Identifying the Main and Secondary components Affecting Organizational Agility in the Petroleum University of Technology

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ABSTRACT

This applied research carried out to identify the main and secondary components affecting organizational agility in the University of Petroleum Industry, PUT. In the qualitative section, by reviewing the researches and using a designed questionnaire, 13 hypotheses affecting the organizational agility of the PUT have been evaluated. The statistical population includes 229 experts working in Ahvaz, Abadan, Tehran and Mahmoudabad colleges. According to the results, out of 42 identified sub-components, 39 components have been confirmed as well as all 13 main hypotheses. The results show that the main effective components with organizational agility followed as organizational agility, human resource value creation, organizational leadership, strategic agility of managers, ICT management, training and empowerment of faculty and staff, establishing knowledge management, strengthening university infrastructure and university culture. It should be noted that SMART PLS software and partial squares technique were used to test the hypotheses.

1. Introduction

The word agility means fast, agile, active as well as the ability to move quickly and easily or think quickly and intelligently. The root of agility is agile production and it means the organization's ability to sense, perceive and anticipate changes in the business environment (Sharifi, 2001). Goldman et al. define organizational agility as giving value to the customer, being prepared to face change, paying attention to skills and creating employee engagement (Goldman, 1995). Organizational

agility is a strategy that is described in environments characterized by uncertainty and rapidly changing (Aghaei, 1393). Organizational agility is the ability of an organization to operate profitably in a constantly competitive environment by constant changes in customer needs (Goldman, 1995). An agile organization is an organization that has the ability to respond to unforeseen and unexpected changes with appropriate methods and at the right time. In addition it has the necessary skills to take advantage of change and gain the benefits of change as opportunities. Agile organizations always emphasize continuous work and movement and are more integrated than their predecessors (Aghaei, 1393). Richard Sharp expresses the agility of the university as a living human system, to flourish and learn from constant waves of change so that change emerged as a natural and inevitable part of the organization. On the other hand, change should not be considered as a separate part and a threatening event (Sharpe, 2012). The concept of agility was first introduced by researchers at the Yakuka Foundation in 1991, while past approaches and solutions have lost their ability to meet challenges belong to the organizational turbulences and external environment. Therefore, organizational agility considered as one of the recommended ways to respond to organizational change. In fact, agility is a new paradigm for the engineering of competitive organizations and firms. Although the two terms agility and flexibility are somewhat close to each other, they have major differences. Agility refers to speed and dexterity as a measure of reaction time to change, while flexibility is a measure of reactivity to change. On the other hand, agility is essentially related to the overall ability of the organization (Goldman, 1995) while flexibility refers to operational capabilities such as those found in manufacturing processes (Goldman, 1995). In other words, it can be said that agility arises from the synergy of flexibility of each component of the company chain. On the other hand, the importance of discussing organizational knowledge has been considered as one of the development strategies of organizations (Erhan, 2015). It should be noted that one of the most important tools of the organization to achieve agility is manpower. In fact, human resources as the most central part of any organization can be considered an important tool to promote agility, in which organizations need empowered human resources. Employee empowerment is a set of systems, methods and actions that are used by developing the capabilities and competencies of individuals to improve the productivity, growth and prosperity of the organization as well as manpower according to the goals of the organization. Today's world is a world of constant change and the age of instability that has profound effects on the organization. Therefore, it is necessary for organizations to adapt to changes that threaten them in order to survive which it can be worked directly and indirectly. In competitive markets, there is an urgent need for development, improving flexibility as well as organizational accountability. Many organizations, meanwhile, face increasingly sustained and unreliable competition, exacerbated by technological innovations, changing market environments as well as changing customer needs. This critical situation has led to major reforms in the strategic vision of the organization. Although agility allows the organization to react much faster than in the past, but the strength of agile competitors raised from predicting the response to customer needs and leadership in creating new markets through continuous innovation (Memarzadeh, 2014). Agility is a comprehensive response to the new competitive environment in which there is no place for employees who say yes and those who do well in continuous and consistent work. Rather, organizations are places for creative and innovative people who can respond appropriately to change. This makes it more important to examine the level of staff agility and all types of lacks affecting agility in order to cope with the changing environment (Sherehiy, 2007).

PUT has a diverse geographical distribution that is active in the provinces of Tehran, Mazandaran and Khuzestan in the cities of Tehran, Mahmoudabad, Ahvaz and Abadan and therefore will be affected by many environmental changes. Breaking the monopoly of this university in attracting students in the field of petroleum engineering and creating the same engineering fields in other universities of the country are among the other issues that necessitate a timely response to environmental changes for this university. It seems that the lack of quick and timely response of the PUT to environmental changes following the emergence of a large number of competitors is one of the serious problems of this university. Numerous studies have been done on organizational agility, but the purpose of this study is to identify the main and secondary components affecting agility in this particular organization. Given the importance of organizational agility in today's environment, it is necessary to identify the factors affecting it so that organizations can achieve their goals (Abolghasemi M, 2017). The PUT is 80 years old and, despite its brilliant history, is not able to attract the positive opinion of the Ministry of Petroleum as an employer. This indicates a change in circumstances, one of the most important of which seems to be the lack of

