best way of developing agile capacity is to develop agility of the workforce for higher educational institutions which mostly depend on academic staff for all organizational processes. The first step of developing agile academic staff is to measure this staff's current workforce agility levels, and a well-developed data collection tool is needed. Therefore, this study aims to develop an original workforce agility scale for academic staff by considering Turkish

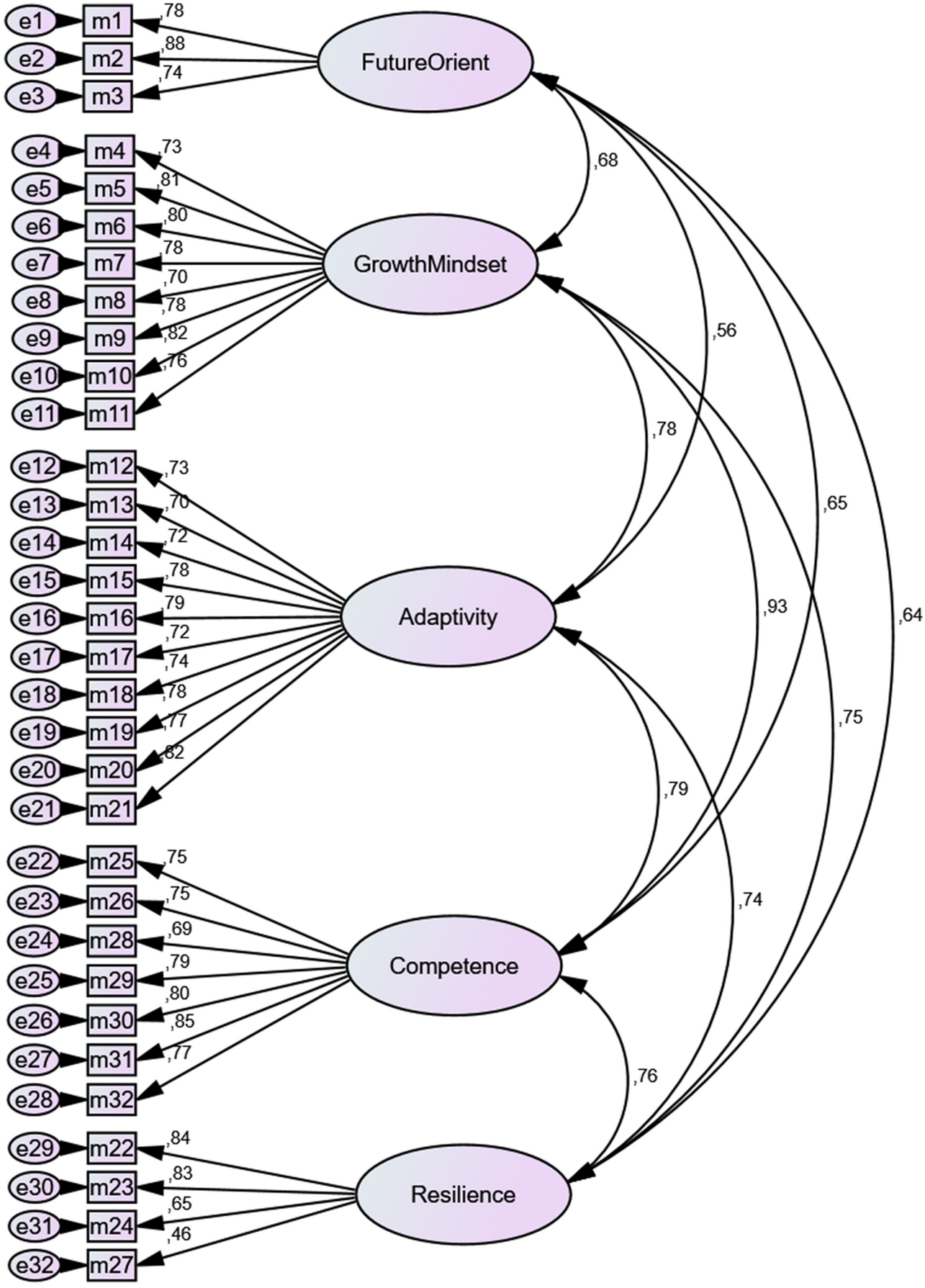

Figure 4.
Standardized Values Obtained From Confirmatory Factor Analysis Study of Workforce Agility Scale.

