# DATA COLLECTION SURVEY ON PROMOTION OF SOLUTION BUSINESS WITH ADVANCED ICT (IN SOUTH ASIA AND CENTRAL ASIA)

## FINAL REPORT FOR ARMENIA

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**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**

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# TABLE OF ABBREVIATED WORDS

| Abbreviation | Definition |
|---|---|
| AMD | Armenian Dram (Currency) |
| ASIC | Application Specific Integrated Circuit |
| CAGR | Compound Annual Growth Rate |
| CIS | Commonwealth of Independent States |
| DX | Digital Transformation |
| DFR | Draft Final Report |
| EAEU | Eurasian Economic Union |
| EDA | Electronic Design Automation |
| EIF | Enterprise Incubator Foundation |
| FEZ | Free Economic Zone |
| FPGA | Field Programmable Gate Array |
| FR | Final Report |
| ICR | Inception Report |
| KGI | Key Goal Indicator |
| KPI | Key Performance Indicator |
| METI | Ministry of Economy, Trade and Industry of Japan |
| MHTI | Ministry of High-Tech Industry |
| ML | Machine Learning |
| NACE | Statistical classification of economic activities in the European Community<br>(Original notation in French = **N**omenclature statistique des **a**ctivités économiques dans la **C**ommunauté **e**uropéenne) |
| PoC | Proof of Concept |
| RA | Republic of Armenia |
| SME | Small to Medium sized Enterprise |
| SMRJ | Small & Medium Enterprises and Regional Innovation, JAPAN (SME Support Japan) |
| STE(A)M | Science, Technology, Engineering, (Art,) and Math |
| UATE | Union of Advanced Technology Enterprises |
| VC | Venture Capital |

# 1 Outline of the Survey

## 1.1 Background of the Survey

Today, we live in an era witnessing the biggest information and communication revolution in human history. Over 50% of the world's population now has access to the Internet, and new users are increasing every day. The world's data traffic is expanding year by year, and the ICT market is continuously active thanks to the rapid progress of AI/IoT in the world as well as the emergence of new markets.

Under such circumstances, the export value and human resources of the ICT industry are growing year by year in emerging countries in South Asia and Central Asia. In addition, some IT companies in emerging countries are already actively engaged in advanced technology development such as AI, Data Science, IoT, and Fintech, and are actively penetrating overseas markets mainly in Europe and America. In order to further develop the ICT industry, these countries recognize the necessity of developing and expanding new markets in addition to the current Western markets, and Japan is one of the candidates for new market development. Such needs for entry into the Japanese market have been confirmed in several countries (Sri Lanka, Armenia, Pakistan).

However, partnerships between Japanese companies and emerging countries have not been fully realized due to such factors as language barriers, differences in business practices, and lack of branding. Some efforts are already being made especially for the offshore development market through Japanese ICT solution providers, but advanced ICT companies in the target countries do not usually opt for offshore business with intermediate companies but prefer direct business matching with Japanese client companies.

For this reason, it is considered important to establish a mechanism to develop human resources that directly connects emerging countries and Japanese companies and promotes bilateral cooperation between countries. At present, however, there are many things that have not been clarified such as the degree of interest of companies in the respective countries, the number of interested companies, specific barriers for entering the Japanese market, building partnerships, and attracting investment, and the content of training to promote bilateral collaboration.

In the Survey, based on the above-mentioned current situation, the issues in promoting direct collaboration between ICT companies in emerging countries and Japanese companies who seek ICT solutions will be sorted, and an appropriate branding/marketing strategy will be created for emerging countries to enter the Japanese market, to collaborate with Japanese enterprises, and to attract investment in the target countries all without need for intermediate companies. In addition, the purpose is to clarify the activities and human resources necessary for implementing the strategy that are lacking in the emerging countries, and to collect the information necessary to consider future support contents.

## 1.2 Purpose of the Survey

The purpose of the Survey is to clarify possibilities and issues involved in direct business collaboration between advanced ICT companies in each target country and potential Japanese client companies with advanced needs, and to create a branding/marketing strategy (draft) of each target country aiming at the Japanese market. The implementation body of the said branding/marketing strategy would be the government or industry associations in each target country, but we will also seek possible candidates through the Survey. In addition, necessary systems, activities, human resources, etc. for implementing the strategy that are lacking in each target country will be clarified, and information will be collected to examine the direction of future support.

## 1.3 Target Countries and Areas

- Armenia (Yerevan)
- Sri Lanka (Colombo)
- Pakistan (Islamabad, Karachi, Lahore)
- Japan

## 1.4 Implementation Strategy of the Survey

As a matter of fact, the three target countries of the Survey are not widely known in Japan for having good IT solution industries. Many emerging countries around Japan have already penetrated into the Japanese IT solution market (including China, India, Vietnam, Philippines, Indonesia, Bangladesh, and Myanmar) mostly by offshore outsourcing businesses through Japanese IT solution providers. Therefore, the offshore development market in Japan is now nearly saturated, and it is now a matter of cost competition. Some advanced IT solution providers in China, India, and Vietnam are now beginning to provide direct solution business to Japanese clients without going through intermediate Japanese IT solution providers, however, this strategy requires very good communication with Japanese clients in Japanese language (because Japan is known for very low English proficiency among non-English speaking countries[1]) as well as full understanding of Japanese business practices.

