



SUMMARY REPORT

Human Resources Research In Technological Innovation Ecosystem



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Preamble

Technology Development Foundation of Turkey (TTGV) was established in 1991 in cooperation with public and private sectors with a view to improving the international competitive capacity of the private sector and promoting the technology and innovation activities in Turkey. Through its activities, TTGV aims to ensure that the diversity in the ecosystem is well comprehended, bring together different players and specialties to think in common and enrich the ecosystem by means of common interests, identify the common problems as well as the real needs that will make a high effect and seek solutions to these problems. For further information on TTGV activities and publications, you can get an insight at www.ttgvl.org.tr



TTGV organizes Strategic Focus Commissions in order to identify the common problems of stakeholders in the technological innovation ecosystem and to seek solutions together. With the Commissions, it is intended to assess the analytical data about the issues that will have a long-term impact on the technology development and production capacity of the private sector regarding the international competitiveness and to introduce the results to the ecosystem and to develop concrete strategy proposals.

“Human Resources” Strategic Focus Commission (STOK-HR) has been established within TTGV in an attempt to take the highly qualified human resources from the perspective of our country’s technological innovation ecosystem. STOK-HR aims to introduce the opinions and behaviours of the industry / real sectors in our country about highly qualified human resources that play a dominant role in technological innovation, into our country’s technological innovation ecosystem and to encourage collective discussions.

Commission works commenced back in June 2019 to explore the approaches of our technological innovation ecosystem about highly qualified human resources. The Commission, which aims to understand the current situation, existing problems and the future of the real sectors of our country within the scope of highly qualified human resources, took the first step and conducted the study with the aim of identifying the challenges in bringing the highly qualified human resources into the workforce, the problems on the part of supply and demand, along with the opinions of authorities, intermediaries and experts. This summary report is a nutshell of the main report in which the study findings are presented in detail.

We would like to extend our sincere thanks to all participants who spared their valuable time for us in making this reports happen, shared their ideas wholeheartedly, which are important in the formation of future view of our ecosystem and in the creation of local knowledge. As the Human Resources Strategic Focus Commission, we hope that the findings of this study will be useful to all our stakeholders.



COVID-19 Note:

The interviews we have conducted to collect data within the scope of the research study were completed in February 2020, just before the outbreak of COVID-19 pandemic and lockdown period in our country. It will be appropriate to separately discuss the trends that may be permanent following the global epidemic which is not over completely and cannot be predicted when it will end, during which the remote and flexible working mode has been heavily tested and experimented, not only by affecting the way we do business, but also changing the manner of our employment and lifestyle.

You can reach us at stok@ttgv.org.tr for any questions, comments and suggestions regarding our research.

Introduction

Human capital is the primary variable with direct effect on development and innovative activities. The existence of educated and skilled humanpower is an important stimulus in the development of countries. Qualified and entrepreneurial humanpower is required for innovation-based economic development. The increase in the welfare of the society will be achieved through economic development and is directly associated with the improvement of technology and innovation. Therefore, it is necessary to increase the qualified human resources in quantity. Talents play an important role not only in increasing the productivity of companies, but also in achieving their strategic goals in the globalized world and pioneering the rapidly changing technological developments.

From this point of view, it is obvious that, thanks to the added value created by highly qualified human resources, the capacity will increase in the fields of Research and Development (R&D), technology and innovation and our real sector will achieve success in sustainable competitiveness owing to the increase in the innovation capacity and as a result of which, the level of sustainable development and welfare will enhance across the entire ecosystem. In the light of these predictions, the STOK-HR study has been initiated with the proposition also given in Figure-1.

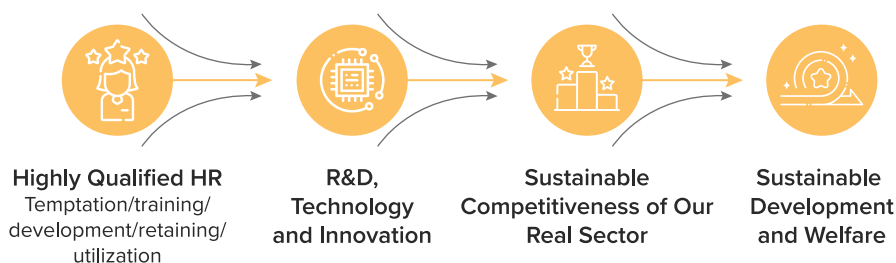


Figure 1: The Proposition on Which The Research is Based

Seven main topics were addressed under the research, as follows:

1. Fundamental Changes Likely to Affect The Workforce / Thought to Occur
2. Our Industry's (Real Sector) Strategic Management and HR Strategy Relations
3. Our Industry Needs for Human Resources
4. Human Resources Skills, Competencies and Attributes Needed in Our Industry
5. Difficulties Encountered by Our Industry in Highly Qualified Human Resources
6. HR Development / Training Activities of Our Industry
7. Higher Education in The Supply of Highly Qualified HR

In each chapter, the findings derived from the subject matter of the research and the results that can be generalized are shared as the summary of the main and comprehensive report.

Methodology and Data Collection Method

In this exploratory study designed as the first step of a possible set of research, the mixed research method was preferred by using both qualitative and quantitative methods. The interviews were conducted in the last quarter of 2019 and in the first quarter of 2020.

Participants

Only limited number of geographical regions was for this phase of the study. In the first stage, data was collected mainly from Istanbul and Ankara, as the two focus centres of industry, trade and technology. Different institutions that supply, demand and intermediate the workforce have been defined for the purpose of collecting data. Universities were selected for the group of institutions that supply the workforce; companies were selected for the group of institutions that demand the workforce and Human Resources / Headhunter companies were selected for the group of institutions as the intermediary institutions. A fourth group (Experts) was formed from the individuals who were not included in these three groups, but could possibly contribute to the study with their opinions. One point to consider here is that no questions have been directed to the staff, namely the workforce, the human resource itself and highly qualified human resources.

Item	Group Name	Organization	Number of participants	Total
1	Supplying	State Universities	19	27
		Foundation Universities	8	
2	Intermediating	HR/Headhunter Companies	9	9
3	Demanding (Companies)	Multinational (Large-Scale) Companies	13	49
		(Large-Scale) Turkish Companies	13	
		SME/Start-Up Companies	23	
4	Other	Experts	24	24
Total Number of People Participating in the Study				109

Table 1: Distribution of Participants by Groups and Organizations

1. Fundamental Changes Likely to Affect The Workforce/Thought to Occur

This part of the study is intended to find out the predictions of all participants **on the type of fundamental changes likely to affect the workforce in medium and long term (within 5-10 years)**. Fundamental changes likely to affect the workforce/thought to occur by the sequence of groupings formed in line with the similarity between the responses given to the research question directed in this context can be examined under main titles as in Table-2.