Table 6.
Accepalues for Fit Indices and the Results of CFA Study

Fit Index	Acceptable Values	References	Results of CFA Study
χ^2/df	$\chi^2/df \leq 3$ = good fit	**Elia and Gagatsis (2008)**	**2.19**
RMSEA	RMSEA ≤ 0.08	Hair et al. (2014) Hooper et al. (2008, p. 54)	0.068
SRMR	SRMR ≤ 0.08	Hu & Bentler (1999); Kline (2011)	0.052
CFI	Close to 1.0 0.90 ≤ CFI ≤ 1	Ding et al. (1995) Hair et al. (2014); McDonald and Ho (2002)	0.908
TLI	Close to 1.0 0.90 ≤ TLI ≤1.0	Ding et al. (1995) Hair et al. (2014)	0.899

Note: CFA = confirmatory factor analysis.

culture, the Turkish education system, and the structure of higher educational institutions.

While developing workforce agility scale for academic staff, the authors first generated an item pool. Item pool generation process included both deductive method which means literature-based item writing and inductive method which means writing items according to the opinions of target population (Hinkin, 2005; Mogrado, 2018). The literature review examined concepts such as adaptability (Gryphon & Hesketh, 2003), flexibility (Chen, 2012; Swafford et al., 2006), responsiveness (Sherehiy et al., 2007), and speed (Zhang & Sharifi, 2000) that are closely related to workforce agility. Then, studies that include dimensions and features of the workforce were examined comprehensively.

The preparation of semistructured interview questions was guided by a review of the literature. Within the framework of the inductive item writing method, semistructured interviews were used. These interviews were conducted with 10 academic staff members. Data obtained from the interviews were analyzed via the content analysis method. Content analysis helps researchers to organize big data obtained with qualitative data collection methods as meaningful, systematic, and interrelated data pieces (Patton, 2014). As a result of this analysis, four themes as main components of workforce agility were identified. These are called as proactivity, adaptability, resilience, and competence. Proactivity includes forward-looking, anticipating changes, openness to innovation, having a growth mindset and skills like critical thinking, creative thinking, and decision-making. Adaptability includes effective collaboration and communication skills, flexibility, and working with different teams easily. In the context of resilience, characteristics such as acknowledging changes, coping with uncertain situation, and not giving up in the face of difficulties are emphasized. Lastly, participants mentioned leading others for changes, acting professionally, and being open to learning within the scope of competence. These themes and qualifications are coherent with qualifications mentioned in the models of workforce agility existing in the literature.

Based on the results of content analysis of semistructured interviews, an item pool consisting of 79 items was generated. This item pool was evaluated by experts from the field of educational sciences. After considering expert feedback, a draft scale form consisting of 47 items was created after necessary changes were made. Exploratory factor analysis and CFA were conducted to ensure the structural validity of the scale. While EFA is used to determine the latent variables in the scale and which items these variables comprise (Brown, 2006), CFA is used to confirm the structure reached with EFA (Jöreskog et al., 2016). So, EFA was conducted first. Exploratory factor analysis resulted in a scale structure consisting of 5 dimensions and 32 items. These five dimensions were named as adaptability, growth mindset, competence, future orientation, and resilience. The adaptability dimension included 10 items, growth mindset dimension included eight items, competency dimension included seven items, future orientation dimension included three items, and resilience dimension included four items. The total variance explained by these five dimensions was found to be 60.091%. Factor loadings of items change between 0.848 and 0.520. After EFA, the five-dimensional structure of the scale was tested with CFA. To determine the fit of the model with data, fit indices were examined within CFA analysis. The suggestions in the literature for good model fit are as follows: χ^2/SD = below 3 (Elia & Gagatsis, 2008), RMSEA and SRMR = above 0.08, and CFI and TLI = close to 1 (Hair et al., 2014). According to the results, χ^2/SD (2.19), RMSEA (0.068), SRMR (0.052), CFI (0.908), and TLI (0.899) values of the scale indicated an acceptable model fit.