In this current situation in Japan, we must clarify differences and distinguished competitive edges from other countries that are already doing business in Japan so that we can give clear brand image of the IT solution industry in the target countries to potential Japanese clients who don't know these countries well. This current situation and our survey strategy are summarized and illustrated in the figure below.

[1] https://www.nippon.com/en/japan-data/h00594/japan%E2%80%99s-english-proficiency-drops-among-non-english-speaking-countries.html

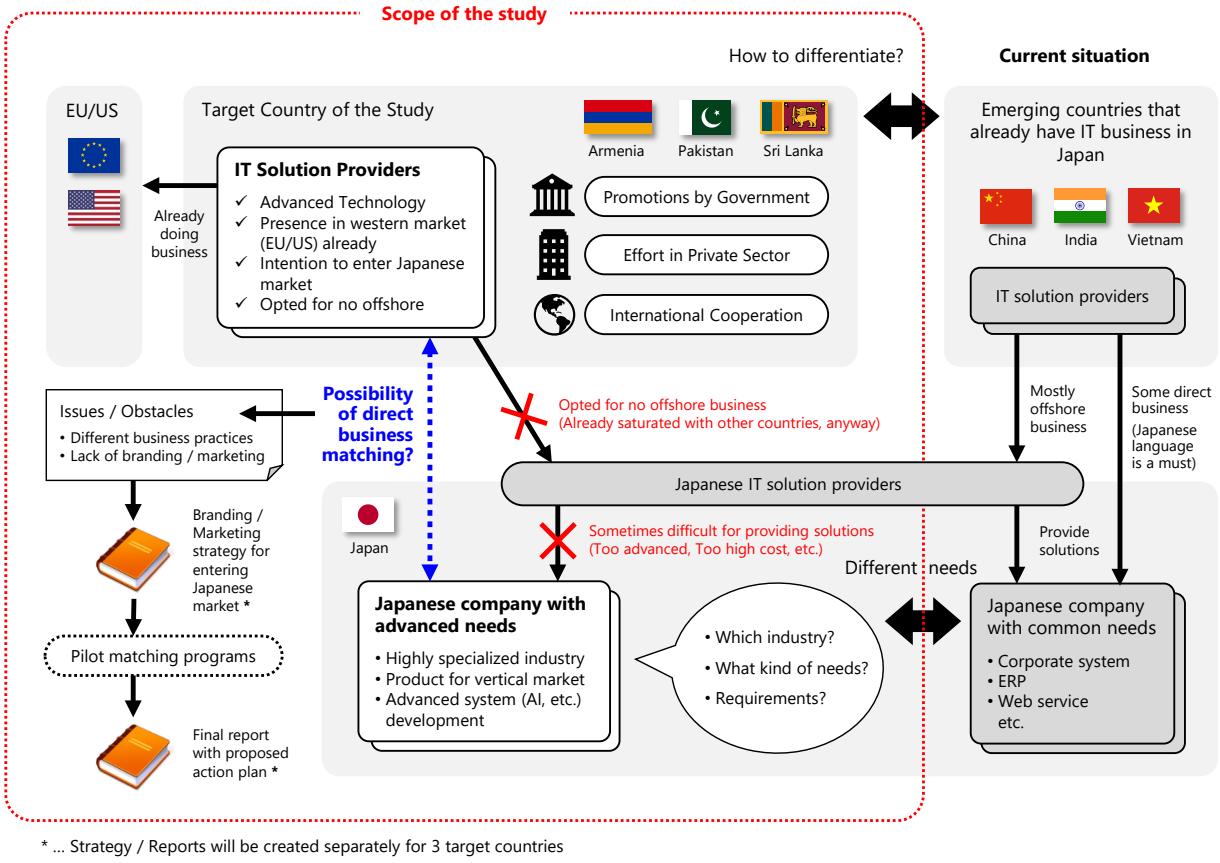



Figure-1 Overview and scope of the Survey (with current situation in Japan)

The competitive edges of target country should be clarified by the following factors, prioritized from (1) to (3).

(1) Among the numerous IT fields, identify specific IT fields in which the IT industry of each target country has clear competitive edge over other emerging countries, then formulate branding strategy that leads to business with Japanese companies that require the specific IT fields.

(2) Examine comparative advantages of each target country in the geographical aspect (such as market access to other areas of the world that Japanese companies may find attractive as a base for business expansion in those areas) or in the cultural aspect (such as in case Japanese companies plan to develop products suited for specific cultural aspect, etc.), then formulate branding strategy based on combination of technological advantages and geographical/ cultural advantages.