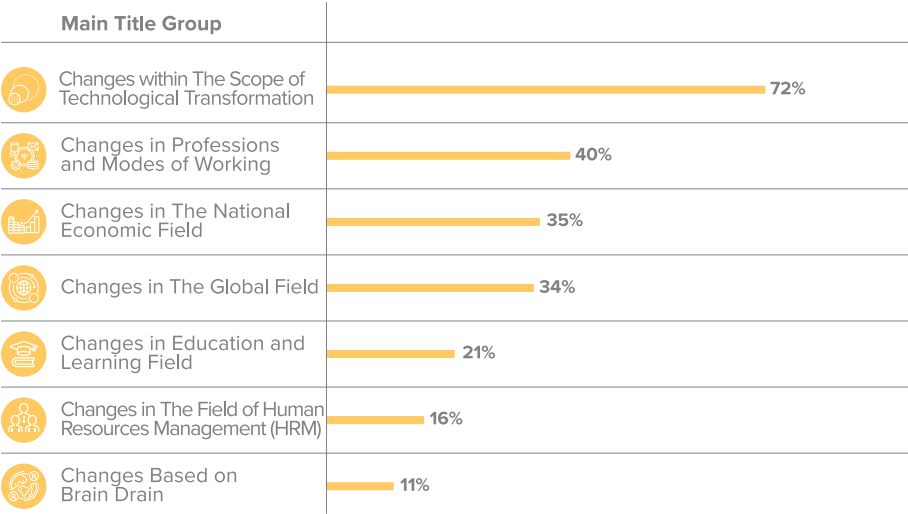


Table 2: Distribution of Fundamental Change Responses

“Changes within the scope of technological transformation”, among what was mentioned by the participants, was by far the most anticipated set of changes.

When the fundamental changes in Table 2 were analysed, it was seen that there was a cause and effect relationship between them. The resulting connections are correlated as in Figure-2.

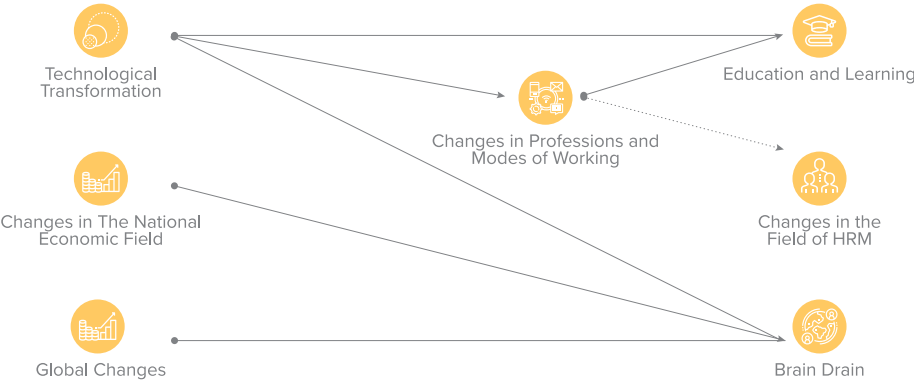


Figure 2: Relationship between The Main Titles, Fundamental Change

As can be seen in Figure-2, the changes in the scope of technological transformation, changes in the national economic field and changes in the global field stand out as the independent variables within the whole set of expectations. In addition, while the changes in professions and modes of working rank the second, the dependent variables that are also affected by other changes can be listed as the changes in education and learning, changes in HRM and brain drain.

Prominent Sub-Titles

When all responses from the research participants and groups are evaluated, considering the frequency of mentioning the fundamental changes that are likely to affect the workforce in the medium and long term, the prominent sub-titles are the technology, professions and modes of working, economic and global reasons, the needs in the field of education and learning and brain drain, as shown in Table-3. That shows that the participants anticipate that possible changes will not occur one after another, but rather the labour market will be different from the past decade due to intense change and experiences in intertwined fields.





























	Sub-Titles	Main Title	Frequency (%)
1	Digitalization/Digital Transformation/ Industry 4.0	 Technology	 41%
2	Automation, Robots/Robotics/ Robotization & Autonomous Systems	 Technology	 40%
3	Artificial Intelligence and Machine Learning	 Technology	 33%
4	Flexible Working (Remote Working) and Change of Working Mode	 Professions and Work	 25%
5	The Emergence of New Professions And Skill Sets	 Professions and Work	 23%
	Economic Difficulties/Changes (Exchange Rate Increase)	 National Economic	 23%
6	Decline in The Quality of Education and The Need for Quality Education	 Education and Learning	 15%
7	Globalization Effect	 Global	 14%
8	Increase in Overseas Travel for Work	 Brain Drain	 11%
9	Big Data and Data Analytics	 Technology	 6%
	E-Commerce	 National Economic	 6%
10	Lost Professions	 Professions and Work	 6%
	Change in The Education System And Technology Integration	 Education and Learning	 6%
	Sharing Economy	 National Economic	 6%

Table 3: Fundamental Change Predictions, Prominent Sub-Titles

2. Our Industry's (Real Sector) Strategic Management and HR Strategy Relations

This chapter aims to discover the evaluation of the persons participating in the study, **regarding the relationship between strategic management and HR strategy in our industry / real sector.** To this end, the same questions were asked to all company participants, regardless of any scale. These questions are intended to figure out the time frame targeted by the corporate strategic plans (CSP) and human resources policies (HRP), the role of senior management / leaders in determining and fulfilling the policies and whether they have made a systematic benchmark in establishing the company's human resources policies.

2.1. For How Many Years The Companies' Corporate Strategic Plans Target

All company participants stated that their corporate strategic plans were in place. The answers given for the time period targeted by the strategic plans are given in Figure-3.