To ensure the reliability of the workforce agility scale, the McDonald's omega and Cronbach's alpha coefficients were used. The Cronbach's alpha coefficient is preferred for reliability analysis in most studies in the literature. However, studies show that the McDonald's omega coefficient is more reliable when the factor loadings of the items are not equal (Dunn et al., 2014). On the other hand, the Cronbach's alpha is suggested to be used when data collection tool includes more than one structure or concept. The Cronbach's alpha is used to determine the reliability of each dimension in such cases (Tavakol & Dennick, 2011). Based on the literature, both McDonald's omega and Cronbach's alpha were calculated for the whole scale, and the Cronbach's alpha was calculated for each dimension. As a result of these reliability analyses, the McDonald's omega was found to be 0.967 and the Cronbach's alpha was found to be 0.964. Cronbach's alpha coefficients for dimensions were calculated as 0.928 for adaptability dimension, 0.920 for growth mindset dimension, 0.910 for competence dimension, 0.838 for future orientation dimension, and 0.781 for the resilience dimension. When the workforce agility scale developed by Sherehiy and Karwowski (2014) was examined, it was seen that the scale consisted of three dimensions which are proactivity, adaptivity, and resilience. According to the reliability analysis of the scale, Cronbach's alpha coefficients of dimensions are found to be as follows: 0.854 for proactivity, 0.867 for adaptivity, and 0.711 for resilience.

Results of validity and reliability analyses showed that "the workforce agility scale," developed through this study, is valid and reliable. So, it can be said that the scale has been achieved to reveal multidimensional structure of workforce agility. This scale can contribute to further research. Both detailed examination of international literature and semistructured interviews conducted with academic staff contributed to the comprehensiveness of the scale items. This multilayer process which constitutes literature examination, semistructured interviews, and quantitative validity and reliability studies assured that workforce agility scale included international context and consisted of items suitable for Turkish culture and the Turkish higher education system.

Having agile academic staff is essential for higher educational institutions to play its crucial role in social development. Hence, these institutions have important functions in leading to social development and producing and disseminating knowledge. Higher educational institutions are under the effect of rapid changes of information and communication technologies in the 21st century, increase in number of students, differentiation of students' qualifications, and competition that goes beyond national boundaries and makes "internationalization" a core necessity (Byun & Kim, 2011; Howells et al., 2014; Khavari et al., 2016). All these factors make agility essential for higher educational institutions that train the future workforce of many organizations and contribute to the structure of societies' economic, political, and cultural sub-systems.

Higher educational institutions need to keep up with environmental changes to equip students with capabilities that help them survive in competitive, uncertain, and constantly changing environments (Roach, 2015). The role of higher educational institutions in the transformation of society increases the importance of developing an agile mindset and behaviors among academic staff for these institutions (Menon & Suresh, 2021; Paul et al., 2020). Academic staff needs continuous learning and development, and they need to keep themselves up dated. Similarly, one of the most valuable assets of higher educational institutions is learning. Therefore, these institutions are expected to be a good representative of learning organizations (Örtanblad & Koris, 2014), and learning is a dynamic process (Antunes & Pinheiro, 2020). The agility of academic staff takes learning and self-development a step further and activates the capability of anticipating what they should learn beforehand.

The first step of developing agile academic staff is to define the current workforce agility levels of this staff. In this sense, the "workforce agility scale," which was found valid and reliable, can contribute to higher educational institutions. This scale can guide academic staff and higher educational institutions to develop indicators for agility, define weaknesses of academic staff in terms of these indicators, and compensate for these weaknesses. Besides, this scale can be used by researchers who examine workforce agility at higher educational institutions and aim to reveal the complex structure of workforce agility with models containing antecedent and consequences. However, the study has some limitations, too. One of these limitations is that all of the academic staff, who participated in semistructured interviews during the item writing process, work at the same faculty. Another limitation of the study is that reliability analysis included only McDonald's omega and Cronbach's alpha coefficients. Other types of reliability analyses were not included. Lastly, study was conducted with academic staff working at state universities. Foundation universities' academic staff were not represented in the sample.