(3) If a sufficient comparative advantage in terms of technology, geography, or culture cannot be identified, there will be no other choice but to differentiate each target country by other factors (especially by economic factors like labor cost, economic scale, etc.). Effort will be made to not simply appeal the comparative cost, but to combine the high added value of technological advantage with economic advantage of each target country.

## 1.5 Survey Schedule

The latest overall schedule of the Survey is shown in the figure below. The schedule has been revised three times in June 2020, September 2020, and May 2021 due to COVID-19 pandemic situation in the world and other reasons.

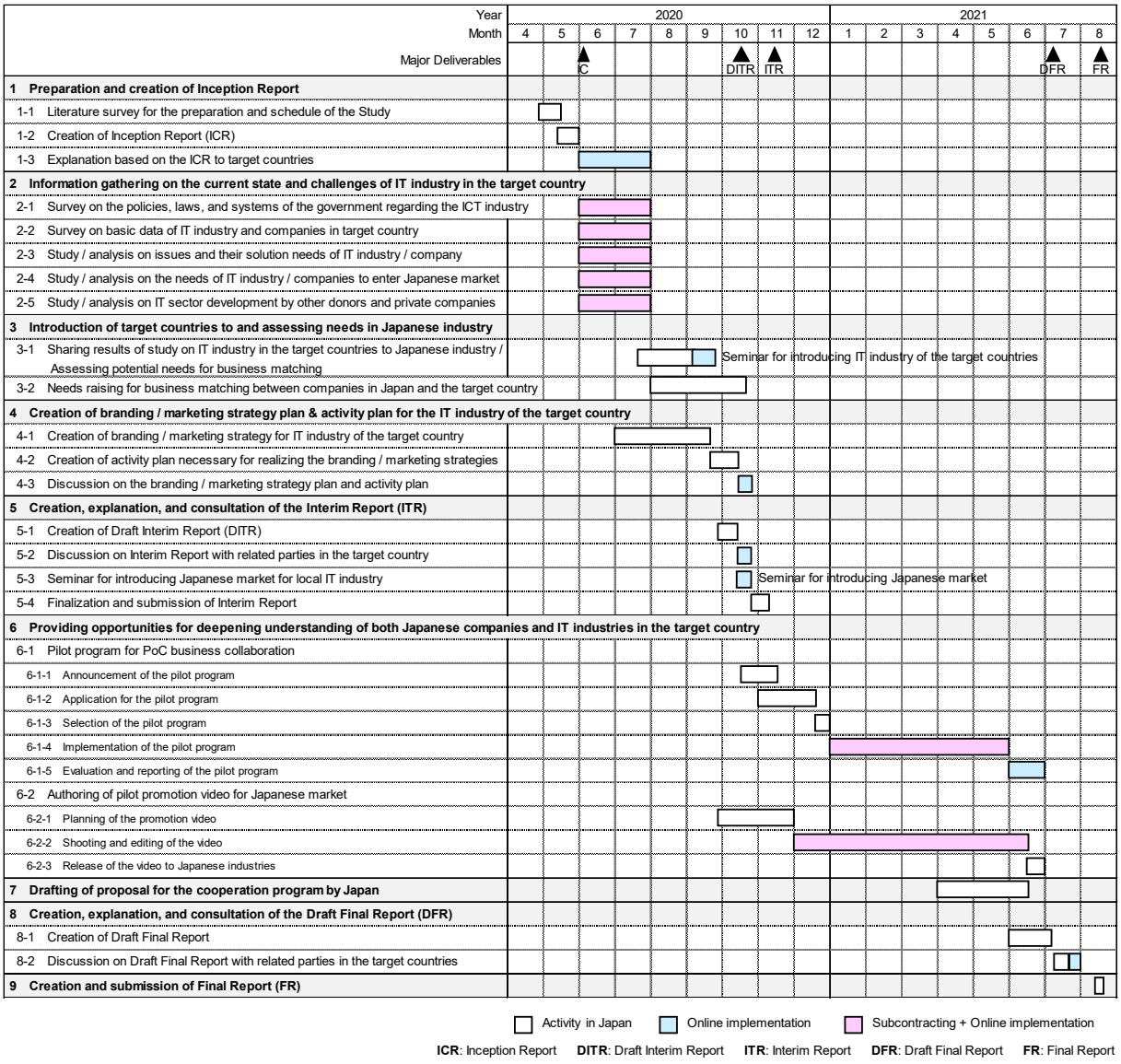



Figure-2 Overall schedule of the Survey

## 1.6 Survey Content

This section describes the contents of each work indicated in the schedule in Figure-2. The Survey is explained in terms of the primary category “Work” and secondary category “Process”.

## Work 1 Preparation and creation of Inception Report

### Process 1-1 Literature study for the preparation and schedule of the Survey

Existing information available online will be collected, examined, and analyzed for preparing detailed contents of the fieldwork in each target country.

When creating Survey items and processes, rather than creating the same content for all target countries, hypotheses will be made regarding the characteristics of each target country and the comparative advantage among the target countries and emerging countries that have already entered the Japanese market. After that, the Survey items and processes will be formulated by prioritizing the topics that can verify the hypothesis.

