

## An in-depth exploration of influential factors impacting the choice of knowledge workers: a comprehensive systematic literature review

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### Abstract:

**Objective:** The selection of knowledge workers in the organization is one of the main tasks of human resource management in the new era, and the lack of criteria and a coherent list of factors influencing the selection of these workers has been raised as a challenging issue in this field. The following article seeks to examine these influencing factors on the selection of Knowledge workers using a systematic review. The process of conducting a systematic research review is derived from the model of Okoli and Shabram (2017) and the selection steps of Silva (2015). Based on this, the number of 1976 articles published without time limit from the databases of Science Direct, Google Scholar, Normags, a comprehensive portal of humanities, the specialized database of Noor magazines, and the scientific information center of academic jihad were examined, and analyzed. In the final step, effective factors were extracted from 16 articles. The findings of the research were presented in the form of three categories of knowledge, skill, and ability, and finally, the key characteristics of knowledge workers were divided into two parts: some characteristics are non-developable and fixed, and others are developable and variable.

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## Introduction

In the last two decades, management has experienced tremendous changes due to various factors such as technological advancement, globalization, changes in work and new management systems. Management has seen a change from the traditional production system to more service-oriented management, known as "knowledge management" (modern management). Modern management describes the rapid change in global management that is enhanced by information and communication technology (ICT) (Muzam, 2022).

One of the characteristics of the modern approach to management, especially knowledge management, is to create a strategy based on acquiring intellectual capital, the individual potential of employees, their competencies, the motivation and ability to learn, and individual creativity. Senior managers know the difficulty of finding people with high qualifications, extensive knowledge and experience. It is about highly qualified knowledge workers with valuable attributes, specific professional preparation, industry knowledge and business connections (Bartkowiak et al., 2021).

Healy (2002) indicated that one of the most critical features of the new management is the creative change in an industry where people work with their brains and think for a living (Davenport, 2005). Currently, the skills and creativity of workers have become more critical than manual work (Drucker, 1969), which has led to the emergence of knowledge workers (Davenport, 2008). According to Gartner (Roth, 2019), the global population of knowledge workers has exceeded one billion. The future of work will witness the continuous increase of Knowledge workers and knowledge workers (Kudyba et al., 2020); Therefore, organizations will need to develop or upgrade their current skills and strategies due to the global market challenge.

The fact that the term "knowledge workers" has multiple definitions creates a challenge for the effective management of knowledge workers in modern organizations (Acsente, 2010). According to Desordi et al. (2021), there are two views. One group considers the prerequisite of knowledge workers to be the production, creation and advancement of knowledge (scientists or researchers). On the other hand, others consider knowledge workers who use and apply organizational knowledge (operational workers). Surawski (2019) compared knowledge workers with other workers, such as white-collar workers and experts. Consequently, one of the critical characteristics of knowledge workers is that they mainly work with symbols and transform these symbols into cognitive processes that create added value. In this study, this definition is viewed from a general perspective, which implies viewing knowledge workers as independent individuals whose work requires a high level of knowledge and who perform complex tasks that primarily focus on problem-solving.

Knowledge workers are responsible for organizational growth and innovation (Jemielniak, 2012). Unlike regular workers, they require different skills and

competencies due to the complexity of their jobs (Gaile et al., 2022). Possessing the necessary skills, knowledge, and attributes to create unique organizational competencies is critical. Creating these features in a dynamic environment is very challenging. Employees must learn on the job and solve problems as they arise because they face unforeseen problems. Hence, adequate understanding and effective management of features are required to get the job done. The company's competencies or soft assets cannot be traded or acquired. Instead, they must be created. Creating the convenient feature provides opportunities for the organization to adapt to emerging markets (Cichocki & Kuleshov, 2020); Therefore, the fundamental challenge is identifying the appropriate feature.

In a traditional environment, work is predefined and requires workers to be trained before completing the work. The work environment has seen drastic changes in the present era. In modern organizations, the characteristics of knowledge workers of companies are a vital source of competitive advantage (Alvesson, 2004); Therefore, it is essential to know what they are. This study is based on human resource management and supports the view that the effective use of characteristics leads to competitive advantage in a dynamic environment (Alvesson, 2004; Leonelli et al., 2022). Identifying, maintaining and employing the characteristics of knowledge workers through talent management are particular values for organizations (Armstrong & Taylor, 2017). This study supports the competency-based HR model, where competencies are emphasized instead of assignments, unlike traditional human resource (HR) models. HR aims to discover the characteristics of knowledge workers and support them in achieving their goals (Sienkiewicz et al., 2014).

The characteristics of knowledge workers are essential and determining factors in the level of their organizational commitment and achieving the best and most influential human resources activities at the beginning of their employment (Shaarbaf Eidgahi et al., 2021). Some believe that the condition of being a scholar depends solely on the academic grade and obtaining a higher GPA (Stiles & Smart, 2021). If this advantage can only be considered an indicator, other significant indicators can be used to select knowledgeable people. Among these indicators, three factors of intelligence, feeling stability and duty are essential and decisive for selecting knowledge workers. Self-esteem, humility, pride, and positive narcissism (adequate self-confidence) are among the characteristics that their identification has an essential impact on the working life of knowledge workers. High self-esteem causes cheerfulness, courage, and risk, which is a positive characteristic of employees. Vigilance is a good indicator for identifying discipline, punctuality and conscientiousness, and it is usually formed during childhood (Asili & Qadirian, 2005).