The following suggestions could be made for researchers and implementors based on strengths, possible contributions to the literature, and implementation and limitations of this study. Firstly, researchers should test the validity and reliability of the workforce agility scale for different samples while conducting their studies. They can also conduct studies that compare state universities and foundation universities by taking the opinions of academic staff working at these universities. Lastly, dimensions and items of the workforce agility scale can guide policies and implementations that aim to improve higher educational institutions. The results obtained from the conduction of this scale in higher educational institutions can help to detect barriers in front of these institutions for meeting the standards learning organizations. In this regard, it can be suggested that higher educational institutions collaborate with other universities and sectors at both national and international levels and participate in projects which bring higher educational institutions together with different organizations.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Anadolu University (Date: December 26, 2018, Number: 112386).

Informed Consent: Written informed consent was obtained from academicians who participated in qualitative interviews in this study.

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References

Alavi, S., & Wahab, D. A. (2013). A review on workforce agility. *Research Journal of Applied Sciences, Engineering and Technology*, *5*(16), 4195–4199. [CrossRef]

Antunes, HdJ. G., & Pinheiro, P. G. (2020). Linking knowledge management, organizational learning and memory. *Journal of Innovation and Knowledge*, *5*(2), 140–149. [CrossRef]

Bateman, T. S., & Crant, J. M. (1993). The proactive component of organizational behavior: A measure and correlates. *Journal of Organizational Behavior*, *14*(2), 103–118. [CrossRef]

Bentler, P. M., & Chou, C. P. (1987). Practical issues in structural modeling. *Sociological Methods and Research*, *16*(1), 78–117. [CrossRef]

Breu, K., Hemingway, C. J., Strathern, M., & Bridger, D. (2001). Workforce agility: The new employee strategy for knowledge economy. *Journal of Information Technology*, *17*, 21–31.

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. The Guilford Press.

Byun, K., & Kim, M. (2011). Shifting patterns of the government's policies for the internationalization of Korean higher education. *Journal of Studies in International Education*, *15*(5), 467–486. [CrossRef]

Chen, X. (2012). *Impact of business intelligence and IT infrastructure flexibility on competitive advantage: An organizational agility perspective* [Doctoral Dissertation]. University of Nebraska, The Graduate College at the University of Nebraska.

Chonko, L. B., & Jones, E. (2005). The need for speed: Agility selling. *Journal of Personal Selling and Sales Management*, *25*(4), 371–382.

Crocitto, M., & Youssef, M. (2003). The human side of organizational agility. *Industrial Management and Data Systems*, *103*(6), 388–397. [CrossRef]

Ding, L., Velicer, W. F., & Harlow, L. L. (1995). Effects of estimation methods, number of indicators per factor, and improper solutions on structural equation modeling fit indices. *Structural Equation Modeling: A Multidisciplinary Journal*, *2*(2), 119–143. [CrossRef]

Dove, R., & Wills, D. (1996). Transforming faculty into an agile workforce. *To Improve the Academy*, *15*(1), 195–207. [CrossRef]

Dunn, T. J., Baguley, T., & Brunsden, V. (2014). From alpha to omega: A practical solution to the pervasive problem of internal consistency estimation. *British Journal of Psychology*, *105*(3), 399–412. [CrossRef]

Dyer, L., & Shafer, R. A. (2003). *Dynamic organizations: Achieving marketplace and organizational agility with people* (vol. *27*). CAHRS Working Paper Series.

Elia, I., & Gagatsis, A. (2008). A comparison between the hierarchical clustering of variables, implicative statistical analysis and confirmatory factor analysis. In R. Gras, E. Suzuki, F. Guillet & F. Spagnola (Eds.) (pp. 131–162). Springer-Verlag. [CrossRef]

Field, A. (2009). *Discovering statistics using SPSS (and sex and drugs and rock 'n' roll)* (3rd ed). SAGE.

