

THE IMPACT OF ARMENIA'S EDUCATIONAL SYSTEM ON INFORMATION AND COMMUNICATION TECHNOLOGIES

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Introduction. The educational sector plays a key role in the development of Armenian information and communication technologies (ICT) sector and startup ecosystem. Its main role is to provide the sector and the ecosystem with the qualified specialists, but it also a place to train the future entrepreneurs who may generate innovative ideas and create startups based on those ideas. So, it is important to understand if Armenian educational sector efficiently provides qualified specialists to the ICT sector and startup ecosystem.

Scientific novelty. We examine the number of graduates with bachelor's degree and master's degree in ICT specializations and compare those numbers with the number of ICT employees in order to try to find out if Armenian educational sector provides the necessary quantity of specialists in the ICT sector. Besides we also review the quality side of the sector to find out if the educational sector provides for their students with the necessary skills and knowledge to enter the ICT sector right after graduation. We emphasize the reasons why Armenian educational sector does not provide those skills and identify the gap between the traditional educational system and ICT sector.

Methodology. We use data provided by Statistical Committee of the Republic of Armenia to compare the number of graduates with bachelor's degree and master's degree in ICT specializations with the number of ICT employees from 2016 to 2020. This allows us to identify the quantitative shortage of employees in ICT sector. Furthermore, we discuss the reasons of qualitative shortage of specialists in ICT sector using the data provided by "Enterprise Incubator" foundation.

Literature review. In our study we take into consideration "Social Situation of RA in 2020" [1], "Social Situation of RA in 2019" [2], "Social Situation of RA in 2018" [3], "Social Situation of RA in 2017" [4] and "Social Situation of RA in 2016" [5] reports conducted by Statistical Committee of the Republic of Armenia to identify the number of graduates with bachelor's degree and master's degree in ICT specializations and their respective shares among all the graduates for each year. Besides, we gathered the information on ICT employees by a request to Statistical Committee of the Republic of Armenia to compare it to the number of graduates. At last, we take into consideration

“Armenian ICT sector 2018” research conducted by “Enterprise Incubator” foundation to find out the qualitative issues faced in Armenian ICT sector [2].

Analysis. The educational sector, which is one of the important factors influencing the development of Armenia's ICT sector and startup ecosystem, plays the role of training specialists in the market and nourishing them in the ecosystem. In Armenia, there is a gap between the practical skills of the graduates of the higher education institution and the skills necessary for the ecosystem. The point is that graduates of the first level of higher education bachelor, and in some cases the second level master's degree program are often not ready to start working in Armenian ICT enterprises or startups immediately after graduation. For that, they often pass trainings organized by various public and private organizations to be able to get a job in their profession and meet the demands of the ecosystem. That is why, especially in recent years, there has been a significant increase in training courses organized by the state or the private sector, which are more adapted to the training of professionals who meet the requirements of the labor market, eliminating the gap between higher education institutions and the labor market. The private sector, in turn, as there is a great demand for qualified specialists, which is growing year by year, takes on a part of the mission of higher education institutions and is interested in organizing such training courses in order to fill the shortage of qualified specialists. Similar courses, focused more on the development of programming and technical skills and knowledge, are conducted by the Armenian Code Academy, established in 2015. It mainly provides programming training courses for both beginners who want to become programmers, starting their education from scratch, and programming training courses for more experienced professionals who want to expand their knowledge in the world of programming and adapt it to new market requirements. Armenian Code Academy already has more than 5,000 graduates by the end of 2021, who have successfully completed at least one course organized by them [1]: Higher education institutions, of course, lag behind and are aware of such a gap with the market, so they offer compulsory or non-compulsory courses aimed at providing students with more practical knowledge, but there, the processes are slow compared to market developments, which is why very often higher education institutions do not have time to adapt their curricula to such rapidly evolving and changing market demands. This is largely due to the fact that the salaries of the teaching staff working in higher education institutions are low, which hinders the opportunity to attract good market professionals who can provide quality and up-to-date teaching and share their rich experience with students [2, p. 32]. In addition, the share of students in ICT education programs is quite low, despite the fact that the demand for specialists in this field is constantly high and growing year by year. In particular, the number of graduates with bachelor's degrees in ICT specializations in 2020 is 918, and their share among all students who graduated in 2020 is only 5.9%. [3, p. 212]: In 2019, they were