### Process 1-2 Creation of Inception Report (ICR)

An Inception Report (draft) will be created based on the above analysis. The composition of the Inception Report will be clearly divided into content common to the three target countries and content specific to each country, and the content to be submitted to each country will be the common part plus the part specific to each country.

Before the fieldwork, a questionnaire and presentation materials will be prepared for the target country. Based on the discussion of the content with JICA, the report will be finalized.

### Process 1-3 Explanation based on the ICR to target countries

The Inception Report will be provided to the target organizations/companies of the Survey along with the official letter from JICA during the first fieldwork by the local subcontractor, and the contents of ICR will be explained during the online meeting with the target organizations/ companies.

## Work 2 Information gathering on the current state and challenges of IT industry in the target country

This is the first fieldwork in each target country. Due to the COVID-19 pandemic, the first survey will be implemented by utilizing local subcontractors in each target country as well as by online questionnaire/interviews. The overall procedures for implementing the fieldwork are illustrated in the figure below.

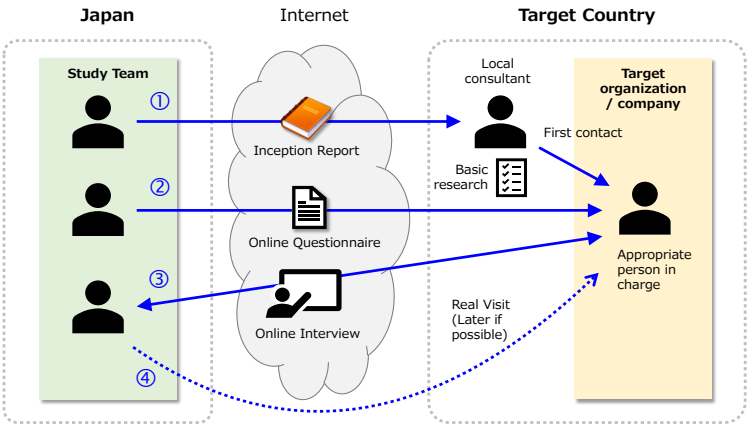



Figure-3 Implementation procedures of the fieldwork in each target country

① The Inception Report will be sent to subcontracted local consultant in each target country, and the local consultant will perform basic research on IT industry there. Then, the local consultant will make the first contact to the target organization or company for the Survey and confirm who will be the appropriate person to talk to.

② The Survey Team will send online questionnaire to the person in charge of the target organization and request response to the questionnaire.

③ Based on the result of online questionnaire, if further clarification is required, the Survey Team will ask for an online interview/meeting with the person in charge of the target organization.

The list of surveyed organization/companies is shown in Appendix 1.

## Work 3 Introduction of target countries to and assessing needs in Japanese industry

### Process 3-1 Sharing results of the Survey on IT industry in the target country to Japanese industry/Assessing potential needs for business matching

The results of fieldwork in the target country will be disseminated to Japanese industries/companies including the information on IT industry/companies, needs and challenges of business matching, etc. Opinions will also be heard from the Japanese side on their needs and issues regarding the possibility of business matching. For these purposes, online seminars (Webinar) have been organized, emphasizing that the content of the seminar is not just an introduction of the target countries, but will lead to the development of speedy and strategic products and services in cutting-edge technology fields that could never be achieved by typical offshore development through Japanese IT solution providers. The detail of this Webinar is described in 5.2/5.3.

### Process 3-2 Needs raising for business matching between companies in Japan and the target country

For Japanese companies that expressed interest in IT companies in the target countries through the seminar, Japanese companies that were unable to attend the seminar but expressed interest, or Japanese companies that had previously approached the target countries but had not been able to collaborate with them, the Survey Team will examine the possibility of individual business matching between local IT companies and Japanese companies as revealed through the fieldwork, and conduct individual visits and interviews with those Japanese companies through online meetings, etc.

## Work 4 Creation of branding/marketing strategy plan & activity plan for the IT industry of the target country

### Process 4-1 Creation of branding/marketing strategy for IT industry of the target country

The branding/marketing strategy for each target country's entry into the Japanese market will be created based on the following processes, i.e., setting of priority target industry in Japan, design of the value image to be evoked, design of customer contact points, finalization of the marketing mix, design of KGI/KPI, and creation of action plan to enter the Japanese market.


Figure-4 Process for creating branding/marketing strategy and activity plan for entry to Japan

The draft branding/marketing strategy for IT industry of the target country is shown in Appendix 4.

### Process 4-2 Creation of activity plan necessary for realizing the branding/marketing strategies

Based on the draft strategy developed in the previous section, the draft activity plan will be developed along a timeline that specifies the key milestones and their timing. In order to realize branding and marketing strategies based on the premise of entering the Japanese market, the draft activity plan should assign more resources to items that are particularly lacking from the current situation in each country. In addition, the proposed activities should have sufficient feasibility for entering the Japanese market by taking into account the current situation and prospects of demand in the Japanese industry for the technology area to be promoted, as well as the market environment and needs of governments and local suppliers in each country.