agility in the last two decades. In the last two decades, various universities across the country have been recruiting undergraduate and graduate students in petroleum engineering. It was expected that the PUT, as a leading university in the oil, gas and petrochemical industry, would still retain its special position, which seems to be far from achievable. With the initial study of the organization and review of the researches, it seems that lack of agility is one of the important problems of the understudy organization. Therefore, in this study, it has been decided to identify the main and secondary factors affecting organizational agility and based on that, suggestions for agility should be given. It seems that on the one hand, identifying dimensions and factors affecting the success of organizations for agility and on the other hand, examining the relationship between these factors, is a vital necessity for study and research in the organization under study. For example, the structural dimension as one of the key parameters of the university can play an important role in responding to the needs and complexities of the external environment. For instance, the structure should have the ability that all learners trained in the university, be able to interact with complex environmental changes (Ahmadi Asl, 2018). Today, organizations need agility due to short-term market opportunities, unpredictable continuous changes in market level and taking advantage of opportunities (Jafarnejad A., 2007). Research has shown that human capital is an important factor in the functioning of production as well as in explaining the differences in agility and growth of organizations between different countries. Hong and Huang believe that the origin of agility is agile production and agile production is a concept that has become common in recent years (Hun, 2001). This concept has been embraced as a successful strategy by manufacturers who prepare themselves to significantly increase performance. In such an environment, each organization must be able to simultaneously produce different, short-lived products, redesign products, change production methods as well as effectively responses to changes. An agile organization will be an organization that has such a view on issues. Regarding the needs of organizational agility, different researchers have presented groups of different indicators and requirements. It was developed four main strategic dimensions that emphasize the achievement of agile competitiveness capabilities named enriching the customer, working together to increase competitiveness, organizing for fundamental change and leveraging the impact of people and information (Sambamurthy, 2003), (Yusuf, 1999). Agility is achieved only through the integration of the hierarchy of customer needs in a

framework of the internal and external environment of the organization. This important achieved from a general view of the advanced production technologies of the organization with internal capabilities and also through the application of information systems technology. It was described agile production enablers as integration, competence, team building, technology, quality, transformation, participation, market, education and ultimately well-being. Jafarnejad and Shehai by reviewing the agility literature, introduced twenty criteria of agility, which include organizational structure, delegation, production drive, employee status, employee participation, management nature, customer response acceptance, product life cycle, product service period, improve design, production method, production planning, cost and accounting systems, automation, information technology integration, change of work and technical processes, time management, quality, productivity and finally outsourcing (Jafarnejad, 2007). In fact, agility requires an essential ability for an organization to be able to sense, perceive, consider, analyze and anticipate changes in the business environment. Thus, the agile producer is an organization that has a broad vision of the new world order of business. This type of organization uses its capabilities to deal with turbulence and capture the advantageous aspects of change flows (Davis, 2009). It was states that agility is the ability of an enterprise to survive and thrive in a competitive environment where changes are continuous and unpredictable. On the other hand, it has the ability to respond quickly to the constant changes in the markets, which are due to customer valuation of products and services. Agility as a productive philosophy (the next generation of production systems) welcomes organizations that compete in all sectors of the economy. Agile organizations think beyond adapting to change and tend to take advantage of potential opportunities in a turbulent environment and gain a foothold through their innovations and competencies. Agile organizations think differently about satisfying customer needs. These organizations not only sell their products, but also sell solutions to meet the real needs of customers (Simon, 2011). These organizations believe that their products are not complete and try to enrich their product in order to enrich the values received by customers or create added value for them. This makes the position of agile organizations inaccessible to competitors. In addition, agile organizations focus on designing or developing products that specifically address the unique needs of customers. The need for effective and fast design means that traditional approach for having new products has failed (Gardas, 2019). Brian Muskle defines agility as the

ability to thrive in a constantly changing and unpredictable environment (Maskell, 2001). In this regard, organizations should not be afraid of and avoid changes in their work environment; rather, they should see change as an opportunity to gain a competitive advantage in a market environment. Agility can be defined as the close alignment of the organization with the needs of variability in order to gain a competitive advantage. In such an organization, the goals of the employees are in line with the goals of the organization and these two together seek to respond appropriately to the changing needs of customers. Also, since change is one of the greatest characteristics of organizations and institutions in today's competitive field, technological change or any other kind of change requires managerial and organizational variations. In fact, such developments have led organizations to seek capabilities to produce a variety of products, according to customer needs, in the shortest time and at the lowest cost, improve quality, create innovation in products and services, and generally more flexibility to environmental needs. Goldman et al. considered agility as the application of new and effective communication technologies (Goldman, 1995). According to them, agility involves four interrelated principles. Sharifi and Zhang presented a conceptual model that includes organizational agility tools, reinforces, capabilities and agility drivers (Sharifi, 2001). According to them, organizational agility tools include organizational structure, people, information technology, innovation and creativity. In the model of Atoz Consulting Group, the agility of the organization depends on the maturity and flexibility of the organization. In this model, activities related to organizational agility at three levels of strategic management, tactical management and operational management are examined. In fact, organizational agility in this model means flexibility and the ability to react to environmental changes, which is possible through constant reinforcement. Permanent reinforcement is also achieved through the acquisition of awareness, the existence of flexibility in the organization and finally, having a control system. Using research literature as well as brainstorming sessions, there were able to provide a multivariate set for agility. Sharp is a theoretical model for agile production that has three basic components of model, model enablers and model outputs. Sharp et al. consider empowerment to include competency focus, virtual enterprise, rapid prototype building, simultaneous engineering, flexible and multidisciplinary people, continuous improvement, carte blanche, change and risk management, information technology and employee empowerment (Sharpe, 2012). In 1399, Mahdieh