Forsythe, C. (1997). Human factors in agile manufacturing: A brief overview with emphasis on communications and information infrastructure. *Human Factors and Ergonomics in Manufacturing*, *7*(1), 3–10. [CrossRef]

Ganguly, A., Nilchiani, R., & Farr, J. V. (2009). Evaluating agility in corporate enterprises. *International Journal of Production Economics*, *118*(2), 410–423. [CrossRef]

Griffin, B., & Hesketh, B. (2003). Adaptable behaviors for successful work and career development. *Australian Journal of Psychology*, *55*(2), 65–73. [CrossRef]

Hair, Jr., J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed). Pearson Education Limited.

Hayton, J. C., Allen, D. G., & Scarpello, V. (2004). Factor retention decisions in exploratory factor analysis: A tutorial on parallel analysis. *Organizational Research Methods*, *7*(2), 191–205. [CrossRef]

Hinkin, T. R. (2005). Scale development principles and practices. In R. A. Swanson & E. F. Holton III (Eds.). *Research in organizations: Foundations and methods of inquiry* (pp.161–178). Berret-Koehler Publications, Inc.

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, *6*(1), 53 –60.

Hopp, W. J., & Van Oyen, M. P. (2004). Agile workforce evaluation: A framework for cross-training and coordination. *IIE Transactions*, *36*(10), 919–940. [CrossRef]

Hosein, Z. Z., & Yousefi, A. (2012). The role of emotional intelligence on workforce agility in the workplace. *International Journal of Psychological Studies*, *4*(3), 48–61. [CrossRef]

Howells, J. R. L., Karata-Ozkan, M., Yavuz, C., & Atiq, M. (2014). University management and organisational change: A dynamic institutional perspective. *Cambridge Journal of Regions, Economy and Society*, *7*(2), 251–270. [CrossRef]

Huck, S. W. (2012). *Reading statistics and research* (6th ed). Pearson Education Inc.

Örtenblad, A. & Koris, R. (2014). Is the learning organization idea relevant to higher educational institutions? A literature review and a "multi-stakeholder contingency approach. *International Journal of Educational Management*, *28*(2), 173–214.

Jöreskog, K. G., Olsson, U. H., & Wallentin, F. Y. (2016). *Multivariate analysis with LISREL*. Springer.

Khavari, S. A., Arasteh, H., & Jafari, P. (2016). Assessing the level organizational universities agility; case study of Islamic Azad University in Mazandaran. *Mediterranean Journal of Social Sciences*, *7*(3/S2), 112–117.

Kline, R. B. (2012). Assumptions in structural equation modeling. In R. H. Hoyle (Ed.). *Handbook of structural equation modeling* (pp.111–125). Guilford Press.

Menon, S., & Suresh, M. (2021). Enablers of workforce agility in engineering educational institutions. *Journal of Applied Research in Higher Education*, *13*(2), 504–539. [CrossRef]

Meredith, S., & Francis, D. (2000). Journey towards agility: The agile wheel explored. *TQM Magazine*, *12*(2), 137–143. [CrossRef]

Merenda, P. F. (1997). A guide to the proper use of factor analysis in the conduct and reporting of research: Pitfalls to avoid. *Measurement and Evaluation in Counseling and Development*, *30*(3), 156–164. [CrossRef]

Morgado, F. F. R., Meireles, J. F. F., Neves, C. M., Amaral, A. C. S., & Ferreira, M. E. C. (2017). Scale development: Ten main limitations and recommendations to improve future research practices. *Psicologia, Reflexao e Critica : Revista Semestral Do Departamento de Psicologia da UFRGS*, *30*(1), 3. [CrossRef]

Muduli, A. (2013). Workforce agility: A review of literature. *IUP Journal of Management Research*, *XII*(3), 55–65.

Mukerjee, S. (2014). Agility: A crucial capability for universities in times of disruptive change and innovation. *Australian Universities' Review*, *56*(1), 56–60.

Patton, M. Q. (2014). *Qualitative research and evaluation methods* (3th ed). Sage Publications, Inc.