#### Process 4-3 Discussion on the branding/marketing strategy plan and activity plan

The content of the draft branding/marketing strategy and draft activity plan will be discussed with the relevant organizations in each target country through online meeting (to be held at the same time with Process 5-2).

### Work 5 Creation, explanation, and consultation of the Interim Report (ITR)

#### Process 5-1 Creation of Draft Interim Report (DITR)

The above findings (up to Process 4-1) will be summarized in the Draft Interim Report (DITR). As in the case of the Inception Report, the structure of the DITR should be clearly divided into common content for the three target countries and country-specific content so that there will be dedicated version of the report for each of the three target countries.

#### Process 5-2 Discussion on Interim Report with related parties in the target country

The content of the Draft Interim Report will be discussed with the relevant organizations of each target country through online meetings.

#### Process 5-3 Seminar for introducing Japanese market for local IT industry

In addition to the discussion on the Draft Interim Report and proposed branding/marketing strategies and activities, an online seminar (webinar) will be held to introduce the Japanese market to the local IT industry, to introduce Japanese industries that are promising for business matching as well as necessary knowledge to enter the Japanese market. The seminar will also encourage participation in the business matching-related events described below. The result of this seminar is described in 5.4.

#### Process 5-4 Finalization and submission of Interim Report

The Interim Report will be finalized and submitted based on the results of discussions (Process 4-3/5-2) as well as the results of the above seminar (Process 5-3).

### Work 6 Providing opportunities for deepening understanding of both Japanese companies and IT industries in the target country

#### Process 6-1 Pilot Program for PoC business collaboration

In order to facilitate real business matching between Japanese industries and the ICT companies in the target countries, a pilot program to support PoC business collaboration will be implemented where Japanese companies are encouraged to “try” the collaboration by raising ideas or plans to do small-scale PoC or prototype development with ICT solution companies of the target countries , and the Survey Team will provide support for the implementation of those PoC/prototyping in the form of subcontracting with the target ICT companies. This activity is designed as an alternative

to the invitation program to Japan that had to be canceled due to the COVID-19 pandemic. The result of this program is described in 5.5.

#### Process 6-2 Authoring of pilot promotion video for Japanese market

Based on the branding/marketing strategy plan created in Process 4-1, a pilot promotion video of each target country will be created for Japanese market. Since these videos will be directly targeted at Japanese market, the content of the video will be carefully designed to match the needs of Japanese industry and to answer typical questions that Japanese companies have with the ICT industry of the target countries. The video is planned to have introduction to the ICT industry of target country as well as interviews, and discussions with ICT industry representatives of each country with Japanese subtitle and /or narration. This activity is designed as an alternative to visiting program to the target country by Japanese companies that must have been canceled due to COVID-19 pandemic. The result of this program is described in 5.6.

### Work 7 Drafting of proposal for the cooperation program by Japan

The possibility of cooperation by JICA in this area will be discussed, and if there is a possibility for cooperation, the cooperation scheme, activities, target counterpart organizations, companies, etc. will be examined and proposed in the final report.

### Work 8 Creation, explanation, and consultation of the Draft Final Report (DFR)

#### Process 8-1 Creation of Draft Final Report

A draft final report (DFR) will be prepared based on the results of the research and activities. Branding and marketing strategy proposals and activity plan will also be finalized based on the results of the activities to date. In particular, the proposed activities should clearly describe the specific content and timing of the activities, as well as the Japanese counterparts involved in each activity, so that the governments and companies of the target countries can immediately participate in the activities.

#### Process 8-2 Discussion on Draft Final Report with related parties in the target countries

After receiving confirmation on the content of DFR from JICA, the report will be explained and reported to the relevant target country representatives via an online meeting to discuss the content of the report.

### Work 9 Creation and submission of Final Report (FR)

The final report will be completed and submitted to JICA, reflecting the comments of the relevant organizations of each target country and JICA on the DFR.

# 2 Current Status of Advanced IT Solution Providers in Armenia

Over the past several years, Armenia has seen tremendous growth in the ICT industry. With a growing number of newly established startups, the ICT industry is now contributing more and more to the economy. The attractive and vibrant business environment is one of the important competitive advantages of the Armenian ICT industry. This is backed by the development of high quality IT human resources. In 2017 Armenia produced 0.38 per 1,000 tertiary graduates from ICT related courses. In the same year, Armenia produced 0.6 per 1,000 graduates in natural sciences, mathematics, and statistics. In both measures, Armenia outperformed global averages 0.32 in ICT and 0.36 in natural sciences, mathematics, and statistics. Armenia has recently been working on improvement of its university programs specialized in IT and related sciences.