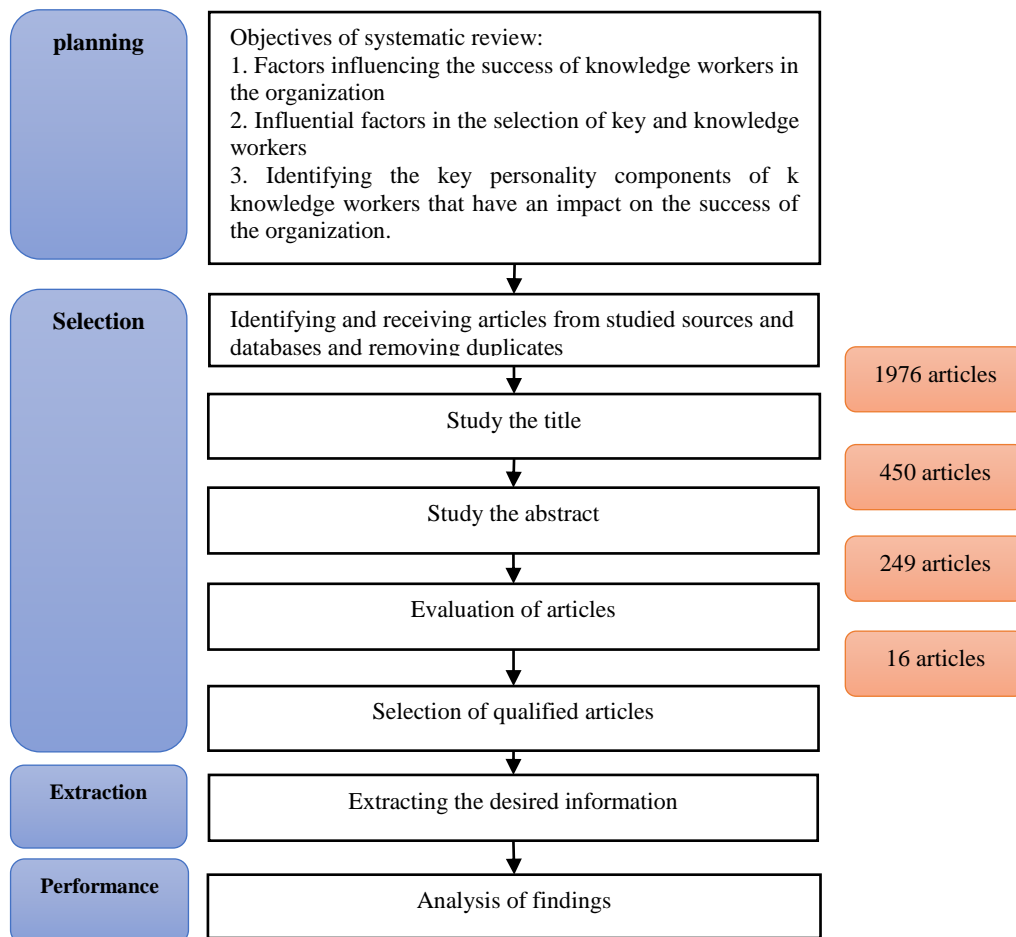
Many books, articles and lectures have discussed the necessary skills for job applicants and measured the required amount of these skills in different jobs,

which shows the issue's importance. Suppose the employees are motivated adequately with experience and knowledge. In that case, the result will be transformation and excellence in the organization, and it will be soon that such an organization steals the lead from other organizations. Therefore, nowadays, the traditional view of knowledge workers has no place, and this belief must be formed at the level of managers that knowledge workers are reliable due to their particular expertise, experiences, reserves and expertise, and the ground must be provided to carry out their activities and present their ideas.

As mentioned, it is essential to identify the characteristics that influence their selection. Many types of research have been conducted in the field of influential factors in increasing the efficiency of Knowledge workers and factors affecting the selection of these workers. However, the extensive review of the literature shows that these studies have not reached a consensus not only in Iran but also in other countries, and no comprehensive study has been conducted in this field; But in the present study, we investigate the factors influencing the selection of Knowledge workers and seek to find answers to these questions: What are the factors influencing the selection of Knowledge workers? How are these factors classified?

### **Methodology**

A systematic review was used for this research in order to carefully examine the existing literature related to the characteristics affecting the selection of Knowledge workers. A systematic review involves using explicit, identifiable, and rigorous research methods (Gough et al., 2017). This research method involves exploring what is known (research question) and unknown about a subject. This research aims to determine how organizations can select the most qualified people by identifying the key characteristics of knowledge workers. In order to determine the path of selection and analysis of articles in a systematic review, first, the objectives and questions of the research must be determined (De Loë et al., 2016). Then, to get answers to the questions raised, the articles are selected according to the goals. After several stages of screening and in-depth study of the final articles, the results are obtained.



**Figure 1. The process of conducting a systematic research review (adapted from Okoli and Shabram's (2017) model and Silva's (2015) selection steps)**

The databases examined and keywords searched in this research are listed in Table 1. In order to identify the prototype, the articles published in the databases of Science Direct, Google Scholar, Normex, the comprehensive portal of humanities, the specialized database of Noor magazines and the scientific information center of academic jihad were selected. The reason for choosing these databases is maximum coverage and achieving more comprehensiveness of articles and obtaining more favorable results (Doloui et al., 2016) and more

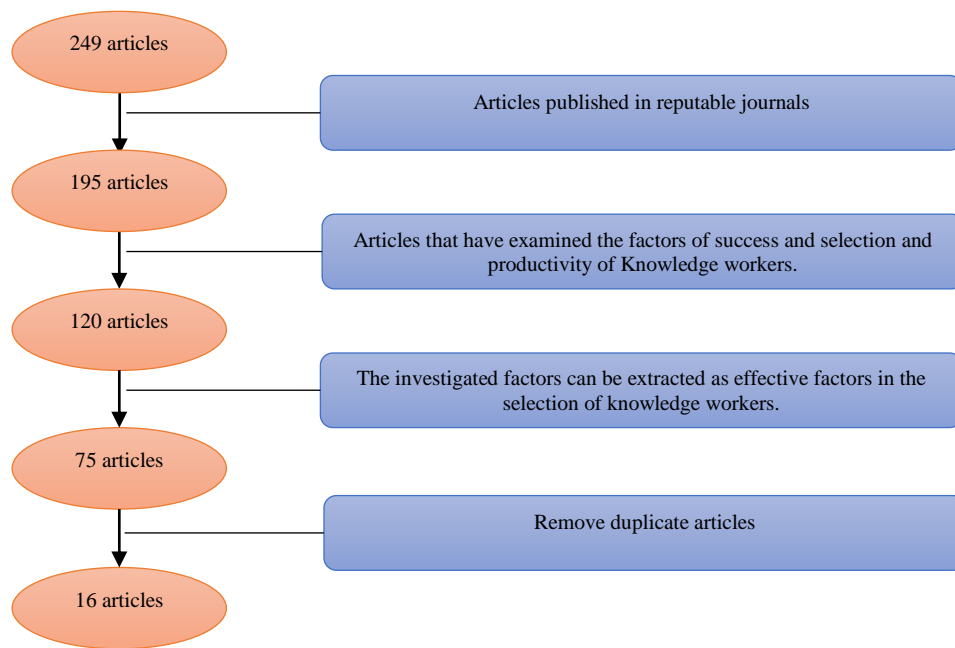
reliable. Therefore, a systematic review was started by searching for articles that used related terms in the title, abstract, or keywords and were published in English and Farsi (date of the last search, 2022/02/04). There is no time limit and all published articles have been reviewed with the mentioned specifications.