conducted a study entitled "The effect of organizational learning on organizational agility with the mediating role of psychological empowerment" in the Regional Electricity Company of Zanjan Province (Mahdieh, 2020). In this study, he concluded that organizational learning and psychological empowerment have a positive and significant effect on organizational agility as well as the effect of organizational learning on psychological empowerment (Mahdieh, 2020). On the other hand, Feizi in a study has identified eight process steps in the form of three groups of "proportionality", "commitment to risk" and "post-risk" (Feizi, 2020). Ghiasi in a study identified the main dimensions and indicators in the culture of intellectual capital in Iranian universities and then analyzed them using interpretive structural modeling (Ghiasi, 2020). He concluded that ethics-oriented principals and students familiar with Iranian-Islamic culture are independent variables of this study and the other variables are the type of interface variables which have a lot of dependence and guidance. In fact, in order to change the situation of culture-oriented intellectual capital of the university, it is necessary to change these variables (Ghiasi, 2020). Ahmadi Asl in a research in the field of higher education that has been done in the form of in-depth interviews and data analysis, concluded that the realization of dynamic learning in the university requires levers as reforming structures and removing existing structural barriers by creating flexible and dynamic structures (Ahmadi Asl & et al, 2019). Also, informal structures and creating a suitable environment for the activity of invisible structures of the university are the other important ones (Ahmadi Asl & et al., 2019). Farjad in a study based on Gelman and Nagel model "first using the opinion of experts and Delphi technique, identified 46 variables as agility of organizational structure of universities and showed that the most important indicators including stability in university management, clear vision, organizational learning and scientific mission, monitoring and evaluation system of research performance, culture of self-evaluation, self-control and self-improvement, attention to teamwork in universities, managers' attention to research results, establishment researcher support fund is the re-engineering of organizational structures and current processes and finally the existence of research units for commercialization in universities, which were classified into five main categories according to the initial conceptual model (Farjad Sh, 2016). Hadi Tabar in their study approved flexibility, knowledge capability and accountability culture as factors of agility in knowledge-based companies (Haditabar, 2017). Sanatigar in a study

concluded that leadership agility, service agility, employee agility, agility in organizational processes as well as agility in IT processes and communication are important and influential factors on organizational agility (Sanatigar). Sarlak showed that the most important factors in organizational agility are related to giving importance to people, information technology, readiness for change, organizational coordination, environmental uncertainty control and employee empowerment (Sarlak, 2016). Also by examining the relationship between teamwork and organizational agility it was concluded that there is a significant relationship between these two variables. In addition, aimed at identifying and prioritizing the factors of organizational agility empowerment in universities which concluded that seven factors of culture, the formation of knowledge-based organization, agile workforce, continuous improvement, partnership and collective cooperation, information technology and structure of organization are considered as key structural enablers of organizational agility in universities. Memarzadeh in their study concluded that 6 factors of employee flexibility, employee responsiveness, organizational change culture, employee speed in response to environmental changes, integration and low complexity in organizational structure, mutual cooperation of employees and their managerial functions have a positive and significant effect on organizational agility of employees (Memarzadeh, 2014). Aghaei in a study concluded that organizational agility includes five components of organizational factors, human factors, strategic factors and technological factors (Aghaei, 1393). Zare concluded that the dimensions of servant leadership including service and love, trustworthiness, humility and modesty affect organizational agility, among which trustworthiness has the highest priority (Zare, 2013). Nikbakht concluded in a study that the components of empowerment in the form of three factors of organizational conditions, management strategies and self-efficacy resources in promoting agility indicators including four components of customer response, readiness to face change, importance for skills and staff knowledge and, ultimately, the degree to which activities are virtual are effective (Nikbakht, 2013). Abbaspour in a study concluded that agility in the university consists of four components of stimuli, capabilities, empowerment and consequences. These findings indicate that there are some drivers of change and agility in universities. These drivers include changes and transformations in technology, constant changes in student expectations, changes and complexities in the environment, economics and knowledge. To achieve these capabilities, universities need special capabilities that include structure, agile manpower, culture and information technology. It should be noted that ultimately these capabilities and empowerment lead to the production of qualified graduates and production of knowledge needed by different sections of society (Abbaspour, 2012). Ulfat in a study entitled "Model for organizational agility in the Iranian electronics industry" showed that the most effective structures in the agility of total quality management are technology management and lean manufacturing (Ulfat & et al., 2009). Daniel concluded in a study that employee competency management has a significant impact on organizational agility and based on this, he has advised these managers to effectively adapt to changes that will occur in the future. For agility, they must increase the competency required in the organization through qualified employees (Daniel, 2020). Those who want to compete and create added value has become a necessity in today's business environment (Joiner, 2019). Ridwadono, an Indonesian researcher reviewing research on IT and organizational agility, stated that the four dimensions of information technology in organizational agility are alignment, IT governance, operating system governance and IT architecture, which play an important role in organizational agility (Ridwadono, 2019). Romiana Ilieva, as a result of a study conducted in Bulgaria, found a model for organizational agility in which the main components of agility activators, agility stimuli and agility barriers affect organizational agility and characteristics. It also determines the capabilities of organizational agility. He identified the sub-components of agility activators as system motivation, skills and training, leadership and management, and ultimately team coordination. The subcomponents of agility drivers are competition, market change, technological advancement and customer change. This researcher considered increasing competitiveness, increasing skills, mastery and aristocracy to change, enriching customers and increasing information as the characteristics of an agile organization, and finally the capabilities of an agile organization are flexibility, time adaptation, competence and responsibility (Ilieva, 2018). Saha in a study in the Czech Republic concluded that organizational agility highlights the effectiveness of effective resources in increasing organizational performance and competitiveness (Shaha, 2017). J. Prakash in her research concluded that the agility model should include organizational skills, motivators and providers of these abilities. These factors can help the organization to meet the diverse needs of the customer in the shortest possible time with effective cost and good quality (Jai, 2017).