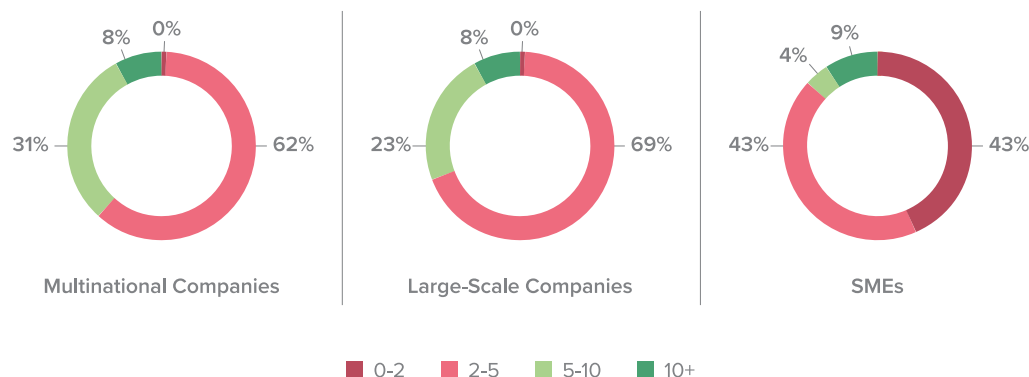


Figure 3: Range of Years Targeted for Corporate Strategic Plans by Company Types

As a general evaluation, it is expressed that 76% of companies have corporate strategic plans for under 5 years. In addition, it has been observed that, in 21% of companies (all SMEs), corporate strategic plans target 0-2 years, 16% target between 5-10 years and only 8% target for more than 10 years.

2.2. For How Many Years The Companies' Human Resources Policies are Designated

When asked about the year targeted by human resources policies, 94% of company participants stated that they had human resources policies in place. The responses given for the time frame targeted by the strategic human resource policies / plans can be seen in Figure-4.

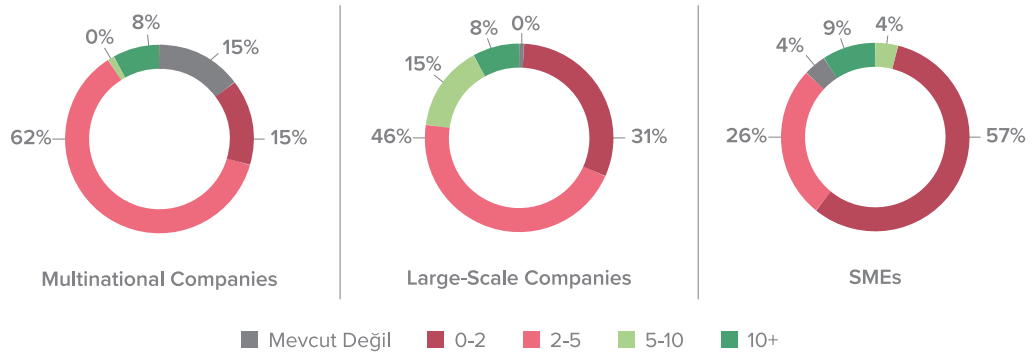


Figure 4: Range of Years The Companies Determine Their HR Policies by Company Types

It has been stated that a vast majority (as high as 84%) of all companies prepared their HR policies so as to target 0 between 5 years. In addition, it was observed that HR policies were determined for a period of 5-10 years in 6% of companies, and for more than 10 years in only 8%. In addition, it was stated that HR policies do not exist in 4%, which was only a low percentage, and it was uncertain in an only small portion (as low as 2%) for how many years HR policies were projected.

2.3. Whether Leadership / Senior Management Plays a Decisive Role in Determining and Fulfilling The Companies' Human Resources Policies

It has been stated that the role of leaders / top management is determinative / effective in determining and fulfilling human resources policies. A great majority of (as high as 63%) of all companies stated that company leaders / senior management had a guiding / leading role in determining and fulfilling the human resources policies. In addition, 4% of all companies were identified as being partially determinant / effective in determining and implementing human resources policies and 4% were defined as having both supportive and guiding / leading role. The responses of the companies by their types are shown in Figure-5.

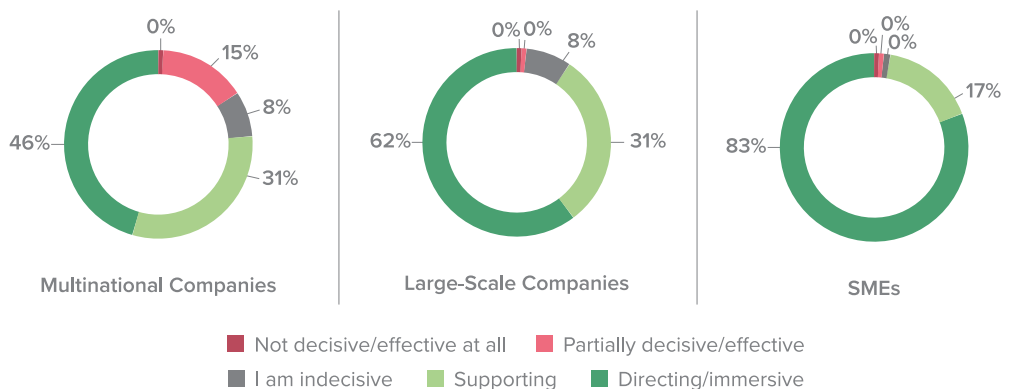


Figure 5: The Role of Leadership / Top Management in Determining The HRP by Company Types

As it can be clearly seen in the table, it can be deduced that the guiding / leading effects of the top management / leaders of the company or, i.e. the intervention or influence of the senior management, increases as the companies become localized and smaller.

Brief Evaluation

When the research findings are analysed, it can be inferred that the corporate strategic plans of our industry target relatively short terms and HR policies target shorter terms as against them. (The reasons for the short-term perspective and the extent to which these strategic plans are complied with were not investigated as part of this study.) However, the horizons of 5 years or less should not be considered as a sufficient time frame to set a game that will have an impact on a strategic level and to train highly qualified human resources. It seems unlikely that our industry can invest in R&D and technology development and innovation in “short” terms, to enter into an effective and sustainable relationship with the academic community and engage in comprehensive or long-term initiatives aimed at training HR.

3. Our Industry Needs for Human Resources

This part probes into the opinions of the participants from the group of companies **on the existing human resources to achieve corporate strategic plans, the needs for human resources to achieve these plans and the opinions of HR companies that match the highly qualified human resources, for the needs of our industry.** Lastly, the opinions of both the companies demanding workforce and HR companies intermediate the workforce, about talent availability.

3.1. How The Companies Evaluate The Skills of Their Existing Employees in Terms of Quality in order to Achieve Their Corporate Strategic Plans

When the companies participating in the research assess the skills of the existing personnel in terms of their qualifications in order to achieve their corporate strategic plans; 53% of them stated that the skills of the current staff are sufficient in terms of quality. The general distribution of the answers is given in Figure-6.

