

# Employees' Competitiveness in IT and Telecom in Vladivostok

M N Ivanenko<sup>1</sup> and M V Artamonova<sup>1</sup>

<sup>1</sup>Moscow State University, Faculty of Economics, Department of Labour Economics and Personnel, 1-46 Leninskiye Gory, 119991, Moscow, Russian Federation

E-mail: mar.nik.ivanenko@gmail.com; mvartamonova@gmail.com

**Abstract.** The topic of employees' competitiveness introduces new issues into the era of digital transformation. Employees should not only to possess the necessary digital competencies, but to improve them, as well as to acquire additional digital competencies to increase their competitiveness. There is a methodology for assessing the level of digital competencies that allows tracing the dynamics of digital competencies level in the Russian Federation since 2015 till 2018 both in the country as a whole and at the regional level. However, this technique does not answer the question of what kind of digital competencies employees should improve or acquire. The aim of our study is to identify the universal (if it is possible) digital competencies of IT and telecom employees, the concentration on which will allow to increase the competitiveness of employees. We analysed the vacancies of Vladivostok as a city in the Far East, which rating is above the average for the Russian Federation in terms of digital competencies.

## 1. Introduction

Employees' competitiveness is an important characteristic of the labor market. In digital transformation, the most acute question is the digital employees' competitiveness.

It is determined, evaluated, analyzed by:

1. State organizations and associations (European Commission [1], OECD [2], UKforCE [3] and etc.).
2. Companies and agencies (Development Economics [4], European Schoolnet and DIGITALEUROPE [5], The Tech Partnership [6] and etc.).
3. Economists and scientists (Carretero, S. et al [7], van Laar, E. et al [8], Ilomaki., L. et al [9], Fraillon, J. [10] and etc).

We define the employees' competitiveness, firstly, as the correspondence of the competences of employees to their vacancies, and, secondly, as the ability to be better than other potential employees applying for these vacancies. Consequently, in digital transformation, in order to increase their competitiveness, employees need to have digital competencies corresponding to their vacancies, and also to have either a wider set of digital competencies or a higher level of digital competencies compared to employees applying for these vacancies.

As researchers, we are interested in whether there is a universal list of digital competencies that can increase the digital competitiveness of employees. The sample includes vacancies in the field of Internet technologies (IT) and telecom as the most advanced field of the digital transformation. The

sample region is Vladivostok, since the Far East in 2018 showed a high level of digital competences compared to the average in the Russian Federation.

## 2. Relevance

Let us reveal the main trends in digital competencies in the Russian Federation. The project “Digital Literacy” of the Regional Public Center for Internet Technologies (RPCIT) and the Higher School of Economics (HSE) aims to annually measure the level of digital literacy among Russians and to identify the dynamics of indicators [11]. Project experts identify three sub-indices as parts of digital literacy index:

- Digital consumption: coverage of fixed and mobile Internet, the level of availability of digital devices for personal use, the number of registered Internet media in the region per capita, consumption of social networks, digital public services, news information on the Internet.
- Digital competencies: searching for information on the Internet, using mobile communication tools, using social networks, conducting financial transactions through the Internet, consuming goods and services via the Internet, critical perception of information and checking for accuracy, producing multimedia content.
- Digital security: are they able to protect personal data, do they have the skills to deal with threats to the integrity of information and computer viruses, how do they relate to pirated software and pirated media content, what is the level of interaction culture on social networks, do they follow ethical standards of content.

**Table 1.** Dynamics of the digital literacy index and subindexes of the Russian Federation and the Far East.

Year	2015		2016		2017		2018	
Region	RF	FE	RF	FE	RF	FE	RF	FE
<b>Digital Literacy Index</b>	<b>4,79</b>	<b>5,17</b>	<b>5,42</b>	<b>4,17</b>	<b>5,99</b>	<b>4,17</b>	<b>4,52</b>	<b>7,32</b>
Sub-index of digital competencies	4,48	3,1	5,27	2,55	6,48	2,55	5,44	7,06
Digital consumption subindex	5,17	5,59	5,49	4,98	5,35	4,98	4,49	5,56
Digital safety subindex	4,86	7,56	5,57	5,62	5,43	5,62	3,29	9,29

The authors used normalized indicators (scale from 0 to 10) and weights identified in the expert survey to calculate the index and sub-indices. Sources of indicators are the nationwide survey of the adult population (1600 people) from 8 federal districts, the database Mediascope, Roskomnadzor and Rosstat.