**Table 1. Databases and keywords examined in the systematic review of research**

Keywords searched for in research	Databases examined in the research
knowledge workers/ staff/ Employee	science Direct
Knowledge work	Google Scholar
Selection of knowledge workers/ staff/ Employee	Normagz
	Comprehensive humanities portal

In the next step, the results of this search were combined, and duplicates were removed. After repeated cases, the number of articles obtained at this stage was 1976 articles. Then, the titles of study articles and irrelevant items were removed from the database. After screening this stage, 450 articles entered the next stage. In the next step, the abstracts of the remaining articles of the study and the number of 201 articles from the domain were removed from the list of analyzed articles due to a lack of connection with the goals and research questions, and 249 articles entered the next stage. Also, during the screening process, only studies were studied which were practical and in which one or a combination of the success factors of knowledge workers or influential factors in selecting these workers were given, or their main focus was knowledge workers. Therefore, the articles that only theoretically dealt with the subject were also removed. Then, in order to obtain more accurate results, the remaining articles were evaluated. In order to evaluate the quality of the articles, following the systematic review of Quiñones and Rusu (2017), the articles were evaluated in terms of these items: 1) Articles that have been published in reputable journals. 2) Articles that have examined the factors of success, selection, and productivity of knowledge workers in the organization. 3) Articles in which the investigated factors can be considered a component for selecting Knowledge workers.

Then, based on the obtained quality score from the collected articles, high-quality articles were identified regarding the mentioned cases, and eligible cases were selected for in-depth study and analysis. The evaluation steps of the articles and the number of excluded articles are given in the following figure:



**Figure 2. Evaluation of 249 articles**

To evaluate the 249 sources that remained after reviewing the abstract, the sources not published in authoritative journals were removed. At this stage, 54 articles were removed, and 195 articles remained. The remaining articles, their introduction and conclusion were examined. Only articles were selected that investigated the factors of success and increasing the productivity of Knowledge workers or factors affecting the selection of Knowledge workers. For example, one of the articles titled "Environmental effects on knowledge and decision-making of knowledge workers", written by Moskaliuk and his colleagues (2016) although was published in a reputable journal because it only examined the physical and managerial factors of decision-making employees and did not examine the characteristics of these employees and factors of success or increasing their productivity, it was removed. Another example of this study was "Knowledge Workers: the last bastion of competitive advantage" by Harrigan Dalmia (1991). This article only examined the existence of knowledge workers in the organization and their competitive advantages for the organization. There was no mention of productivity factors and factors that are considered in selecting these employees.

In the next step, from 120 sources, articles were selected in which the investigated factors can be considered as a factor for selecting employees. These factors included factors that increase productivity and success or are considered a competitive advantage for the organization; however, only the articles with measurable and influential factors in the selection of Knowledge workers were included in the final review. For example, an article entitled "Analysis and Increasing the Performance of female knowledge workers: the case study of Pars Khodro Company" was published by Najafi and Abbas Afrazeh (2009). This research only examined the factors of the organization's environment that caused the employees' productivity and did not deal with the individual and behavioural factors of the employees.

Another example was an article titled "Presenting a Model to Evaluate the Performance of Knowledge Workers" by Alidadi and his colleagues (2013). This article only examined the practical factors for active and employed employees in the organization and did not address the factors influencing the selection of employees entering the organization. Then 75 articles on factors affecting success, productivity, or competitive advantage were extracted from them, and these factors were repeated in about 59 sources. Finally, 16 articles from the mentioned sieves were analyzed with systematic review techniques.

### **findings**

The most crucial goal of meta-analysis selection in the current research was to know the "practical factors in the selection of Knowledge workers "; However, other goals, such as factors influencing the success of Knowledge workers in the organization, knowledge of concepts and theoretical frameworks, methodology and research implementation process, statistical population, results and suggestions presented in connection with the present research are carefully analyzed, and the analysis is done. Accordingly, according to the monitoring and selection of 16 reliable domestic research sources, the etymology of the selected research is categorized and presented in Table 4.

**Table 2. Etymology of selected researches**

<b>Type of source</b>	<b>Frequency</b>	<b>Percent</b>
The scientific research paper	13	81/25
Ph.D. Thesis	1	6/25
Master's thesis	1	6/25
Book (with an authorial approach)	1	6/25
<b>Total</b>	<b>16</b>	<b>100</b>

Next, in order to better examine the selected sources, each of the introduced sources has been systematically reviewed and evaluated based on 10 indicators.



**Table 3. Systematic review of source one**

<b>Source title</b>	Job flexibility, job security and job satisfaction of academic staff in Poland
<b>Source type and publication location</b>	PhD Thesis/University of Oberta de Catalunya
<b>Researcher(s)</b>	Wilczynska, A. Batorski, D. & Sellens, J. T
<b>Research publication time</b>	2014
<b>Main theory(s)</b>	Job security determines job satisfaction - more satisfaction of knowledge workers - job satisfaction of knowledge workers is less influenced by job security
<b>Research Methodology</b>	Qualitative
<b>Statistical Society</b>	Polish Knowledge workers
<b>Sampling</b>	Two-step stratified sampling
<b>Sample size</b>	8642 people
<b>Important findings</b>	Knowledge workers with a temporary contract are more satisfied than other workers with similar working conditions; in the case of knowledge workers, a temporary contract is associated with the possibility of favorable mobility and smooth changes between jobs.