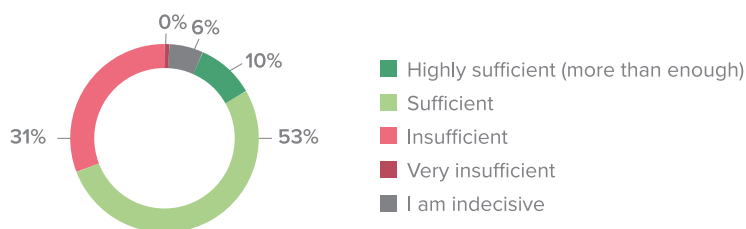


Figure 6: Opinions of All Participating Companies on Existing Employees for Realization of CSP

As can be seen in Figure-6, 63% of company participants in total considered their current employees sufficient and highly sufficient to achieve their corporate strategic plans, while 31% stated that they considered them insufficient. No participating company assessed the qualifications of the existing employees as extremely insufficient.

3.2. Whether The Companies Need Highly Qualified Human Resources to Achieve Their Corporate Strategic Plans

A good part of the group of companies (78%) stated that the need for highly qualified human resources will be higher in the future, than it is today, in order to achieve their corporate strategic plans. Distribution of the answers is shown in Figure-7.

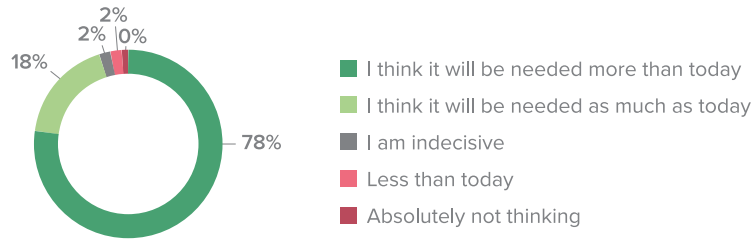


Figure 7: The Need of All Companies for Highly Qualified Human Resources for Realization of CSP

To that end, the company group participants who participated in the research considered the qualification of the existing personnel sufficient to achieve their corporate strategic plans while they mentioned that there will be a significant problem in highly qualified human resources in the future. This can be interpreted as the companies will be in need of highly qualified human resources in the future.

3.3. Whether a Talent Gap is Felt in The Labour Market

As a result of the findings obtained within the scope of the research, 57% of the participants from all companies and HR companies pointed out that the problem of talent gap is still being felt strongly in the labour market today.

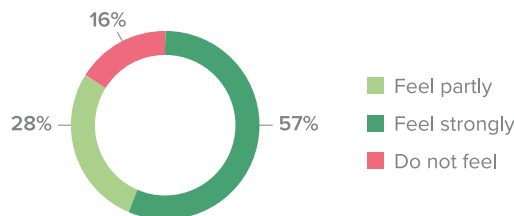


Figure 8: Views of All Companies and HR Companies on The Talent Gap

3.4. How Applicable/Feasible Skill-Based Recruitment is for Our Country's Industry/Real Sectors

All participants of the study were asked that, in some cases abroad, large technology companies have increasingly adopted skill-based recruitment practices instead of diploma or label-based recruitment and to what extent that can work for our country's industry. The answers are given in Figure-9.



Figure 9: Opinions of All Participants within The Scope of Skill-Based Recruitment

As can be seen in Figure-9, 75% of the stakeholders of the technological innovation ecosystem as well as the parties who supply and demand highly qualified human resources have the opinion that skill-based recruitment will become more popular in our country while 23% stated that this practice would probably not be doable.

Brief Evaluation

When the research findings are examined in brief;

● A total of 63% of the companies consider their existing personnel sufficient or highly sufficient.

● 78% of companies think that they will need more highly qualified human resources than they do today.

● The talent gap is still being felt in the labor market today.

● It is thought that skill-based recruitment practices will be more prevalent in the future, instead of diploma or label-based recruitment.

4. Human Resources Skills, Competencies and Attributes Needed in Our Industry

This chapter includes the views and opinions of the people who participated in the study, on **what the human resources skills needed by our industry/real sector could be**. The human resources skills, competencies and attributes to be needed in our industry can be examined under the main titles in Table 4, by the groupings sorted in line with the similarity between the responses given to the research question directed in this context.

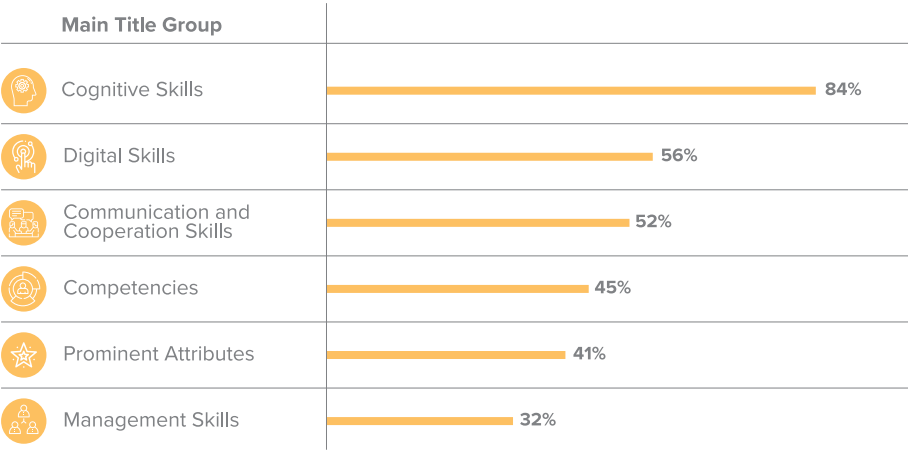


Table 4: Distribution of New Skills, Competencies and Attributes to Be Needed

Prominent Skills, Competencies and Attributes

When all the responses from the research participants are evaluated, the human resources skills, competencies and attributes that our real sector thinks it will need are sorted as in Table-5.

