Paul, M., Jena, L. K., & Sahoo, K. (2020). Workplace spirituality and workforce agility: A psychological exploration among teaching professionals. *Journal of Religion and Health*, *59*(1), 135–153. [CrossRef]

Plonka, F. E. (1997). Developing a lean and agile workforce. *Human Factors and Ergonomics in Manufacturing*, *7*(1), 11–20. [CrossRef]

Prange, C., & Heracleous, L. (Eds.) (2018). *Agility. X: How organizations thrive in unpredictable times*. Cambridge University Press.

Qin, R., & Nembhard, D. A. (2015). Workforce agility in operations management. *Surveys in Operations Research and Management Science*, *20*(2), 55–69. [CrossRef]

Razzaghi, G. F., Moghaddam, A. Z., & Jafari, P. (2016). Education system and agility culture. *International Journal of Humanities and Cultural Studies (IJHCS)*, *2*(3), 1197–1213.

Roach, D. A. (2015). *The importance of improving learning agility for a growing population of graduate students: Helping universities meet 21st century workforce demands* [Doctoral Dissertation]. Robert Morris University, Department of Instructioanl Management and Leadership.

Rowan, N., & Wulff, D. (2007). Using qualitative methods to inform scale development. *Qualitative Report*, *12*(3), 450–466. [CrossRef]

Schumacker, R. E., & Lomax, R. G. (2010). *A beginner's guide to structural equation modeling* (3rd ed). Routledge/Taylor & Francis Group.

Sherehiy, B. (2008). *Relationships between agility strategy, work organization and workforce agility* [Doctoral Dissertation]. University of Louisville, Department of Industrial Engineering.

Sherehiy, B., & Karwowski, W. (2014). The relationship between work organization and workforce agility in small manufacturing enterprises. *International Journal of Industrial Ergonomics*, *44*(3), 466–473. [CrossRef]

Sherehiy, B., Karwowski, W., & Layer, J. K. (2007). A review of enterprise agility: Concepts, frameworks, and attributes. *International Journal of Industrial Ergonomics*, *37*(5), 445–460. [CrossRef]

Sohrabi, R., Asari, M., & Javad Hozoori, M. J. (2014). Relationship between workforce agility and organizational intelligence (case study: the companies of "Iran High Council of Informatics). *Asian Social Science*, *10*(4), 279–287. [CrossRef]

Suofi, H., Hosnavi, M. R., & Mirsepasi, N. (2014). A study on relationship between workforce agility and knowledge sharing. *Management Science Letters*, *4*(5), 1015–1020. [CrossRef]

Swafford, P. M., Ghosh, S., & Murthy, N. (2006). The antecedents of supply chain agility of a firm: Scale development and model testing. *Journal of Operations Management*, *24*(2), 170–188. [CrossRef]

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed). Pearson Education, Inc.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, *2*, 53–55. [CrossRef]

Wagnild, G. M., & Young, H. M. (1993). Development and psychometric evaluation of the resilience scale. *Journal of Nursing Measurement*, *1*(2), 165–178.

Worthington, R. L., & Whittaker, T. A. (2006). Scale development research: A content analysis and recommendations for best practices. *Counseling Psychologist*, *34*(6), 806–838. [CrossRef]

Yıldırım, A., & Şimşek, H. (2013). *Sosyal bilimlerde nitel araştırma yöntemleri [Qualitative research methods in social sciences]* (Extended 9th ed). Seçkin Publication.

Zhang, Z., & Sharifi, H. (2000). A methodology for achieving agility in manufacturing organisations. *International Journal of Operations and Production Management*, *20*(4), 496–513. [CrossRef]

Zygmont, C., & Smith, M. R. (2014). Robust factor analysis in the presence of normality violations, missing data and outliers: Empirical questions and possible solutions. *Quantitative Methods for Psychology*, *10*(1), 40–55. [CrossRef]

Appendix 1.
Items and Item Factor Loadings of the Workforce Agility Scale in Turkish