Anas Al-Hadid conducted a research by the Jordanian Technology Organization, demonstrated that there is a positive correlation between organizational agility and organizational performance (Anasy, 2016). Joseph et al. in a study of 122 large Spanish companies illustrated that the effectiveness of the collection not only supports knowledge management processes and the application of knowledge has a direct impact on the performance of the organization but also is related to organizational agility (Joseph, 2020).

2. Methodology

The goal of research is to find the truth, and what researchers are doing is trying to get closer to the truth. But this does not mean that the results obtained from research activities are 100% true, because the ways and methods of cognition and study are unlimited and human consciousness to discover the truth is limited. Therefore, achieving or approaching the research objectives will be possible when the research methodology is done correctly (Moradi, 2011). This research is based on the purpose of the applied type and on the method of data collection of the mixed type. In the qualitative section, by collecting and reviewing domestic and foreign studies, valid scientific sources have been used. In this study, as a result of qualitative studies, 9 main categories and 42 sub-categories have been identified. Accordingly, the initial model of drawing Weber has been defined based on 13 hypotheses. In the quantitative part to test the hypotheses, using Morgan table and Cochran's formula, a statistical sample of 214 people was determined and then a researcher-made questionnaire of 42 questions was developed (Appendix A). The amount of factor load is greater than 0.5 in all cases, so items play an important role in explaining each factor. T-statistic is also obtained in all cases more than 1.96, so the observed factor loads are statistically significant. Due to the conditions caused by the Covid-19 virus epidemic, questionnaires were sent to the upload site and its link to about 400 members of the statistical community, and finally 229 employees at the PUT participated in the research (Appendix B). SMART PLS software and partial squares technique were used to test the hypotheses. The 9 main structures include organizational leadership, academic culture, knowledge management, information technology management, university infrastructure, strategic agility of managers, training and empowerment of members, organizational value creation and organizational agility. The mean extracted variance (AVE) is greater than 0.5 so there is convergent validity for all data. Cronbach's alpha of all variables is greater

than 0.7 so reliability is confirmed. The value of combined reliability (CR) is also greater than AVE and in all cases is greater than the threshold of 0.7, so the third condition is met. It needs to be mentioned that sample size has been calculated using Cochran's formula as follows and the number 214 has been obtained (Equation 1).

$$n = \frac{PqNZ^2}{d^2(N-1)+PqZ^2}$$
(E1)

Where n represents the sample size; N, the size of the research community; Z, the value of the normal distribution variable of the standard unit at the 95% confidence level (1.96); p, is the value of the attribute ratio in the community and considered as 0.5 while it was not available; considered to maximize the amount of variance; q is the probability of occurrence equal to (1-p); d is the allowable error value which we have considered 0.05.

One of the methods for calculating reliability is Cronbach's alpha coefficient (Equation 2). If the Cronbach's alpha coefficient is calculated for a scale greater than 0.7, the reliability of that optimal scale is evaluated. The reliability of the questionnaires was confirmed by calculating Cronbach's alpha coefficient.

$$\alpha = \frac{k}{k-1}\{1 - \frac{\sum S_i^2}{S_X^2}\}$$
(E2)

In this formula; a, Cronbach's alpha coefficient; K, number of questionnaire questions; S_i^2, variance for question i and finally, S_x^2 total variance of test are considered. In this study, in addition to calculating the composite reliability, Cronbach's alpha was also calculated and Cronbach's alpha of all 9 structures is greater than 0.7. Therefore, the reliability of all structures is confirmed. Table 1 summarized all factor loads and statistical T-values. Also, in the following you can find all corresponding hypothesis.

Hypothesis 1: Organizational leadership has a positive and significant effect on academic culture in the PUT.

Hypothesis 2: Organizational leadership has a positive and significant effect on knowledge management in the PUT.