	Sub-Titles	Main Title	Frequency (%)
1	General Digital Skills and Digital Literacy	 Digital Skills	 43%
2	Creativity/Creative Thinking, Innovation / Innovative Perspective, Imagination, Curiosity (Innovation and Creativity)	 Cognitive Skills	 38%
3	Cooperation and Teamwork	 Communication and Cooperation Skills	 27%
4	Effective Communication Skills	 Communication and Cooperation Skills	 26%
5	Analytical Thinking and Problem Solving	 Cognitive Skills	 25%
	Compliance/Adaptability (Flexibility and Quick Adaptation)	 Prominent Attributes	 25%
	Professional Competence And Specialization (Depth of Knowledge About The Profession)	 Competencies	 25%
6	Entrepreneurship	 Management Skills	 12%
7	Ability to Work in A Multidisciplinary And Interdisciplinary Way	 Competencies	 11%
8	Continuous Learning	 Cognitive Skills	 10%
	Coding and Software Skills	 Digital Skills	 10%
9	Using The Information Correctly And Researching (Researching And Using The Information)	 Cognitive Skills	 8%
	Values (Consistency and Having Responsibility)	 Prominent Attributes	 8%
	Foreign Language	 Competencies	 8%
10	Data Literacy and Data Management	 Digital Skills	 7%
	Leadership	 Management Skills	 7%

Table 5: Top 10 Skills, Competencies and Attributes

5. Difficulties Encountered by Our Industry in Highly Qualified Human Resources

This chapter deals with the views and evaluations of the people who participated in the study, about the **potential challenges they experience in terms of highly qualified human resources** and the possible reasons thereof.

Companies work with their own Human Resources units and / or HR companies to recruit the skills they need. In this context, participating companies and groups of HR companies as the intermediary agents were initially asked whether they experience any difficulty in recruiting the workforce.

5.1. Whether Our Industry Faces Difficulties in Managing The Workforce

First of all, all participating companies and HR companies in the research were asked whether our industry had difficulties in managing the workforce in general (finding, retaining, etc.). As can be seen in Figure-10, with the exception of 2 large-scale participating companies (3%), all responses mentioned that our industry had difficulties in managing the workforce.

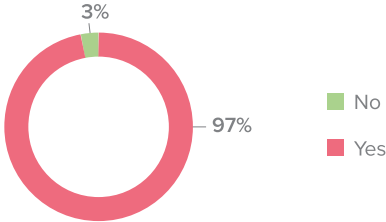


Figure 10: Distribution of Answers Given Within The Scope of Labour Management

5.2. How Difficult It is for Our Industry to Find Highly Qualified Human Resource

When asked about how difficult it was for our industry to secure highly qualified human resources, 50% of the answers obtained from the research participants stated that our industry had grave difficulties, 34% had little difficulty and 6% did not have much difficulty. 1% of the participants stated that our industry had no difficulties at all. On the other hand, a slice of 9% stated that they were undecided. Distribution of answers can be seen in Figure-11.

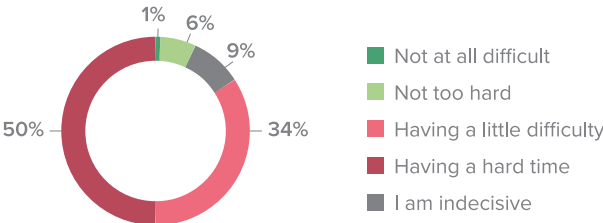


Figure 11: Views of All Participants as to How Difficult It is for Our Industry to Finding Highly Qualified Human Resources

5.3. How Difficult It is for Our Industry/Real Sectors to Retain Highly Qualified Human Resources

When asked about how difficult it is our industry to retain highly qualified human resources, 44% of the participants from all groups stated that they had a lot of difficulties, 37% said they had a little difficulty, 9% did not have much difficulty and 4% stated that they did not have any difficulties at all. A slice of 6% stated that they were undecided. Considering the distribution of the answers, the dominant view revealed that our industry thinks that there are difficulties experienced in retaining highly qualified human resources. Answers are provided in Figure-12.

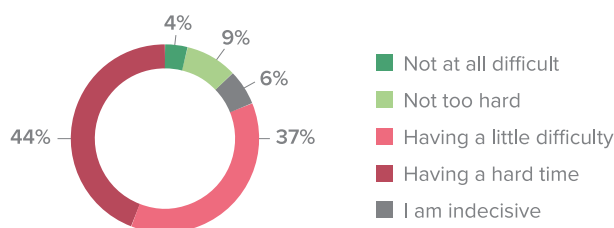


Figure 12: Views of All Participants as to How Difficult It is for Our Industry to Retain Highly Qualified Human Resources

5.4. Which One is More Difficult; To Retain or To Find Highly Qualified Human Resources?

When the responses of all groups contributing to the study were analysed, 47% of the participants stated that retaining and finding highly qualified human resources were similarly difficult, 31% stated that it was more difficult to retain, and 22% said it was more difficult to find. The distribution of the answers is given in Figure-13. Our industry has difficulty in finding and retaining the talent it needs. It can also be inferred that retaining is relatively harder than finding. In this case, although the perception that it is difficult to find highly qualified human resources in our technological innovation ecosystem is mentioned more often than not, it has been revealed that they might have more difficulties in “retaining” than in “finding”, which is much less expressed based on the research findings.

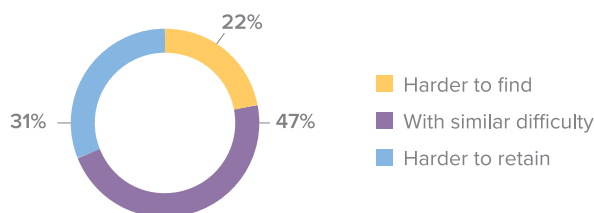


Figure 13: Views of All Participants on Finding and Retaining

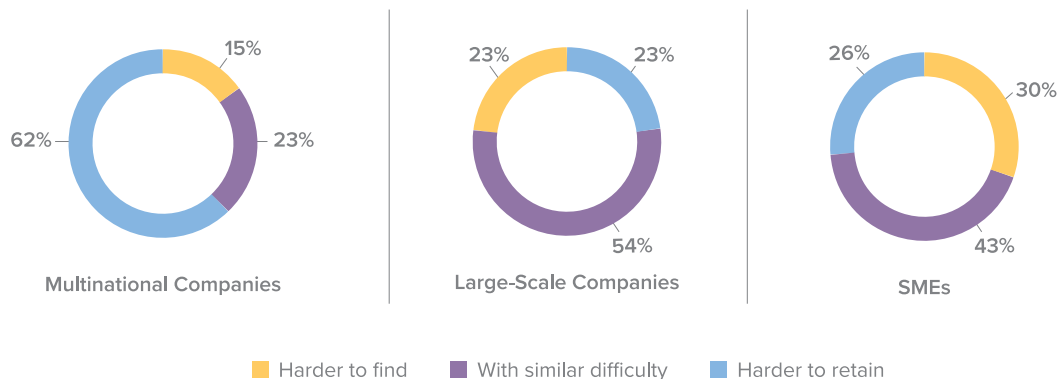


Figure 14: Opinions of Companies by Types within The Scope of Finding and Retaining

5.5. The Most Basic Challenges Faced/Thought to be Faced by Our Industry in Terms of Highly Qualified Human Resources.

This section focuses on the findings concerning the main challenges that our industry / real sector experiences or is thought to experience with regard to highly qualified human resources. The groupings and the sequencing between groups based on the similarity between the responses given to the research question are given in Table -6.