Main trends in the field of digital literacy in Russia in 2018 are:

- Increase in the level of infrastructure and involvement in information processes.
- Growth and expansion of digital competencies.
- Increased awareness of online action and critical thinking.

Table 1 shows the dynamics of the digital literacy index and sub-indices for the Russian Federation and the Far East that is in second place in 2018 after the North-West District.

The unstable dynamics of the digital competence sub-index and the trends identified by experts underscore the need to improve the employees` digital competencies.

## 3. Hypotheses, sample and results

We put two hypotheses to identify how to improve the digital employees` competencies:

**Hypothesis 1.** Programmers of Vladivostok are primarily (50% of vacancies or more) in demand in the field of IT.

**Hypothesis 2.** There are software packages in Vladivostok that are popular (50% of vacancies and more).

We analyzed the job market of Primorsky Krai, associated with programming and development in the field of IT and telecom. Since July 1 till July 29, 2019, 108 vacancies in Primorsky Krai were published on the HeadHunter website. 103 of them are vacancies from Vladivostok, which were included in the sample of our study. Therefore, the study included vacancies on the following criteria:

- Region: Vladivostok.
- Professional field: IT, telecom.
- Specialization: Programming, Development.
- Employment type: Full-time.
- Schedule: Full day.

**Table 2.** Companies in IT and Telecom vacancies in Vladivostok.

Company industry	Number of industry vacancies in the sample	Industry vacancy rate in the sample
Retail	26	25,2%
Information technology, system integration, Internet	23	22,3%
Electronics, instrumentation, household appliances, computers and office equipment	16	15,5%
Transportation, logistics, warehouse, foreign trade	10	9,7%
Financial sector	8	7,8%
Medicine, pharmacy	8	7,8%
Others	12	11,7%
<b>Total</b>	<b>103</b>	<b>100,0%</b>

**Table 3.** Required experience in IT and Telecom vacancies in Vladivostok.

Experience	Number of vacancies in the sample	Percentage of vacancies in the sample
1-3 years	55	53,4%
3-6 years	30	29,1%
No experience	17	16,5%
More than 6 years	1	1,0%
<b>Total</b>	<b>103</b>	<b>100,0%</b>

Vacancies descriptions were analyzed by the content analysis method in the MAXQDA 2018 program and outlined in Table 4 and Table 5. Following trends were identified:

1. Among the responsibilities of programmers with a strong margin leads "development" (73.8% of vacancies). Consequently, with high probability this area is a competitive advantage of a programmer in IT and telecom in Vladivostok.

2. The second place is the area of the "data bases" (29.1% of vacancies).

3. Such non-information areas as “accounting” (21.4% of vacancies) and “enterprise” (20.4% of vacancies) will be a competitive advantage for programmers whose activities are more related to business processes.

4. There is no universal software package, knowledge of what would be required by more than half of employers in Vladivostok. However, employers often mention 1C (38.8% of vacancies) and SQL (35.9% of vacancies). So, choosing a software package for the study, besides the two mentioned, the programmer must take into account the specifics of their future company.

The identified trends allow us to draw the following conclusions about the hypotheses posed:

**Hypothesis 1.** Programmers of Vladivostok are primarily (50% of vacancies or more) in demand in the field of IT - is refuted.