Hypothesis 3: Organizational leadership has a positive and significant effect on information technology management in the PUT.

Hypothesis 4: University infrastructure has a positive and significant effect on university culture in the PUT.

Hypothesis 5: University infrastructure has a positive and significant effect on knowledge management in the PUT.

Hypothesis 6: University infrastructure has a positive and significant effect on information technology management in the PUT.

Hypothesis 7: University culture has a positive and significant effect on the strategic agility of managers in the PUT.

Hypothesis 8: Knowledge management has a positive and significant effect on the strategic agility of managers in the PUT.

Hypothesis 9: IT management has a positive and significant effect on the strategic agility of managers in the PUT.

Hypothesis 10: Strategic agility of managers has a positive and significant effect on training and empowerment of members in the PUT.

Hypothesis 11: The strategic agility of managers has a positive and significant effect on value creation of human resources in the PUT.

Hypothesis 12: Training and empowering members has a positive and significant effect on organizational agility.

Hypothesis 13: Value creation of human resources has a positive and significant effect on organizational agility.

Table 1: Factor loads and statistical T-values.

Parameters	Items	Factor loads	Statistical T-value
Organization agility	Identify the strengths and weaknesses of the organization (Q01)	0.880	45.055
	Flexibility and adaptability to the environment (Q02)	0.920	67.185
	Improving the process of doing things (Q03)	0.822	29.698
	Competence and Achieving Goals (Q04)	0.823	22.020
	Optimal responsiveness to individuals (Q05)	0.824	32.633
	Increasing people's satisfaction (Q06)	0.800	20.352
	Update and enrich strategic and operational plans (Q07)	0.803	20.069
	Attention to the geographical dispersion of the university (Q08)	0.773	18.425
Value creation of human resources	Merit and Succession (Q09)	0.862	29.141
	Performance-based payment system (Q10)	0.853	30.369
	Support for Senior Managers (Q11)	0.903	50.075
	Increase interaction and inter-unit communication (Q12)	0.923	62.362
	Increasing people's participation in macro decision making (Q13)	0.920	54.674
Leadership	Dynamics, style and attitude of leadership (Q14)	0.867	32.615
	Talent Management (Q15)	0.855	30.660
	Leadership skills to resolve existing conflicts (Q16)	0.832	23.572
	Ability to make bold and quick decisions (Q17)	0.844	22.105
Strategic agility of managers	Performance Monitoring and Evaluation (Q18)	0.790	10.410
	Having systemic thinking (Q19)	0.819	15.427
	Commitment to the organization's vision (Q20)	0.839	18.489
	Risk and Crisis Management (Q21)	0.857	28.776
	Having team building skills (Q22)	0.821	28.776

IT	Upgrading and integrating information systems and upgrading information security (Q24)	0.882	20.042
	Targeted development of information technology in the university (Q25)	0.868	28.100
	Provision of software and hardware facilities (Q26)	0.862	24.636
Training and empowering of members	Updating the course headings (Q27))	0.920	45.428
	Standardization of training programs (Q28	0.902	38.039
	Strengthen participation in research activities (Q30)	0.876	21.399
Knowledge management	Increasing general university knowledge (Q31)	0.660	5.633
	Increasing University Technical Knowledge (Q32)	0.636	6.138
	Review and amend administrative, financial, educational and research regulations (Q33)	0.876	49.934
Organizational structure	Attract new staff and faculty members (Q34)	0.875	40.548
	Upgrading and updating the organizational structure (Q36)	0.902	34.784
	Strengthening welfare, student and laboratory facilities (Q37)	0.903	60.105
Culture of university	Commitment to Ethics and Professional Ethics (Q38)	0.903	57.590
	Establishing a learning culture (Q39)	0.898	47.253
	Implementing a Culture of Trust and Commitment (Q41)	0.704	7.314
	Establishing a culture of agility capability development (Q42)	0.672	3.120

3.Research Findings

After analyzing all data with partial quadratic technique and using SMART PLS software, the standard factor load of the effect of organizational leadership on academic culture represented as 0.203. Also, the value of t-statistic obtained as 2.289. Therefore, it can be claimed with 95% confidence that organizational leadership has a positive and significant effect on university culture. The standard factor for the effect of organizational leadership on knowledge management and the value of t-statistic were 0.343 and 3.869, respectively. Therefore, with 95% confidence, it can be claimed that organizational leadership has a positive and significant effect on knowledge management. The standard factor of the effect of organizational leadership on information technology management presented as 0.406 with the value of t-statistic as 5.510. Therefore, it can be claimed that organizational leadership has a positive and significant impact on IT management with 95% confidence. The standard factor of the effect of university infrastructure on university culture is 0.766, which is proved by a statistical value of t of 8.812 with 95% confidence of a positive and significant effect of university infrastructure on university culture. On the other hand, the standard factor load of the effect of academic infrastructure on knowledge management is 0.441 and with a t-statistic value of 4.378, so the positive and significant effect of these two parameters on each other has been proven. Also, the standard factor of the