Main Title Group	
 Issues Related to Labour Market Dynamics	95%
 Failure to Meet Employee Expectations	84%
 Educational Quality Issues	44%
 Inadequate Human Resources Management of Companies	39%
 Intergenerational Differences	22%

Table 6: Distribution of Responses Given under The Key Difficulties regarding Highly Qualified Human Resources

As can be seen in Table-6, the most basic difficulties experienced / thought to be experienced in terms of highly qualified human resources are the issues related to the labour market, by 95%. The failure of the industry to meet the employee expectations, which was mentioned by 84% the participants, ranked the second. These are followed by the issues of educational quality, inadequate HRM of companies and intergenerational differences, which were less frequently mentioned than these two difficulties.

Prominent Challenges

A list has been prepared for the top 10 challenges by frequency of the challenges encountered by our industry / real sectors within the scope of highly qualified human resources. The two columns on the right hand of Table-7 show the ranking of the problematic issues, as the reasons of failure to find and retain, as mentioned by the participants.











	Sub-Titles	Main Title	Reason For Failure To Find	Reason For Failure To Retain
1	Limited number of supply in qualified human resources and widespread lack of knowledge, skills and competencies	 Labour Market Dynamics	1.	-
2	Expectations regarding the management approach (failure to provide a management understanding for highly qualified human resources, constructional problems)	 Expectations	-	1.
3	Expectations regarding the wages, salaries and benefits	 Expectations	2.	2.
4	Global competition (international ecosystems offering better opportunities)	 Labour Market Dynamics	3.	3.
5	Country's conditions (economic crises, political and sociocultural reasons)	 Labour Market Dynamics	4.	4.
6	Insufficiency and decreasing quality of the education system at all levels and decrease in the number of qualified graduates	 Education	5.	-
7	HRM systematics failing to keep up with the information age (Traditional processes are still in use. Failure to match the appropriate personnel with the proper job, wages and benefits in securing qualified / required workforce)	 HRM	6.	5.
8	Domestic market competition	 Labour Market Dynamics	7.	6.
9	Lack of development, career planning and scheduled training programs (internal development and training)	 HRM	8.	7.
10	Management of intergenerational differences in expectations	 Intergenerational	9.	-

Table 7: Top 10 Difficulties Encountered within the Scope of Highly Qualified Human Resources

6. HR Development/ Training Activities
of Our Industry

This section part contains the opinions and evaluations of the people who participated in the study, on the **plans of our industry for the development and training of human resources as well as the adequacy of the financial resources allocated and what the activities could be for this purpose**. Through various questions directed to company representatives, the activities aimed at talent development and training as well as internal and external procurement methods have been investigated.

6.1. Whether There Are Plans in Place for The Development/ Training of Highly Qualified Human Resources (for Companies)

A total of 37% of the participants from all companies of different scales, who participated in the study, stated that they had an adequate plan to develop / train human resources, 53% stated that their plans were insufficient, while 10% stated that they did not have any plans in place. Figure-15 includes the inputs about our industry's plans.

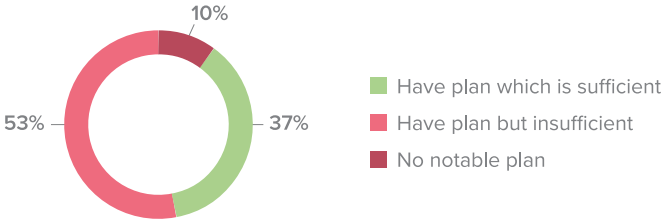


Figure 15: Opinions of All Companies about The Plans for Developing/Training Highly Qualified Human Resources

6.2. The Extent of Financial Resource Allocation to The Development/ Training of Highly Qualified Human Resources (for Companies)

49% of companies stated that they allocated sufficient financial resources for the development / training of highly qualified human resources, 37% of them stated that they allocated resources but these resources were insufficient and 14% did not allocate any significant resources, at all. The distribution of the answers is given in Figure-16.



Figure 16: Opinions of All Companies about Financial Resources for Developing/Training Highly Qualified Human Resources

6.3. How The Internal or External Procurement Opportunities Are Utilized for The Development/Training of Highly Qualified Human Resources (for Companies)

It has been investigated how the plans and allocated resources are used, in an effort to scrutinize the activities carried out to develop / train highly qualified human resources. The activities performed in this context are divided as internal and external activities. It has been stated that the companies most often mention those works as part of internal activities, by the frequency of the responses, which are followed by external activities and studies conducted in cooperation with the universities. The answers are given in Table-8.

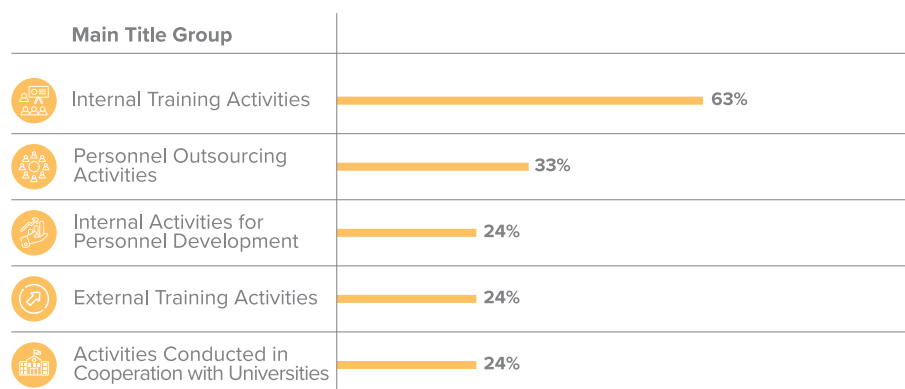


Table 8: Distribution of Companies' Studies in Developing / Raising Highly Qualified Human Resources / Distribution of Responses

Internal training activities mostly carried out by companies within the scope of developing / training highly qualified human resources, including at least half of SMEs, are given as follows;

- Transferring the knowledge and competencies of highly qualified employees to other personnel through internal trainings organized both online and face-to-face,
- Trainings sessions delivered by company academies
- On-the-job training and activities for competence development.