**Table 4. Systematic review of source two**

<b>Source title</b>	Investigating the relationship between effective feedback and participation (belonging) of the studied Knowledge workers: Mapna Group
<b>Source type and publication location</b>	Master thesis/ Allameh Tabatabai University
<b>Researcher(s)</b>	Afsarian
<b>Research publication time</b>	1394
<b>Main theory(s)</b>	Effective feedback and sense of participation, cooperative behavior
<b>Research Methodology</b>	Quantitative
<b>Statistical Society</b>	Experts at Mapna Headquarters
<b>Sampling</b>	Simple random sampling
<b>Sample size</b>	234 people
<b>Important findings</b>	There is a direct correlation between effective feedback and participation (belonging) on two levels of sense of belonging (satisfaction, cooperation, commitment, empowerment) and belonging behavior (organizational citizenship behavior, personal initiative, career development, adaptability).

**Table 5. Systematic review of source three**

<b>Source title</b>	Designing the competence model of Knowledge workers in the Oil Industry Research Institute
<b>Source type and publication location</b>	Article/ Journal of human management in the oil industry
<b>Researcher(s)</b>	Babashahi, Yazdani, Tahmasabi, Rajabpour Babashahi, Yazdani, Tahmasabi, Rajabpour
<b>Research publication time</b>	1396
<b>Main theory(s)</b>	Extracting the competencies required for each category of Knowledge workers
<b>Research Methodology</b>	Qualitative
<b>Statistical Society</b>	Different groups of oil industry research institute
<b>Sampling</b>	Purposive and snowball sampling
<b>Sample size</b>	18 people
<b>Important findings</b>	Competencies of Knowledge workers of the research category: personal characteristics: pragmatism, risk-taking, obedient and adaptable - skills: analytical ability, social intelligence, project management - knowledge: specialized knowledge, familiarity with the rules and regulations of the institution, competencies of Knowledge workers of the faculty researcher category: individual characteristics: trustworthiness, self-management, ethics-skills: strategic thinking, counseling and guidance, problem clarification- knowledge: specialized and general knowledge, research methods, entrepreneurship, competencies of knowledge workers Management category: individual characteristics: self-management, ambiguity tolerance, ethics - Skill: political intelligence, organization resource management, strategic guidance, business intelligence, decision making, customer orientation - Knowledge: managerial knowledge, project management principles, basic competencies of three categories: continuous learning, networking, communication, creativity and innovation, time management, teamwork, knowledge management;

**Table 6. Systematic review of source four**

<b>Source title</b>	The effect of policies related to working environment conditions on Knowledge workers productivity (case study: Birjand State University)
<b>Source type and publication location</b>	Article/journal of public policy in management
<b>Researcher(s)</b>	Rajai and Banai
<b>Research publication time</b>	2017
<b>Main theory(s)</b>	Working conditions and working methods (work actions, especially self-management behavior) are effective on the productivity of knowledge workers.
<b>Research</b>	quantitative

<b>Methodology</b>	
<b>Statistical Society</b>	Official faculty members of Birjand University in the academic year 2016-13
<b>Sampling</b>	random sampling
<b>Sample size</b>	140 faculty members
<b>Important findings</b>	<p>Knowledge requirements of the job: applying creativity and innovation, problem-solving and decision-making skills, teamwork skills, perceptual and cognitive skills, continuous learning, knowledge intensity: intellectual effort, result-oriented, complexity, independence, a lot of knowledge, not structured, not concrete, Being unusual and non-repetitive.</p> <p>Physical conditions of the workplace, social conditions of the workplace, self-management, self-control, self-organization have a positive effect on productivity (the ability to understand and recognize the job or role clarity, organizational support, motivation, feedback, credit, adaptability).</p>

**Table 7. Systematic review of source five**

<b>Source title</b>	The relationship between soft skills, hard skills and innovation of knowledge workers in the era of knowledge economy
<b>Source type and publication location</b>	10th Triple Helix Conference 2012
<b>Researcher(s)</b>	Achmad Fajar Hendarmana, Jann Hidajat Tjakraatmadjab
<b>Research publication time</b>	2012
<b>Main theory(s)</b>	The relationship between soft skills, hard skills and innovation of knowledge workers
<b>Research Methodology</b>	quantitative
<b>Statistical Society</b>	Knowledgeable workers of House Ware Porcelain Indonesia
<b>Sampling</b>	stratified random sampling method
<b>Sample size</b>	32 people
<b>Important findings</b>	<p>Information seeking in soft skill positively affects technical innovation and hard skills positively affect non-technical innovation.</p> <p>Hard skills: managerial knowledge, ICT literacy, soft skills: self-efficacy, information search, strategic thinking</p>

**Table 8. Systematic review of the source six**

<b>Source title</b>	Indexing knowledge sharing behavior of knowledge workers through knowledge internalization
<b>Source type and publication location</b>	Article/Journal of Knowledge Management Research & Practice
<b>Researcher(s)</b>	Kamphol Wipawayangkool & James T. C. Teng
<b>Research publication time</b>	2019
<b>Main theory(s)</b>	Knowledgeable workers have higher self-efficacy and knowledge sharing intention than low knowledge workers, knowledge workers prefer personalization for coding more than low knowledge workers.
<b>Research Methodology</b>	quantitative

<b>Statistical Society</b>	MBA students who had jobs
<b>Sampling</b>	Available sampling
<b>Sample size</b>	295 people
<b>Important findings</b>	Knowledge self-efficacy and the power of expertise are more in experts, lower in trainees and lowest in beginners. Professionals and trainees are more likely to share their knowledge than novices. Professionals and trainees prefer the personalization strategy. Trainees are more satisfied with coding than professionals. Newbies are less inclined to code.

**Table 9. Systematic review of source seven**

<b>Source title</b>	Creativity of Knowledge workers and role of physical work environment
<b>Source type and publication location</b>	Article/ Journal of Social Indicators Research
<b>Researcher(s)</b>	Dul, J. Ceylan, C. & Jaspers, F.
<b>Research publication time</b>	2011
<b>Main theory(s)</b>	Creative personality, social-organizational work environment and physical work environment are related to creative performance
<b>Research Methodology</b>	quantitative
<b>Statistical Society</b>	27 SME companies
<b>Sampling</b>	Simple random sampling
<b>Sample size</b>	274 people
<b>Important findings</b>	The relative share of the physical work environment is less than the socio-organizational work environment, and both have a lower share of a creative personality. These results support human resource practices that focus on the individual, in the socio-organizational work environment, and the physical work environment to increase knowledge worker creativity. The effect of creative personality on creative performance depends on the perceived support of the social-organizational work environment and the physical work environment. A highly creative personality benefits more than a low creative personality from a higher level of support from the work environment. The effect of perceived support from the social-organizational work environment on creative performance depends on the perceived support from the physical work environment, so support from the physical work environment and support from the social-organizational work environment have a more significant effect on creativity.