impact of academic infrastructure on information technology management is 0.343 and the value of t-statistic is 4.456. Therefore, it can be claimed with 95% confidence that the university infrastructure has a positive and significant effect on IT management. Regarding the effect of academic culture on the strategic agility of managers, the value of the standard factor is 0.281, which with a t-statistic value of about 2.518, proves a positive and significant effect between these two factors. Also, the value of t-statistic has been obtained to investigate the effect of knowledge management on strategic agility of managers as 2.064, which proves a positive and significant effect between them with a standard operating load of 0.272 with 95% confidence. The standard factor of the effect of IT management on the strategic agility of managers is 0.380, which with a value of t-statistic of 4.457 proves with 95% confidence that IT management has a positive and significant effect on the strategic agility of managers. The value of t-statistic to investigate the effect of strategic agility of managers on training and empowerment of members was equal to 8.174. On the other hand, the standard load of 0.804 proves the positive and significant effect of these two parameters on each other. In addition, the standard value of the effect of managers 'strategic agility on human resource value creation is 0.595, which with a t-test of 6.607 with 95% confidence can be claimed that managers' strategic agility has a positive and significant effect on human resource value creation. On the other hand, the effect of

training and empowerment of members on the agility of the organization is positive and significant because it has a standard operating load of 0.576 and a value of t-statistic equal to 6.204. Finally, the standard factor of the effect of human resource value creation on organizational agility is 0.467. Also, with a t-value of 5.256 with 95% confidence, it can be claimed that value

creation of human resources has a positive and significant effect on organizational agility. Table 2 summarizes the test results of the research hypotheses. As it can be seen in the following, all hypotheses were confirmed.

Table 2: Test results of research hypotheses.

Independent variable	Dependent variable	Factor load	t-statistic value	Result
Leadership	University culture	0.203	2.289	Accepted
	Knowledge management	0.343	3.869	Accepted
	IT	0.406	5.510	Accepted
University infrastructure	University culture	0.766	8.812	Accepted
	Knowledge management	0.441	4.378	Accepted
	IT	0.343	4.456	Accepted
University culture	Strategic agility of managers	0.281	2.518	Accepted
Knowledge management	Strategic agility of managers	0.272	2.064	Accepted
IT	Strategic agility of managers	0.380	4.457	Accepted
Strategic agility of managers	Training and empowerment of members	0.804	8.174	Accepted
	Value creation of human resources	0.595	6.607	Accepted
Training and empowerment of members	Organization agility	0.576	6.204	Accepted
Value creation of human resources	Organization agility	0.467	5.256	Accepted

4.Discussion

The aim of this study was to determine the main and sub-components affecting organizational agility. After studying the internal and external researches in the authoritative scientific sources, the main structures

affecting organizational agility have been extracted and 13 hypotheses have been defined. In order to test the hypotheses, a 42-item researcher-made questionnaire was used, which after analyzing all gathered data with the partial squares technique, all 13 hypotheses were confirmed. Based on the results, the sub-categories of

organizational agility are identifying the strengths and weaknesses of the organization, flexibility and adaptability to the environment, improving the process of doing things, competence and achieving goals, optimal response to people, increasing people's satisfaction, updating and enriching strategic and operational plans and finally, considering the geographical dispersion of the university. In the results of Hadi Tabar research, the component of flexibility and accountability is mentioned and from this perspective, it is very consistent with the results of the present study (Hadi Tabar, 2017). In addition, the present results are in a great agreement with the research results of Abolghasemi (Abolghasemi, 2017), Daniel (Daniel, 2020), Sharp (Sharpe, 2012) and finally Sharifi and Zhang (Sharifi, 2001). Sub-categories of human resource value creation include meritocracy and succession, pay-as-you-go payment system, support of senior managers, increase of interaction and inter-unit communication, increase of people's participation in macro-decisions. In the results of the study, Farjad et al. (Farjad, 2016) also mentioned the component of support and from this perspective is consistent with the results of the present study. In addition, the present results are consistent with the results of the research of Sarlak (Sarlak, 2016), Daniel (Daniel, 2020), Joyner (Joiner, 2019), Iliva (Ilieva, 2018), Anas Al-Hadid (Anasy, 2016), Sharp (Sharpe, 2012), (Goldman, 1995). On the other hand, dynamism, leadership style and attitude, talent management of individuals, leadership skills to resolve existing conflicts, the ability to make bold and quick decisions are sub-categories of organizational leadership. In the results of Zare study, the component of organizational leadership and its impact on organizational agility is pointed out and from this perspective is in line with the results of the present study (Zare, 2013). It should be said that, the present results are matched with the results of research by Farjad (Farjad, 2016), (Ilieva, 2018), (Joiner, 2019), (Memarzadeh, 2014), (Sharpe, 2012), Atoz Consulting Group. In addition, the sub-categories of strategic agility of managers include monitoring and evaluating performance, having a systemic thinking, being committed to the organization's vision, risk and crisis management, and having team building skills. In the results of Feizi study, the component of risk and commitment to risk were mentioned which referred to the component of teamwork that are similar to the results of the present study (Feizi, 2020). In addition, the present outgoings are consistent with the results of research by (Ilieva, 2018) and (Sharpe, 2012). The sub-categories of information and communication technology management are upgrading and integrating information systems and promoting information security, targeted development of information technology in the university, providing software and hardware facilities. In the results of Abolghasemi study, the component of information technology is also mentioned and from this perspective is consistent with the results of the present study (Abolghasemi, 2017). In addition, the present results with the results of (Ilieva, 2018), (Jai, 2017), (Ridwadono, 2019), (Sanatigar, 2017), (Sharifi, 2001), (Sharpe, 2012), (Taghavi, 2015), (Ulfat, 2009), (Zhen, 2021) and Atoz Consultants, are consistent. Sub-categories of training and empowerment of faculty members and staff named updating the topics of educational disciplines, standardization of educational programs and strengthening participation in research activities. The present results are consistent with the results of (Ilieva, 2018), (Goldman, 1995), (Sharpe, 2012), (Nikbakht, 2013), (Sanatigar, 2017). On the other hand the sub-categories of establishing knowledge management are increasing the general knowledge of the university, increasing the technical knowledge of the university, reviewing and amending the administrative, financial, and educational and research regulations. Based on the results of our research, all have a great harmony with the results of research by (Ghiasi, 2020), (Hadi Tabar, 2017), (Jai, 2017), (Joiner, 2019), (Taghavi, 2015). In addition, attracting new staff and faculty members, upgrading and updating the organizational structure, strengthening the welfare facilities, students and laboratories are sub-categories of strengthening the university infrastructure. In the results of Ahmadi-Asl study, the component of structural modification and removal of obstacles to the progress of structures is pointed out and from this perspective is consistent with the results of the present study (Ahmadi Asl, 2019). In addition, the present results are consistent with the results of research by (Ilieva, 2018), (Joiner, 2019) and the dynamic model of organizational agility. It should be mentioned that commitment to ethical issues and professional ethics, establishing a culture of learning, implementing a culture of trust and commitment, establishing a culture of developing agility are sub-categories of academic culture. In the results of Mahdieh study, organizational learning is also mentioned and from this perspective, it is consistent with the results of the present study (Mahdieh, 2020). In addition, the present results are consistent with the results of research by (Abolghasemi, 2017), (Ghiasi, 2020), (Hadi Tabar, 2017), (Joiner, 2019) and (Memarzadeh, 2014).