Boyut Adı					
Uyumluluk	**Faktör Yükü**				
Daha önce birlikte çalışmadığım ekiplere kolaylıkla uyum sağlarım.	**,779**	,107	,179	,057	,164
Farklı beceriler gerektiren sorumluluklar üstlenirim.	**,688**	,258	,120	,099	,166
İş arkadaşlarımla açık iletişim kurarım.	**,687**	,168	,257	,138	,094
Kurum içinde farklı alanlardan arkadaşlar edinirim.	**,681**	,243	,055	,166	,115
Ekip çalışmalarında farklı görevlerde rol alabilirim.	**,671**	,175	,358	,124	,065
Ekip arkadaşlarımla çalışmaktan zevk alırım.	**,650**	,261	,130	,105	,076
Farklı ekiplerle çalışmak mesleki gelişimime katkı sağlar.	**,646**	,122	,436	,077	,068
Yeni bir çalışma ortamına kolaylıkla uyum sağlarım.	**,641**	,079	,317	,117	,240
Disiplinlerarası projelerde çalışmaya istekliyim.	**,636**	,284	,212	-,039	,157
Kendi alanımla ilgili kurumum dışındaki çalışma ekiplerinde yer alırım.	**,609**	,355	-,072	,005	,227
Gelişim Odaklılık					
Çalışma alanımla ilgili güncel gelişmeleri yakından izlerim.	,219	**,706**	,267	,096	,004
İşimde beni geliştirecek olanaklar oluşturmaya çalışırım.	,179	**,690**	,226	,202	,142
Aldığım kararların sonuçlarına göre işimle ilgili yeni stratejiler geliştiririm.	,228	**,673**	,285	,143	,224
İşimle ilgili gelişmeleri takip etmek için birden çok kaynak kullanırım.	,258	**,648**	,330	,136	,028
İşimi yaparken kullandığım yöntemleri düzenli olarak güncellerim.	,222	**,637**	,270	,040	,264
İşimle ilgili uzun vadeli planlar yaparım.	,270	**,630**	,254	,079	,118
İşimle ilgili ortaya çıkabilecek fırsatları değerlendiririm.	,299	**,563**	,103	,352	,142
Geleceğe dönük kararlar verirken deneyimlerimden yararlanırım.	,273	**,520**	,347	,187	,173
Yetkinlik					
İşimin gerektirdiği yeterlikleri edinmek için çaba gösteririm.	,229	,331	**,692**	,180	,049
Beni başarıya ulaştıracak yöntem ve teknikler ararım.	,220	,417	**,672**	-,001	,212
Sahip olduğum beceriler, görevlerimi yerine getirmemi sağlayacak düzeydedir.	,117	,212	**,629**	,234	,018
Her yaştan insandan yeni bilgiler öğrenmeye çalışırım.	,281	,270	**,616**	-,051	,133
İşimde yaptığım hataları öğrenme deneyimi olarak görürüm.	,127	,173	**,607**	,127	,328
Yönergelerin açık olmadığı durumlarda işin nasıl yapılacağını çözmeye çalışırım.	,245	,263	**,599**	,275	,174
Yeni yöntemler deneme konusunda çalışma arkadaşlarıma öncülük ederim.	,290	,298	**,577**	,093	,179
İleri Görüşlülük					
Kurumumu etkileyebilecek değişimleri öngörürüm.	,106	,189	,110	**,848**	,068
İşimle ilgili ortaya çıkabilecek problemleri önceden sezerim.	,043	,082	,163	**,834**	,070
İşimle ilgili ortaya çıkabilecek problemlere yönelik farklı çözüm önerileri geliştiririm.	,286	,320	,168	**,655**	,130
Yılmazlık					
Çalışma alışkanlıklarımı değiştirmek benim için kolaydır.	,207	,050	,131	,063	**,727**
İşimle ilgili koşullar değişse de ben görevimi yapmaya odaklanırım.	,240	,186	,321	,198	**,652**
İş yerimde yaşanan değişimlerin olumlu yönlerine odaklanırım.	,270	,122	,312	,241	**,593**
İşin tamamını bilmesem de kendi üzerime düşen görevleri sorgulamaksızın yerine getiririm.	,084	,182	,019	-,037	**,577**
Açıklanan Toplam Varyans=%60,091					