**Table 10. Systematic review of source eight**

<b>Source title</b>	Creating more creativity in knowledge work
<b>Source type and publication location</b>	Article/Research-Technology Management magazine
<b>Researcher(s)</b>	Henard, D. H. & McFadyen, M. A.
<b>Research publication</b>	2008

<b>time</b>	
<b>Main theory(s)</b>	Competitive results of Knowledge workers at three academic levels
<b>Research Methodology</b>	Review study
<b>Important findings</b>	Levels of knowledge: 1. Acquired knowledge (knowledge can be acquired in a variety of ways, including past experiences, consultation with colleagues, interaction with outsiders, formal training, and active study), 2. Unique knowledge (such knowledge relies on and relies on prior knowledge is, it is a more complex individual ability that requires higher cognitive processing), 3. Creative knowledge (the peak of a person's knowledge ability, from this level of ability, creativity and innovation often flow)

**Table 11. Systematic review of source nine**

<b>Source title</b>	Exploring the relationship between learning organizations and knowledge worker retention
<b>Source type and publication location</b>	Article/The learning organization magazine
<b>Researcher(s)</b>	Lee-Kelley, L. Blackman, D. A. & Hurst, J. P.
<b>Research publication time</b>	2007
<b>Main theory(s)</b>	Learning organizations and employee retention
<b>Research Methodology</b>	Qualitative
<b>Statistical Society</b>	UK Knowledge workers
<b>Sampling</b>	available sampling
<b>Sample size</b>	148 employees
<b>Important findings</b>	Three primary strategies should be implemented by HR managers in order to reduce potential employee turnover. The first identified strategies include connecting shared vision, challenge, and systems thinking through personal communication with each other. Second, the more critical mental models are created and shared in the organization; And finally, the development of team learning systems throughout the organization.

**Table 12. Systematic review of sources ten**

<b>Source title</b>	Investigating the relationship between personality factors and the silence of Knowledge workers
<b>Source type and publication location</b>	Article/Journal of Public Management Research
<b>Researcher(s)</b>	Afkhami Ardakani, Khalili Sadrabadi
<b>Research publication time</b>	2013
<b>Main theory(s)</b>	Personality factors and silence of Knowledge workers
<b>Research Methodology</b>	quantitative
<b>Statistical Society</b>	Knowledge workers of Oil Industry Research Institute
<b>Sampling</b>	Simple and stratified random method

<b>Sample size</b>	191 employees
<b>Important findings</b>	Extroversion has a negative relationship with employees' silence (extroversion facilitates the development of social networks). Adaptability has a positive relationship with employees' silence. Openness has a negative relationship with employees' silence (people with a high score in this personality component are imaginative and flexible thinking people who have a high capacity for ambiguity and gaining experience).

**Table 13. Systematic review of sources eleven**

<b>Source title</b>	Identifying and prioritizing motivational factors affecting knowledge sharing among knowledge workers with the fuzzy multi-criteria decision-making approach (F-MCDM)
<b>Source type and publication location</b>	Article/ Journal of Development and Transformation Management
<b>Researcher(s)</b>	Modiri, Shakibai sabet, Rangriz
<b>Research publication time</b>	2013
<b>Main theory(s)</b>	Identifying the motivational factors affecting the knowledge sharing of Knowledge workers
<b>Research Methodology</b>	quantitative- Qualitative
<b>Statistical Society</b>	Experts in the field of knowledge workers
<b>Sampling</b>	available sampling
<b>Sample size</b>	6 people
<b>Important findings</b>	Motivational factors affecting knowledge sharing Internal factors: 1-behavior: perceived behavior control level, individual attitude level, internal norms, 2-trust: trust based on benevolence, trust based on competence, trust in management, 3-learning: mutual ignorance of the value of knowledge, time for Knowledge activities, informal interactions of employees, formal interactions of employees, personal and communication skills External factors: 1- Information technology: usage rate, access rate, ease of use, 2- Reward: getting the opportunity to develop personality, gain fame and reputation, job privileges, cash reward, 3- Organizational culture: supportive culture, bureaucratic culture, innovative culture

**Table 14. Systematic review of source twelve**

<b>Source title</b>	Knowledge sharing and psychological contract: managing knowledge workers in different stages of employment
<b>Source type and publication location</b>	Article/ Journal of Managerial Psychology
<b>Researcher(s)</b>	O'Neill, B. S. & Adya, M.
<b>Research publication time</b>	2007
<b>Main theory(s)</b>	<b>How managers and organizations can be a medium to manage the perception of psychological contracts for the benefit of knowledge sharing among current employees, newcomers and job applicants.</b>
<b>Research Methodology</b>	qualitative (review study)

<b>Important findings</b>	Knowledge sharing is very important for knowledge workers. It is mandatory for managers to provide the following things to motivate employees: Ensure consistent application of transparent performance metrics to all employees. Create an appropriate communication strategy. Provide opportunities to train employees and model knowledge sharing behaviors. Encourage and solicit knowledge sharing behaviors. Demonstrate clear and consistent expectations and incentives for knowledge sharing. Create a rapport with technology. Create and promote mentoring programs. Build organizational commitment.
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**Table 15. Systematic review of source thirteen**

<b>Source title</b>	Identifying and prioritizing criteria affecting the career path of Knowledge workers using fuzzy network analysis model
<b>Source type and publication location</b>	Article/Journal of Management of Government Organizations
<b>Researcher(s)</b>	Rajaibpur
<b>Research publication time</b>	2019
<b>Main theory(s)</b>	Prioritizing factors affecting the career path of Knowledge workers
<b>Research Methodology</b>	quantitative
<b>Statistical Society</b>	Knowledge workers of Oil Industry Research Institute
<b>Sampling</b>	Purposeful judgmental sampling
<b>Sample size</b>	14 people
<b>Important findings</b>	Factors that influence the promotion of Knowledge workers, in order of influence: 1. Specific competences: knowledge, skills and abilities that a person, having these criteria, perform beyond and above the standard (by evaluation and development centers). 2. Performance evaluation 3. Advantageous features: system of proposals, knowledge sharing criteria, knowledge management, exemplary researcher, training to colleagues, work discipline, certificates of appreciation 4. Training courses: valid scientific degrees with career path work, Training courses completed inside and outside the organization, 5. Work experience 6. Education