## 2.1 Government Policy and Relevant Organization for ICT Sector Development

### 2.1.1 Overview of Government Initiatives

The Armenian government deserves praise for the country's tech revival and the development of an attractive business environment and vibrant startup ecosystem in the industry. Although the government has long recognized the importance of ICT to its economy, it did not have a clear vision of policy as to the role of the ICT industry in the national economy until 2000, when the government declared the ICT as one of the priority sectors of Armenian economy. The ICT Master Strategy, the very first strategy specifically for the ICT industry, was adopted in the following year. The ICT Master Strategy aims at two main goals;

**Goal 1**: To create a vibrant and sustainable ICT industry that promotes growth in the sectors of the Armenian economy

**Goal 2**: To position Armenia in the knowledge-based global economy

This strategy provided a clear vision to enable Armenia's ICT industry to produce high-value and knowledge-intensive goods and services (more innovative and niche products and services instead of general and low-value ones) with creative human resources at the core (ICT talent development). Under this strategy, the government started to roll out important policies and has been undertaken numerous targeted actions to achieve these goals.

One of the most important legislations undertaken by the government was the adoption of tax privileges for startup ICT companies.

Establishment of Free Economic Zone (FEZ) is another great development. FEZ has been contributing to the growth of the ICT industry as well. Since establishment of the first FEZ, "Alliance FEZ", in 2012, two more FEZs, Meridian FEZ and Meghri FEZ, have been added, and the fourth one to open in

Hrazdan[2]. These FEZs have been promoting foreign direct investment, increasing export volumes, creating new jobs, as well as ensuring sustainable economic development.

**Alliance FEZ**

Its focuses on production and export of innovative and high technologies in the field of information technologies, electronics, precision engineering, pharmaceuticals and biotechnologies, alternative energy, industrial design, and telecommunications

**Meridian FEZ**

This FEZ is unique and focuses on jewelry, diamond cutting, and watchmaking manufacturing companies.

**Meghri FEZ**

Meghri FEZ was strategically established on the border with Iran to become a bridge between Iran, the EAEU and the EU, strengthening the economic ties with Iran, and for more effective use of relations and potential with EAEU and EU.

**Hrazdan FEZ**

Hrazdan is expected to attract over 50 companies by 2021, with an estimated 15 million USD investment. It is notable that the focus of this FEZ is on AI and Blockchain.

The FEZ residents are exempt from all taxes except the payroll taxes: exempt from profit tax, value added tax, excise tax and customs fees. Multi-usage currencies are also permitted.

The government has built the fundamentals for the ICT industry through implementing essential legislative regimes discussed earlier. On top of it, the government has been working on raising four pillars of success; Attractive entrepreneurial environment; Access to capital; Access to markets; and ICT Talented human resources, which are absolutely necessary to achieve its goal; create continuous growth and sustainable ICT industry.

[2] http://www.fez.am/eng/index.php

Table-1 Chronology of Armenian ICT industry development

| Year | Events |
|---|---|
| 1994 | Adopted the Law on Foreign Investment to promote foreign investment to ICT industry |
| 2000 | Declared the IT sector a priority in the development of the Armenian Economy |
| | UATE, the biggest high-tech business association in Armenia, was established |
| 2001 | The Viasphere Technopark, the first technopark in Armenia, was launched |
| 2002 | The government established the Enterprise Incubator Foundation (EIF) in collaboration with the World Bank |
| 2004 | Synopsys established a presence in Armenia |
| 2005 | The first technological expo DigiTec Expo was organized |
| 2006 | Adopted the Law on State Support for Innovation Activity to promote innovation and R&D activities in the industry |
| 2008 | The government adopted a new ten-year industry strategy "Sustainable Development Program 2008" focused on building infrastructure, improving the quality of IT graduates, and creating venture and other financing mechanism for startup companies |
| 2011 | The Microsoft Innovation Center (MIC) was established through the joint efforts of the Government, USAID, Microsoft Inc., the National Engineering University of Armenia, and EIF |
| | TUMO Center for Creative Technologies was established |
| 2012 | The first Armenian Free Economic Zone (FEZ) was established |
| 2013 | Armenia's first venture capital firm, Granatus Ventures, was established |
| 2014 | Promulgated RA Government Decree # 442 Armenia Development Strategy 2014-2025 (Amendment to Sustainable Development Program 2008) |
| | The Government enacted the Law on State Support for the IT Sector, which provides tax privileges for startups |
| | The Armath engineering laboratories were launched in the Armenian educational system |
| 2016 | The Government adopted the 2016 tax legislation to provide VAT exemption to those who actively involved in R&D operations |
| 2017 | More VC firms and angel networks came into play |
| 2018 | The Armenian Revolution 2018 |
| | The Engineering Association was established |
| 2018 | Signed "Agreement for Promotion and Protection of Investments between Armenia and Japan" |
| 2019 | The Ministry of High Tech Industry was established |
| | WCIT 2019 was hosted in Yerevan by UATE: the largest IT Congress for innovators and entrepreneurs |

### 2.1.2 Ministry of High-Tech Industry

The Ministry of High-Tech Industry of the Republic of Armenia is an authorized body to develop the high-tech sector and Industry in Armenia including ICT sector. The Government of the Republic of Armenia has recognized the high-tech sector as one of the high priority sectors of the Armenian economy including ICT sector.