5.Conclusion

This study was conducted to identify the factors affecting organizational agility in the University of Petroleum Industry, PUT. After reviewing the relevant research, the main factors affecting organizational agility including organizational leadership, academic culture, knowledge management, information technology management, university infrastructure, strategic agility of managers, training and empowerment of members, organizational value creation and organizational agility were identified. On the other hand all corresponding 13 hypotheses were formulating and tested. Considering the confirmation of all the hypotheses raised during the causal relationships between the research models, the model presented in the present study has sufficient validity to be established in the mentioned university. Therefore, relevant managers can improve the organization's agility by applying the results of the present study and implementing the components provided. The most important element in promoting organizational agility is organizational leadership. This makes sense with things like dynamism, leadership style and attitude, and so leadership skills to resolve existing conflicts. Also, managing the talent of individuals along with the ability to make bold and quick decisions are effective in organizational leadership. Therefore, sensitivity in choosing the director of the PUT is one of the important issues to consider. Another important factor in promoting organizational agility is the value creation of human resources, this will be facilitated by meritocracy and succession. Because the selection of human resources appropriate to the work environment and related activities, has an effective role in promoting organizational agility. In order to maintain the useful forces of the organization, there is an urgent need for the support of senior managers and the provision of a payment system commensurate with performance. As relevant managers increase their interaction between units, the likelihood of individuals participating in major decision-making will increase, and employees will become familiar with the various aspects of management that are necessary to replace and determine future managers. If there is a strategic agility of managers, the goals of promoting organizational agility will not be out of reach. This will be possible by monitoring and evaluating performance and having systemic thinking. Management's commitment to the organization's vision and having team building skills can certainly be significant in organizational risks and crises. Laying the groundwork for promoting organizational agility goes back to information and communication technology management, training and empowerment of faculty and staff, and so strengthening the university infrastructure. By integrating information systems and enhancing information security, university administrators will be able to overcome the challenges facing organizational agility. Also, capable managers will be able to compete with other world-renowned universities by purposefully developing information technology in the university and providing software and hardware facilities. This can be achieved by updating the curriculum and standardizing training programs. It should be noted that updating and enriching strategic and operational plans along with strengthening participation in research activities is also helpful in promoting organizational agility. It is clear that one of the effective pillars in upgrading and improving the organizational structure is attracting new staff and faculty members. Managers of the PUT by strengthening the welfare facilities, students and laboratories can further strengthen the university infrastructure and provide the necessary basis for the implementation of organizational agility. Also, in order to achieve the goals of organizational agility, managers must pay special attention to the geographical distribution of the PUT in three provinces and four cities of the country. In the meantime, in order to accept all active people in the PUT, there is a need for university culture. In the case of commitment to ethical issues and professional ethics, the culture of trust and commitment is implemented. In turn, it has positive effects on promoting organizational agility. In addition to creating and promoting organizational culture, there is a need to establish knowledge management. Relevant managers can prepare the ground for improving the agility of the organization by increasing general and technical knowledge of the university and reviewing and amending the administrative, financial, educational and research regulations. Finally, by implementing the above, organizational agility will be expected in the PUT. The oil industry improves how things are done by identifying the strengths and weaknesses of the organization and increasing flexibility and adaptability to the environment. Regarding the value creation of human resources, it is suggested that managers of the PUT strive for meritocracy and succession by making efforts to increase the participation of individuals in major decisions. Regarding organizational leadership, it is suggested that the relevant officials of the PUT pay more attention to the management of people's talents along with the dynamism, style and attitude of the leadership. Because leadership skills to resolve existing conflicts and the ability to make bold and quick decisions can lead to establishment of agility in the university. Regarding