**Table 16. Systematic review of source fourteen**

<b>Source title</b>	Antecedents of innovative behavior of knowledge workers active in pharmaceutical industries of Mashhad
<b>Source type and publication location</b>	Article / Journal of Strategic Management of Organizational Knowledge
<b>Researcher(s)</b>	Nikkhah Farkhani & Daneshvari
<b>Research publication time</b>	2019
<b>Main theory(s)</b>	The effect of knowledge sourcing, self-efficacy and on innovative behavior
<b>Research Methodology</b>	quantitative
<b>Statistical Society</b>	Active knowledge workers in research and development units of Mashhad pharmaceutical industries

<b>Sampling</b>	Random sampling available
<b>Sample size</b>	148 people
<b>Important findings</b>	Knowledge sourcing has a positive and significant effect on innovative behavior. Self-efficacy has a positive and significant effect on the innovative behavior of Knowledge workers. The perception of information transparency has a positive and significant effect on the self-efficacy of Knowledge workers. The strengthening of knowledge workers can have an increasing effect on the behavior of employees, and managers can ensure the increase of self-efficacy and, of course, the increase of innovative behaviors of knowledge workers, and lay the groundwork for improving their productivity and individual and organizational performance.

**Table 17. Systematic review of source fifteen**

<b>Source title</b>	Exploring the predictive factors of work alienation of knowledge workers
<b>Source type and publication location</b>	Article/ Journal of Management Decision
<b>Researcher(s)</b>	Nisha Nair & Neharika Vohra
<b>Research publication time</b>	2010
<b>Main theory(s)</b>	Factors predicting alienation
<b>Research Methodology</b>	quantitative
<b>Statistical Society</b>	Knowledge workers in the field of information technology in India
<b>Sampling</b>	available sampling
<b>Sample size</b>	1142 people
<b>Important findings</b>	Factors predicting work alienation: 1- structure: concentration, formalization, 2- nature of work/work: autonomy, diverse challenge and creativity, meaningfulness, self-expression, 3- work relationships, 4- perceived justice: procedural justice, distributive justice. The lack of meaningful work, the inability of work to express itself, and low-quality work relationships were found to be the strongest predictors of work alienation for scientists. In a work environment where the structures are rigid and prevent the individual from being flexible in delivering work, this itself can be a reason for disconnection.

**Table 18. Systematic review of source sixteen**

<b>Source title</b>	Building and shaping knowledge workers in the information economy
<b>Source type and publication location</b>	Book
<b>Researcher(s)</b>	Keith Sherringham & Bhuvan Unhelkar
<b>Research publication time</b>	2020
<b>Important findings</b>	Adaptability, responsiveness and flexibility to respond to rapid technological changes. The resilience of knowledge workers to respond to rapid events. We are managing risk for a business at risk and achieving



the required results and benefits.

Strengthen and develop professional skills: tolerance of ambiguity (being able to accept ambiguity and work in an environment with ambiguity), change management (these changes in people, processes, groups, business areas, jobs, integrated vertical industry sector and cross-industry sector (It is about knowing how to work with change.)) Collaboration: Knowledge worker operations are increasingly connected to multiple stakeholders working across the organization. Problem-solving requires collaboration. This cooperation also involves sharing the necessary information but not overloading the parties so that dependencies can be managed. Communication: The ability to communicate ideas with diverse stakeholders and communicate effectively is the core of knowledge workers' activities. Financial management: Budgeting, balance sheet reading and profit and loss management are essential. Writing business cases and analyses is also required. Governance: At least the implementation approach is appropriate to the need, and the governance is appropriate to the goal. People management: It is people who make everything happen. People enable automation, intervene in cases of problems and work where automation is not used. Problem-solving: related to ambiguity management. The automation of knowledge worker's services and the management of these cases, and the use of cloud-based services require extensive problem-solving. Project management: The ability to manage change and perform continuously is part of the Knowledge workers' services, which requires project management expertise embedded in the business. Risk Management: Transforming and automating knowledge workers is a risk-based approach to business. Risk management is a core skill. Strategy and planning: Knowing how to achieve specific goals (strategy) and adapting actions to them (planning) is more important in the economy of automated knowledge workers.

## Discussion

Suppose employees with experience and knowledge are selected correctly. In that case, the result will be transformation and excellence in the organization, and it will be soon that such an organization steals the lead from other organizations. Therefore, today, the traditional view of knowledge workers has no place. This belief must be formed at the level of managers that knowledge workers are reliable due to their particular expertise and experiences, and reserves and expertise. The ground must be provided to carry out their activities and present their ideas. The existence of knowledge workers has valuable results for an organization. Therefore, the proper selection of these employees is critical. Several factors surrounding the selection of Knowledge workers are given in the studied sources, and we briefly discuss the critical factors.

The number one priority of many companies is to attract intelligent employees at any cost (Barrick & Parks, 2019). There are many definitions of intelligence. For example, intelligence can be considered any repeatable pattern of thinking, feeling and human behavior that can be used productively. If you are instinctively

curious, that is smart. If you are competitive, this is another smart thing. According to this broad definition, even negative traits used in a productive context are intelligence. It is wise to stay in the trench and behind your gun in front of the enemy with a hard head and stare (Buckingham, Clifton, 2010).

Also, some facts about intelligence are so evident that there is no severe technical debate about them, and everyone accepts them. For example: (1) the degree of IQ of a person is in perfect proportion to what people call intelligence or cleverness in standard language. (2) The degree of IQ of a person remains constant throughout most of his life (although with slight changes). (3) Completely accurate and laboratory tests, IQ does not show a specific tendency towards social, economic, ethnic and racial groups. (4) Smarter employees are, on average, more competent and knowledgeable than other employees (Robbins, 2020).

Having interpersonal skills is very important in many jobs. So that in some jobs, if these skills are not used, the employees will not be able to perform their duties properly. Maxwell describes communication skills in his book on employee training (Maxwell, 2012): giving sincere importance to the audience; ability to focus on the respondent; Ability to communicate with all kinds of people; making eye contact with the audience; A warm smile.