#### (1) Overall policy of the Ministry

**Priority technology area**

According to the strategy of the MHTI, there are 19 priority areas as shown in the table below. Among them, the fields related to ICT, fields that have already been established as industries by private companies, and fields that are still in the research stage are shown in the table.

Table-2 Priority areas in the MHTI strategy

| No. | Priority area | ICT related | Industry | Research |
|---|---|---|---|---|
| 1 | Artificial intelligence | ✓ | ✓ | |
| 2 | Data science | ✓ | ✓ | |
| 3 | Cybersecurity | ✓ | ✓ | |
| 4 | Quantum computers/technologies | ✓ | | ✓ |
| 5 | Nanotechnologies | | | ✓ |
| 6 | Robotics | ✓ | ✓ | |
| 7 | Internet of things | ✓ | ✓ | |
| 8 | Information technologies | ✓ | ✓ | |
| 9 | Modern technologies of tele/communication | ✓ | ✓ | |
| 10 | Optical-laser technologies | | ✓ | |
| 11 | Radio electronics and microelectronics | ✓ | ✓ | |
| 12 | Bioengineering technologies | | | ✓ |
| 13 | DNA Sequencing | | | ✓ |
| 14 | Superconductors | | | ✓ |
| 15 | Alternative energy technologies | | ✓ | |
| 16 | Energy storage technologies | | | ✓ |
| 17 | High precision manufacturing technologies | | | ✓ |
| 18 | Blockchain technologies | ✓ | ✓ | |
| 19 | Aerospace technologies | | ✓ | |

**Priority regions/zones**

Due to technoparks constructed in the 2nd and 3rd largest cities of Armenia (Gyumri and Vanadzor) they have more IT companies compared to other regions. The next target is likely to be the Syunik region, where there is no tech center at the moment but has a big potential from infrastructure perspective and skilled IT professionals.

**Incentives for ICT industry**

Investment promotion, tax incentives, relaxed regulations, government investment, government investments are expected to launch after establishing the Armenian National Venture Fund.

### (2) Programs for ICT industry development

To promote the ICT industry in Armenia, the Ministry has initiated several different programs, including the followings.

**Grant programs**[3]

"From Idea to Business Grants" project

At the aim of promoting the development of new solutions, creation of new products and delivery of services, as well as the introduction of new technologies in the private sector, the MHTI has implemented the first stage of "From Idea to Business grants project in 2019 extending grants to technological startups. Financing and consultancy have been anticipated

[3] https://hti.am/main.php?lang=3&page_id=737

during the activities, creation of networking opportunities, transfer of expertise in the development of technology commercialization strategies and business advancement expertise.

Grants to mitigate COVID-19 impact on tech firms

The government now conducts "State Support 17th Initiative" to neutralize the consequences of coronavirus on tech firms, and there are three grant programs targeted at COVID-19 under the "From Idea to Business grants" project.[4] The first program is for Innovation up to 10 million AMD per winner project. The second program is for sustainable companies up to 20 million AMD per project. The third program is for co-financing grants (the companies will be provided with 100% co-financing grants not exceeding 30 million AMD).

**Educational projects**

In the auspices of "Higher Education Institution-Private Sector Cooperation for Training of Professionals" project aimed at neutralizing the economic consequences of COVID-19, "Basics of Programming"[5] courses have been designed, as a result of which over 2,000 participants will have the opportunity to receive technological education, minimum 30% of whom will be from outside regions of the capital city of Yerevan. The target of the program is to create the conditions for obtaining the basic knowledge and transferring to the technological sphere to 2020 graduate students and work in the industrial areas that suffered from COVID-19.

**Engineering City project[6]**

This is a public-private partnership project between the Government of Armenia and a Consortium of Private Companies to create a city with environment for engineering companies in the high-tech sector with the purpose of facilitating and accelerating the development of complex engineering solutions. It serves as a platform where engineering, science, and education come together to tackle the advanced engineering challenges of the 21st Century.[7]

**National Venture Fund[8]**

A public-private partnership announced in the Business Innovation Forum in 2019 by the MHTI to create a national-level multi-stakeholder structured fund aiming to further improvement and sophistication of high-tech startup ecosystem in Armenia that will be managed by international world-class professionals. Initial target capital of the National Venture Fund is 18,000,000 USD,

4 https://hti.am/main.php?lang=3&page_id=758, https://hti.am/main.php?lang=3&page_id=759, https://hti.am/main.php?lang=3&page_id=760
5 https://www.edu2020.am/en
6 http://engineeringcity.am/
7 https://armenpress.am/eng/news/999264.html
8 https://news.am/eng/news/547401.html

and 50% of that will be invested by the Government of Armenia, within 5-7 years to invest in startups.

**Scholarships for the development of entrepreneurial skills**[9]

The Government and Draper University in California, USA signed a MoU on September 25, 2019 to provide scholarship for sending tech entrepreneurs from Armenia to a 7-week training program at the University so they get a better understanding of what in Silicon Valley is conducive for building a global company. The winners are already announced, but due to the COVID-19 pandemic, the course is conducted online.