the strategic agility of managers, it is suggested that managers of the PUT manage the risk and crisis of the university by monitoring and evaluating organization performance and having a systemic thinking. Managers' commitment to the organization's vision and their team building skills are also important factors in establishing agility in the PUT.

Appendix A

In the following you can find the corresponding questionnaire (Table 3).

Table 3: Corresponding questionnaire.

Dimensions	Questions	Very low	Low	Medium	High	Very high
Organization agility	Establishing agility in PUT leads to identifying the strengths and weaknesses of the organization.					
	Flexibility and adaptability to the environment will be created following the establishment of organizational agility.					
	Implementing agility in PUT leads to improving the process of doing things.					
	Competence and achieving goals is possible with the establishment of agility in PUT.					
	One of the important pillars in creating agility in Iran PUT is optimal accountability to individuals.					
	Increasing people's satisfaction is considered as a positive consequence of establishing agility in Iran PUT.					
	Creating agility in Iran PUT leads to updating and enriching strategic and operational plans.					
	Creating agility in PUT requires attention to the geographical dispersion of the university.					
Value creation of human resources	Value creation of human resources leads to meritocracy and succession in the university.					
	The payment system is commensurate with the performance arising from the value creation of human resources.					
	The value creation of human resources in the university depends on the support of senior managers.					
	Increases interaction and inter-unit communication facilitates agility implementation at PUT.					
	Implementation of agility in PUT is accelerated by increasing the participation of individuals in macro decision making.					
Leadership	Dynamics, style and leadership attitude are important in achieving agility in PUT.					

Category	Statement					
	Establishing agility in PUT will be achieved by managing the talent of individuals.					
	Leadership skills to resolve existing conflicts is one of the important pillars in achieving agility in PUT.					
	The ability of the leader of the organization to make bold and quick decisions in solving academic challenges is important.					
Managers' strategic agility	Monitoring and evaluating performance on university administrators is mandatory.					
	Having systemic thinking facilitates the creation of agility in PUT.					
	Managers' strategic agility is measured by the degree of commitment to the organization's vision.					
	Risk and crisis management is essential for the survival and sustainability of any organization.					
	Having team building skills leads to agility in PUT.					
IT	Upgrading different systems and keeping up with new technologies is necessary to create agility in PUT.					
	Upgrading and integrating information systems and promoting information security in the university is essential.					
	Targeted development of information technology in the university is effective in creating agility in PUT.					
Training and empowerment of members	Establishing agility in PUT can be achieved by providing software and hardware facilities.					
	Updating the topics of the educational disciplines is necessary to improve the skills of the members.					
	Standardization of educational programs leads to increasing the knowledge of active members in the university.					
	Training and development of social and communication skills leads to agility in PUT.					
	Strengthening participation in research activities empowers members.					
Knowledge man age	Increasing the general knowledge of the university is necessary to create agility in PUT.					

Organizational structure	Establishing agility in PUT is facilitated by increasing the technical knowledge of the university.						14
	It is necessary to review and amend the administrative, financial, educational and research regulations for the implementation of agility in the university.						
	Attracting new staff and faculty members will strengthen the university infrastructure.						
	In order to create agility in PUT, it is necessary to strengthen the relationship with industry and develop practical and professional education.						
	Upgrading and updating the organizational structure is effective in accelerating the creation of agility in PUT.						
	Establishing agility in PUT can be achieved by strengthening welfare, student and laboratory facilities.						
University culture	Commitment to ethical issues and professional ethics reflects the rich academic culture.						
	Establishing a learning culture helps to implement agility in PUT.						
	Promoting a culture of knowledge in order to implement agility in PUT is important.						
	Creating agility in PUT will be possible by creating a culture of trust and commitment.						
	Establishing a culture of developing agility capabilities is a prerequisite for implementing agility in PUT.						

Appendix B

In the following you can find any details about PUT statistical society understudy (Table 4).

Table 4: Details of statistical society of PUT.

Degree	Diploma		Associate Degree		BSc		MSc		PhD		Results	
Workplace	M	F	M	F	M	F	M	F	M	F	Total	Participant

Headquarters	8	1	6	7	18	11	21	8	7	0	87	49
PUT of Ahwaz	81	6	10	2	26	7	6	7	17	2	164	85
PUT of Abadan	62	3	5	4	10	14	6	1	15	2	122	48
PUT of Tehran	11	1	6	1	8	10	5	8	12	0	62	25
PUT of Mahmoudabad	14	0	6	0	13	4	8	1	1	0	47	22
Total	176	11	33	14	75	46	46	25	52	4	482	229

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