Knowing the job in demand is very obvious. To the extent that other skills cannot compensate for and overlap with the shortcomings in this field. So that it can be said: fundamental awareness does not guarantee the achievement of excellence, but without them, excellence cannot be achieved either; Therefore, no matter how smart and skillful you are, if you do not know that brown is made from the combination of red and green colors, you will not become a painter (Clifton, Buckingham. 2009).

Many thinkers in the field of management think it is wrong to rely solely on having job backgrounds, although they consider it very useful to learn more about the applicant's skills. For example, Robbins expresses this concept in this way: if each job applicant can prepare three personal records containing statements about ambition, stability, conscientiousness, ability to work with others, etc., such records can contribute to the selection process of efficient and high-performing applicants. The answer is none (Robbins, 2020).

In many job positions, having leadership power is very helpful for IT employees, especially in managerial positions. Considering that activities related to information technology are primarily done as team activities, paying attention to this skill when selecting applicants is necessary. A leader, in the word, often refers to a person who has insight and can also convey his insight to others to encourage them to act. This type of leadership is necessary for projects and team activities (Issahaka & Lines, 2020).

The importance of employees having decision-making skills is not hidden from anyone. Although at higher organizational levels, this skill is one of the

necessities of holding jobs in many organizational structures, considering the transformation in the structure and the flattening of the structure of organizations, especially in industries with superior technologies such as information technology, by granting more powers to employees and reducing concentration in decision-making, having a certain level of this skill is necessary for all employees. This concept is expressed by Harris, quoting Earley and Erez as follows: In a horizontal organizational culture, individual decision-making is prevalent, and leaders delegate this power to their employees. While in a vertical organizational culture, decisions are made centrally and top-down (Harris, 2008). In addition, depending on the organizational levels, management skills are needed according to those levels.

In many jobs related to information technology, excellence and mastery of foreign languages are required by the organization at various levels. This necessity can be seen, among other things, in jobs that need to communicate with suppliers or foreign customers or jobs that have a research-oriented nature and require knowledge of modern science at the international level.

In order to increase flexibility in employing employees, organizations need competent employees who can work in various jobs and positions (Anser et al., 2020). Similarly, Robbin's three characteristics include fewer employees and their multi-skills. Furthermore, it mentions the matching of employees and their job position for a high-performance team (Robbins, 2020).

Working as a team is essential in projects that are done as a group. According to Maxwell, it is game over for someone who tries to do anything alone. To do something truly great, you must unite with others. The number "one" is too small to be very successful in front of "(Maxwell, 2012). Possessing the characteristic analytical thinking ability is also one of the characteristics in some jobs, especially in jobs related to information technology. It is considered a positive feature and even necessary in many cases.

By examining the results of the sources, finally, the primary criteria for selecting knowledge workers were extracted in the form of three groups of knowledge, ability and skills.

**Table 19. Primary criteria identified (Knowledge)**

<b>Knowledge</b>	<b>Description of Knowledge</b>
<b>Supervision and management</b>	Management knowledge in business, strategic management, resource allocation, human resource modeling, leadership, human resource coordination
<b>Economics and accounting</b>	Knowledge of economics. Accounting issues, financial markets, banking and the ability to analyze financial reports
<b>Education and training</b>	Evaluating the effectiveness of training
<b>Education and training</b>	Knowledge of English language skills including translation, grammar, conversation and reading comprehension

**Table 20. Primary identified criteria (Skills)**

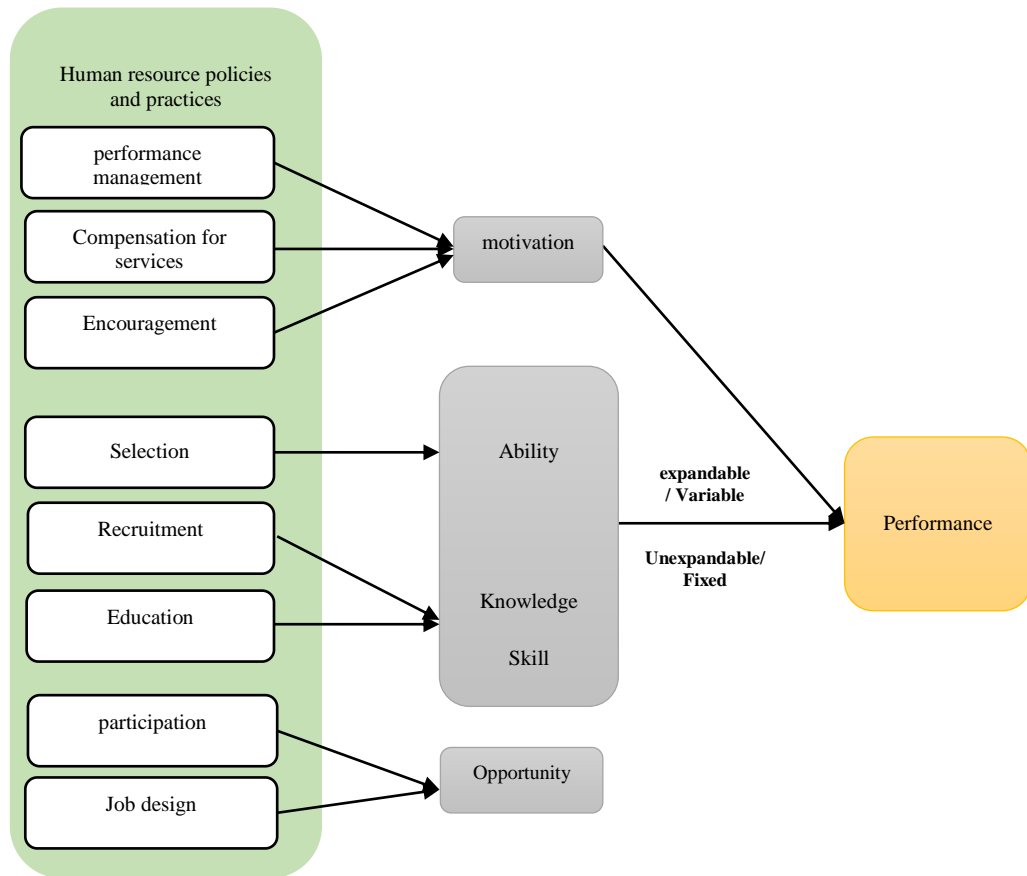
<b>Skills</b>	<b>Description of Skills</b>
<b>Active in learning</b>	Proper understanding of new and new information in order to solve current and future issues and make decisions
<b>good listener</b>	Paying attention to everything others say and asking the right questions in the right place and not interrupting others
<b>Solving complex problems</b>	Understanding difficult issues and applying relevant information and options to provide appropriate solutions
<b>coordination</b>	Identifying and matching issues related to each other
<b>Mindset</b>	Using logic and reasoning to identify the strengths and weaknesses of various solutions
<b>Education</b>	Teaching others how to do things
<b>Judgment and decision making</b>	Paying attention to the cost and benefits of decision-making in order to choose the best solution
<b>Teaching/learning strategy</b>	Using appropriate procedures when dealing with new things, whether in learning or teaching
<b>Calculations</b>	Use mathematical knowledge to solve problems
<b>Supervision</b>	Monitoring the performance of oneself or others in order to identify the problem points and try to solve it
<b>Ability to negotiate</b>	Efforts to create harmony between group members
<b>Persuasion</b>	Convincing others to change their thoughts and opinions
<b>Analysis and quality control</b>	Testing and inspecting products, services or processes that need to measure their efficiency or quality
<b>Comprehension</b>	Understanding work-related content and writings
<b>Scientific method</b>	Using scientific methods to solve problems
<b>Helping others</b>	Be active in helping others
<b>talking</b>	Speaking for others in such a way that information is effectively communicated with them
<b>Design technology</b>	Production or use of tools and technology in order to meet needs
<b>Time Management</b>	Managing your time and that of others
<b>Diagnosis</b>	Identifying problems related to work and making decisions about how to deal with it
<b>Write</b>	The ability to convey content to the reader in the most appropriate way possible