External training and talent outsourcing activities that all companies of all sizes stated that they used relatively less often, compared to the internal activities, and are given as follows;

- Participation in domestic and international events (congresses, fairs, seminars, training, research),
- Supplementary trainings from stakeholders and business partners,

- “Freelance” use of external talents and outsourcing the specialist jobs,
- Determination and training of the candidates by means of practices like Hackathon,
- Collaborations performed for the company promotion,
- Service outsourcing from HR companies and
- Use of social media platforms for the business world.

7. Higher Education in The Supply of Highly Qualified HR

This chapter is intended to explore the assessments of the persons participating in the study, on the **effect of higher education on the supply of qualified human resources**. In this regard, firstly, primary focus was on the extent to which the university education trains the human resources with the qualifications as required by the industry and the benchmarking when establishing the higher education programs. Then, the decisiveness of the requirements of the real sectors in the establishment of university programs, the effect of universities in identifying the highly qualified human resources needed by the industry and types of methods used in identification have been investigated. Lastly, 21st century basic knowledge and skills of university newbies and graduates have been examined.

7.1. Whether The University Education Trains The Human Resources with The Qualifications Needed by Our Industry

As can also be seen in Figure-17, 80% of all participants stated that they do not think that university education trains qualified human resources needed by our industry/real sectors.

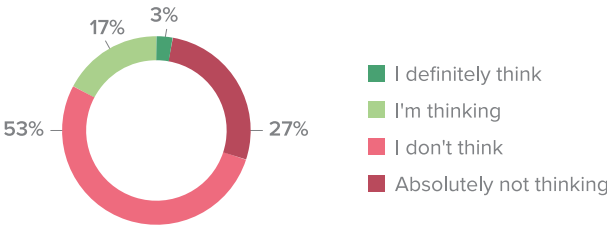


Figure 17: Opinions of All Participants as to whether University Education Trains the Human Resources with The Qualifications Needed by Our Industry / Real Sectors

According to the findings obtained, it has been shown that there is a widespread perception that university education cannot train the qualified human resources at the level as required by our industry / real sectors.

7.2. How Decisive The Needs of Our Industry/Real Sectors Are in The Formation of University Programs and Curriculum or The Education System

Looking at how effective the needs of our industry are in establishing the curriculum or education system of our universities that supply highly qualified human resources, it seems that this is relatively low. Answers are provided in Figure-18.

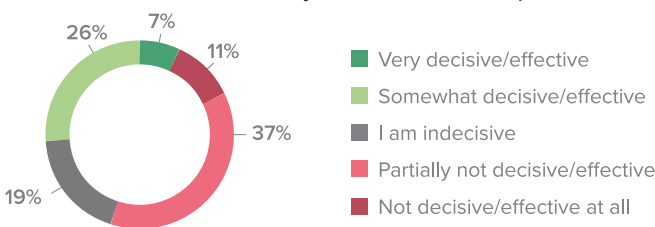


Figure 18: Views of The Group of Universities on The Role of Industry in Creating The Training Program

7.3. How The Universities Identify The Needs of Industry

The method mostly used in determining the human resources qualifications needed by our industry / real sectors, according to the opinions of university participants, was “University-industry cooperation studies (regular focus group meetings, congresses, career centres, industry advisory board)”. The methods of identification mentioned by the university group participants are given in Table-9.

Identification Methods	
University-industry cooperation studies (regular focus group meetings, congresses, career centres, industry advisory board)	63%
By communicating with the student communities and through relations with the alumni / part-time Master's Students (projects, R&D activities and internship reports)	30%
Through observations / investigations and following up the developments in the field as well as social developments (national and international)	26%
Trade associations 'reports, companies' human resources reports, related reports, current situation analysis reports	11%
Through university strategic plans. With road map and action plan	7%

Table 9: Methods of Determining the Needs of the Industry

7.4. 21st Century Basic Knowledge and Skills

A response was sought for the question on the extent to which 21st century basic knowledge and skills, which have been prepared by Partnership for 21st Century Skills (P21) (<http://www.p21.org/>) and given in Table-10, were gained at university entrance and university graduation.

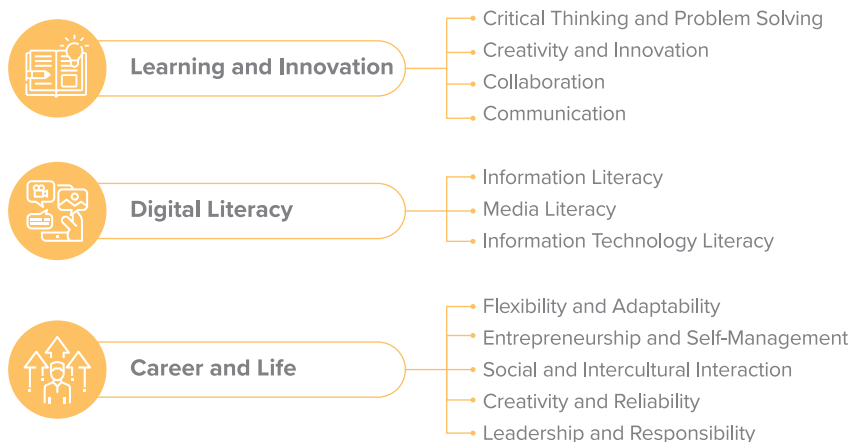


Table 10: 21st Century Basic Knowledge and Skill Set

The university group participants were asked about 21st century skills possessed by the students who began their university education. As for 21st century skills of university graduates, questions were asked to the participants of the companies, HR companies and experts groups.

Comparison

The comparison radar of 21st century basic knowledge and skills of university newbies and graduates is shown in Figure-19.