**Hypothesis 2.** There are software packages in Vladivostok that are popular (50% of vacancies and more) - is refuted.

**Table 4.** Content analysis of the areas names in IT and telecom vacancies in Vladivostok.

Area name	Number of vacancies in the sample containing the area name	Share of vacancies in the sample containing the area name
development	76	73.8%
data bases	30	29.1%
enterprise	24	23.3%
revision	23	22.3%
analysis	22	21.4%
accounting	22	21.4%
setting	22	21.4%
testing	22	21.4%
writing	21	20.4%
enterprise	21	20.4%

**Table 5.** Content analysis of the software packages names in IT and Telecom vacancies in Vladivostok.

Software package name	Number of vacancies in the sample containing the area name	Share of vacancies in the sample containing the area name
1c	40	38.8%
sql	37	35.9%
ms	17	14.3%
git	13	10.9%
linux	12	10.1%
php	12	10.1%
erp	11	9.2%
js	11	9.2%
java	10	8.4%
oracle	10	8.4%

#### 4. Conclusion

It should be emphasized that as a result of testing our hypotheses, it was revealed that in order to increase the digital competitiveness of IT and telecoms employees, they are recommended to:

1. Improve digital competencies related to 1C and SQL software packages.
2. Improve digital competencies related to development and databases.
3. Diversify digital competencies by choosing relevant for their industry.

Since both IT companies and non-IT companies were included in the sample, further studies should analyze the specifics of digital competencies for each industry in Vladivostok.

#### References

- [1] European Commission 2017 ICT for work Digital skills in the workplace (Brussels: European Commission) URL: <https://ec.europa.eu/digital-single-market/en/news/ict-work-digital-skills-workplace>
- [2] OECD 2013 OECD Skills Outlook 2013: First Results from the Survey of Adult Skills URL: <http://skills.oecd.org/skillsoutlook.html>
- [3] UKforCE 2014 Digital Skills Taskforce call for evidence: Submission from the UK forum for Computing Education (UK forum for Computing Education: Cited in Ecorys UK 2016) URL: [https://www.legco.gov.hk/general/english/library/stay\\_informed\\_overseas\\_policy\\_updates/digital\\_skills\\_in\\_the\\_uk.pdf](https://www.legco.gov.hk/general/english/library/stay_informed_overseas_policy_updates/digital_skills_in_the_uk.pdf)
- [4] Development Economics 2013 The Future Digital Skills needs of the UK Economy URL: <http://cdn.news.o2.co.uk.s3.amazonaws.com/wp-content/uploads/2013/09/The-Future-Digital-Skills-Needs-of-the-UK-Economy1.pdf>
- [5] European Schoolnet and DIGITALEUROPE 2017 e-skills Manifesto URL: <https://ec.europa.eu/docsroom/documents/21341>
- [6] The Tech Partnership 2017 Basic digital skills framework Retrieved January URL: <https://www.thetechpartnership.com>
- [7] Carretero S, Vuorikari R and Punie Y 2017 DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use (European Commission. EU Science Hub)
- [8] van Laar E, van Deursen A J A M, van Dijk J A G M and de Haan J 2017 The Relation Between 21st- Century Skills and Digital Skills: A Systematic Literature Review vol 72 (Computers in Human Behavior) pp 577– 88
- [9] Ilomaki L, Kanotsalo A, Lakkala M 2011 What is digital competence? (Brussels: European Schoolnet) URL: [https://helda.helsinki.fi/bitstream/handle/10138/154423/Ilom\\_ki\\_et\\_al\\_2011\\_What\\_is\\_digital\\_competence.pdf?sequence=1](https://helda.helsinki.fi/bitstream/handle/10138/154423/Ilom_ki_et_al_2011_What_is_digital_competence.pdf?sequence=1)
- [10] Fraillon J, Schulz W and Ainley J 2013 International Computer and Information Literacy Study- An Assessment Framework (The Australian Council for Educational Research) URL: [https://research.acer.edu.au/cgi/viewcontent.cgi?article=1010&context=ict\\_literacy](https://research.acer.edu.au/cgi/viewcontent.cgi?article=1010&context=ict_literacy)
- [11] Regional Public Center for Internet Technologies 2019 Digital Literacy URL: <http://цифроваяграмотность.рф/mindex/2018/far-east/>