**Table 21. Identified primary criteria (Ability)**

<b>Ability</b>	<b>Description of Ability</b>
<b>intelligence</b>	The ability of a person to adapt to the environment and the value of predicting conditions to recognize opportunities and threats
<b>Self-esteem</b>	It is a self-evaluation that reflects one's belief in one's abilities, possessions, success, and worth; Therefore, self-esteem is a personal judgment about one's worth.
<b>knowledge management</b>	It refers to measures that are systematically used to find, organize and make available the intellectual capital of the organization and to strengthen the culture of continuous learning and knowledge sharing in the organization.
<b>independence</b>	The need for independence can be defined in terms such as having control over one's destiny, doing something for oneself, and being one's own master.

<b>Creativity</b>	A new, suitable, correct and accessible answer, exploratory and innovative, in order to solve the organization's issues and problems.
<b>spontaneity</b>	Organizational spontaneity includes additional activities such as caring for colleagues, protecting the organization, making constructive suggestions, developing oneself, and extending goodwill.
<b>seek success</b>	The need for achievement is based on the expectation of doing something better or faster than anyone else or doing it better than before. Being challenging, accepting personal responsibility for results and consequences, and innovation are the characteristics of people who have a high need to achieve success.
<b>Ability to communicate</b>	A process during which people share their information, thoughts and feelings through the exchange of verbal and non-verbal messages.
<b>Information processing speed</b>	The speed of information processing is considered a determining factor for the development of cognitive abilities.
<b>Auditory attention</b>	The ability to focus on the sound source and distinguish a specific sound from among other sounds
<b>Deductive reasoning</b>	The ability to generalize general rules to a specific problem to reach the appropriate answer
<b>Memory</b>	Remembering information such as words, numbers, pictures and procedures
<b>Inductive reasoning</b>	The ability to combine components to form a general rule
<b>Speed of understanding</b>	The ability to quickly and accurately identify the differences or similarities of different subjects at the same time or at different times.
<b>Sensitivity in identifying shapes</b>	The ability to report a bug in a particular issue is not important, just recognizing that there is a bug, solving it, and making a decision about it.
<b>Spatial visualization</b>	Identifying how an image will appear after rotation.

Considering that the use of forms and models is a good way to depict conceptual relationships (Whetten, 1989), the position of key characteristics and components of knowledge workers in the human resource management system obtained from reviewing the theoretical foundations is shown in Figure 3. given.



**Figure No. 3. Relationship of human resource systems with performance**

As seen in the figure above, the key characteristics of knowledge workers are divided into two components. Some characteristics are non-expandable and fixed, while others are expandable and variable. In the recruitment and training subsystem, non-developable features are considered because, in these subsystems, it is impossible to develop features by spending reasonable time and money. However, expandable features are considered in the selection because these characteristics create a competitive advantage for organizations that choose people with the highest level of these characteristics from among the available options.

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## بررسی عمیق عوامل مؤثر بر انتخاب کارکنان دانشی: یک مرور نظام‌مند جامع بر ادبیات پژوهشی

### چکیده:

انتخاب کارکنان دانشی در سازمان یکی از وظایف اصلی مدیریت منابع انسانی در عصر جدید است و نبود معیارها و لیست منسجم عوامل مؤثر بر انتخاب این کارکنان به‌عنوان یک مسئله چالش‌برانگیز در این حوزه مطرح شده است. مقاله حاضر به بررسی این عوامل مؤثر بر انتخاب کارکنان دانشی با استفاده از مرور نظام‌مند می‌پردازد. فرآیند انجام مرور نظام‌مند پژوهش برگرفته از مدل اوکولی و شبریم (۲۰۱۷) و مراحل انتخاب سیلوا (۲۰۱۵) است. بر این اساس، تعداد ۱۹۷۶ مقاله منتشر شده بدون محدودیت زمانی از پایگاه‌های داده ساینس دایرکت، گوگل اسکالر، نورمگز، پورتال جامع علوم انسانی، پایگاه تخصصی مجلات نور و مرکز اطلاعات علمی جهاد دانشگاهی بررسی و تحلیل شدند. در مرحله نهایی، عوامل مؤثر از ۱۶ مقاله استخراج شدند. یافته‌های پژوهش در قالب سه دسته دانش، مهارت و توانایی ارائه شد و در نهایت ویژگی‌های کلیدی کارکنان دانشی به دو بخش تقسیم شدند: برخی ویژگی‌ها توسعه نیافتنی و ثابت هستند و برخی دیگر توسعه یافتنی و متغیر.