respectively 902 and 5.7% [4, p. 217], in 2018 they were respectively 1,039 and 6.7% [5, p. 220], in 2017 they were respectively 649 and 3.6% [6, p. 215] and in 2016 they were respectively 898 and 4.7% [7, p. 214]: Analyzing these figures, we can state that the number of students graduating from the faculties with ICT specializations had little fluctuations, except in 2017, when the number of graduates was much lower. The same is true for the share of students graduating from ICT faculties among the total number of graduates, which suggests that the education sector is unable to respond adequately to the growing demand for ICT professionals.

The number of graduates with master’s degrees of the faculties with specializations in the field of ICT and their share among the total number of graduates were also low. In 2020 they were respectively 192 and 4.2% [3, p. 238]. In 2019 they were respectively 204 and 4.2% [4, p. 252], in 2018 they were respectively 276 and 5% [5, p. 247], in 2017 they were respectively 110 and 2.4% [6, p. 242] and in 2016 they were respectively 204 and 3.1% [7, p. 241]: By analyzing these indicators we can state that the number of students graduating with master’s degrees from the faculties with specializations in the field of ICT also had little fluctuations, except for 2017, when the number of graduates was much lower. As for the share of students graduating with master’s degree from ICT faculties among the total number of graduates, it generally ranged from 2% to 4%, which is also a low figure. This shows that the higher education institutions of Armenia do not prepare sufficient preconditions and incentives for the involvement of students in the faculties with specializations in this field, so that their number and the share of the total number of graduates becomes more significant. In addition, many individuals are self-taught to enter and work in the field of ICT through the Internet or various training courses. This also justifies the fact that the higher education institutions of Armenia are not the best at training such specialists in the field of ICT, who will be able to immediately start working in the ICT enterprises of Armenia after completing the relevant educational program.

These figures in the field of education can be compared with the number of employees in the field of ICT, which is presented below.

Table 1 [8]. Number of ICT employees from 2016 to 2021

Year	Number of ICT employees	Growth rate
2016	14,118	-
2017	15,095	6.92%
2018	16,170	7.12%
2019	17,493	8.18%
2020	19,827	13.34%

As we see every year the number of ICT employees is increasing by at least 1,000 since 2016 however the number of students graduating with bachelor’s degree from ICT

faculties is barely reaching to 1,000. The number of ICT employees increased by more than 2,000 in 2020 and the number of students graduating with bachelor's degree from ICT faculties was 918 in 2020, so there is yet a shortage of specialists in the field within in terms of quantity as well.

Conclusion. The link between educational and ICT sector is weak, resulting in a shortage of skilled professionals in the field, which ICT enterprises and startups are trying to fill. This shortage is seen both in quantitative and qualitative aspects which causes many ICT enterprises and startups to conduct training courses in order to fill that shortage.

References

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4. "Social Situation of RA in 2019", Statistics Committee of the Republic of Armenia, 2020, p. 673.
5. "Social Situation of RA in 2018", Statistics Committee of the Republic of Armenia, 2019, p. 695.
6. "Social Situation of RA in 2017", Statistics Committee of the Republic of Armenia, 2018, p. 645.
7. "Social Situation of RA in 2016", Statistics Committee of the Republic of Armenia, 2017, p. 634.
8. Statistics Committee of the RA.

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Armenian ICT sector and startup ecosystem are growing and the demand for qualified specialists is rising year by year. Specifically, since 2016 it increases by at least 1,000 for each year and in 2020 the increase level became more than 2,000. However, the educational sector provides no more than 1,000 graduates with bachelor's degree in ICT specializations for each year since 2016. This is a quantitative issue the ICT enterprises and startups face in Armenia. Besides, the educational sector in Armenia does not provide the necessary skills and knowledge to their students so that they can start working in ICT enterprises and startups right after their graduation. This is a qualitative issue the ICT enterprises and startups face in Armenia. For this reason, many ICT enterprises and startups organize training courses in order to fill the gap that educational system does not.