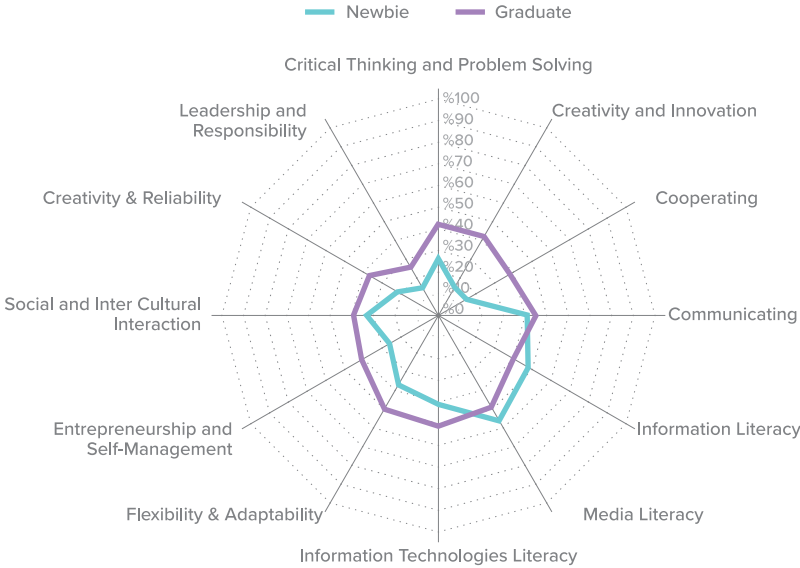


Figure 19: Skills Comparison of University Newbies and Graduates

The most striking point is that 50% of the participants mentioned that even the highest skills existed.

When a difference as low as +/- 10% is ignored and the university newbies and graduates are compared; it can be said that a significant increase is achieved in the skill of creativity and innovation (+29%), cooperation (+23%), critical thinking and problem solving (+18%), entrepreneurship and self-management (+16%), creativity and reliability (+14%), flexibility and adaptability (+13%) and leadership and responsibility (+ 11%) following their graduation from the university.

It is obvious that our country requires highly qualified human resources for a sustainable competitiveness. When the research findings and evaluations are analysed, it can be deduced that the problem is not a problem of “failing to find someone suitable for the job in the labor market”, but rather it is a problem of multidimensional ecosystem and it follows from this that an appropriate solution should be addressed in the context of the entire ecosystem. Therefore;

- The key word is the “quality” of human resources.
- Awareness, prioritization and implementation activities are required for the quality at every level of ecosystem within the scope of human resources only.
- In order to develop value-added technology, train qualified human resources and become a centre of attraction, “investments must be made for qualified scientific production, as well”.

Looking at the business level and considering the fact that common custom of various organizations that consider mostly domestic market and tend to exhibit relatively short-term practical behaviour, also tend to quickly secure someone suitable for the position, it is thought that acquiring talent for innovation will become more difficult.

It is observed that innovative and globally thriving organizations are able to attract and retain highly qualified human resources more readily and began to organize acting almost like a “school” increasingly in order to train qualified human resources themselves, as they are not willing to settle for what was offered by the labour market.

In this context, all stakeholders are required to adopt a “long-term perspective”, highlight quality-based practices rather than quantity and gain awareness and competence on “HR quality”, when establishing the Corporate Strategic Plans and Human Resources Policies.

The fact that SMEs stand in a very different position from large-scale companies within the scope of highly qualified human resources, as in many other aspects, requires that a separate study should be carried out for SMEs.

Our industry needs business environments, recruiters, managers, educators and even intermediaries that can recognize, evaluate and develop highly qualified human resources. To give an example, as an auxiliary finding, it has been deduced that HR companies / Headhunters exhibit practical behaviour mostly in the domestic market again by focusing on obtaining the requested skills quickly. Therefore;

- There is also a need for activities intended to increase the qualifications of the recruiters and human resources employees.
- It is necessary to understand the different expectations and behaviours of the new generations and to develop the work environments they can adapt to.

- It is predicted that flexible and remote working models will become widespread and permanent to a certain extent. In this context, practices need to be diversified and internalized.

It is the outputs of the higher education system that the real sector encounters in the education system in the first place and most intensely. In the context of higher education, a diploma in its simplest form is a document that represents a certain knowledge and skill set. From where we stand now, we witness that the relationship between diploma and knowledge-skill is getting weaker and weaker day by day. Even though the recruitment criteria still focus on the label (or simply certain universities and departments) today, our technological innovation ecosystem believes that this could change in favour of the talent / skill, as is the case in the increasing examples abroad. Hence, what the “diploma” will mean in the future, how education / training systems will change and what kind of impact technology may have on the future of education can turn out as major research topics.

Moreover, there is a risk of serious erosion of the benefits that the higher education institutions focusing on the serial teaching can acquire owing to the effect of developing educational technologies, without producing any quality information. With respect to the higher education;

- It is essential to increase the quality scientific research and knowledge production.
- It is required that the agility of the universities as well as the programs should be able to be updated “quickly” in line with the requirements of the age.
- In order to train qualified human resources, it is necessary to prioritize the qualifications of academicians and lecturers, as well.
- It is necessary to develop innovative applications so that the persons with high real sector / industry / field experience can be attracted by the universities, in order for them to contribute to both education and research activities.
- It is required that university-industry cooperation go beyond “conventional summer internship” and the contribution and effect of the industry to academic programs be increased.
- A significant amount of information and data is produced in our industry. Mechanisms that will enable bidirectional flow of information and data between the industry and academy should be established.

We can talk about the need for a quality increase at every level of education. It is obvious that there is a very strong need for basic education. In addition, it is also observed that there are efforts to offer some basic knowledge and skills that should be acquired in basic education, as part of the higher education.

- There is a need to increase the quality of education for basic sciences, especially mathematics and physics, from the very beginning.
- Regardless of the profession the students will pursue in the future, it should be a priority to enable them to acquire the most needed “cognitive”, “digital” and “communication-cooperation” skills.
- Furthermore, learning to research, learning to learn (even forgetting what is inapplicable and re-learning what is necessary) and lifelong learning is getting more and more critical. Systematics need to be developed to enable these skills to be acquired.

It should be kept in mind that the demand of highly qualified human resources is as critical as the supply. It is increasingly observed that university graduates do not prefer to work in jobs offering low wages, no security, low status, namely the jobs do not seem right, like the jobs they have dreamed.

In the technological innovation ecosystem, it is not enough simply to define the discussions on Human Resources as “finding the proper person for the job” within the framework of customs.

Following stages of highly qualified human resources are all equally critical in the transformation of scientific knowledge → technology → value-added products → socio-economic benefits;

- Discovering the potential
- Training
- Attracting / Employing
- Developing
- Assigning / Utilizing / Managing
- Retaining

Annex-1: Study Team

The persons involved in the study team are listed alphabetically by their surnames.



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