### (3) Legislations to support/promote ICT industry

With the purpose of supporting the industry, a law "On State Support To The Information Technologies Sector"[10] was adopted firstly by the Ministry of Economy in 2014 which then was amended and the competency of certification was transferred to the Ministry of High-Tech Industry. The law, along with respective amendments to the tax legislation[11], defined tax privileges for newly established and startup entities, including a zero percent profit tax rate and a ten percent income tax rate, by December 31, 2022.

The law "On the state support for the innovation activities"[12] adopted by the Ministry of Economy in 2006 is also still in force.

**Policies/legislations to support SMEs**

The SME sector is one of the priority directions for development of the Armenian economy. Therefore, the Government of the Republic of Armenia continually takes steps towards creating a state support system for SMEs. One of the first steps in this direction was the 'Concept for SME Development Policy and Strategy in Armenia' (adopted by the Government of the Republic of Armenia in August 2000), which set the main social, economic, and political goals for SME development policy. This document provided preconditions for adoption of the RA Law 'On State Support of Small and Medium Entrepreneurship' (adopted by the National Assembly on 5 December 2000), which first defined SME standards and the main directions of SME State support in the Republic of Armenia.

In 2010, this law was amended in order for the standards of SMEs of Armenia to comply with the standards set for SMEs by the EU. In order to facilitate the implementation of state support annual programs, the SME DNC of Armenia Fund was established by Decree N282 of the Government of

9 https://hti.am/pages.php?lang=3&page_id=1&id=7493&page_name=news
10 http://translation-centre.am/pdf/Translat/HH_orenk/IT/state_support_to_IT_en.pdf
11 https://www.bdo.global/en-gb/microsites/tax-newsletters/world-wide-tax-news/issue-52-september-2019/armenia-tax-incentives-for-information-technology-startups-extended
12 http://parliament.am/law_docs/140606HO63eng.pdf

the Republic of Armenia on 19 March 2002. It is now considered to be one of the most dynamic SME agencies in the region. The main purpose of the SME DNC is to support development of the SME sector in Armenia, as well as represent and advocate the interests of SMEs by serving as a liaison between the Armenian Government and the business community.

On 1 October 2015, the SME Development Strategy (2016-2018)[13] was approved, and covered the situation of SMEs in Armenia, an analysis of the situation, the strategic objectives of the SME sector over the following three years, the ways and means to implement them, a study of international experiences, the fields that policy addresses, and an analysis of strengths and weaknesses (Ministry of Economy, 2015)[14].

The strategic program of the development of the RA 2017-2022 emphasizes export-driven growth, based on agriculture, IT, tourism, and manufacturing. Among the top priorities are reforms to economic competitiveness and the development of the private sector (in particular, the reduction of administrative barriers and the simplification of tax administration).[15]

**Policies/legislations to support startups**

As mentioned above, the law on "On State Support to the Information Technologies Sector" applies to startups, techno-parks, Technology Centers, incubators, and accelerators, as well as educational and research organizations. Falling in one of these categories does not automatically lead to qualification for tax privileges, as the government requires applying for an additional special license.

In order to be eligible for this new program, a company needs to be involved in the technology sphere in one way or another. This could mean software and internet companies; consulting, computing systems, data mining, or hosting services; network administration or online media companies; and those that work in education and research in IT. The company must be newly established and independent. Companies which are established as branches of foreign entities do not qualify for the program.

**Policies/legislations to support development of advanced ICT**

There is no policy or legislation specifically targeting the latest advanced ICT such as AI, IoT, Blockchain, etc. Those fields are supported through different grants projects implemented by the MHTI.

[13] http://www.bso.am/wp-content/uploads/2016/02/SME-Development-Strategy.pdf
[14] https://www.mineconomy.am/en/page/86
[15] http://www.bso.am/wp-content/uploads/2018/06/SMEs-in-Armenias-economy-2017.pdf
https://eu4business.eu/files/medias/country_report_armenia.pdf

### 2.1.3 Relevant Government Organizations

#### (1) Enterprise Incubator Foundation (EIF)[16]

EIF comprises the largest technology business incubators and IT development agencies in Armenia. Established in 2002 within the framework of the World Bank's "Enterprise Incubator" project, EIF supports the development of ICT sector in Armenia through creating a productive environment for innovation, technological advancement and company growth. EIF's activities cover every aspect of the sector development ranging from ICT-related legal, business and educational reforms, investment channeling and creation of funding schemes for startups, individualized services and consulting for IT companies, talent identification and workforce development. EIF acts as a cross-point for all entities in the sector - public and private institutions, international organizations and government agencies, major multinationals and small startups - and bring them together to act jointly towards the ultimate goal of ICT excellence. The objectives of EIF are:

1. Developing effective information and communication technology infrastructure to enhance technological advance and transition to knowledge economy.
2. Enhancing nationwide access to computers and development of e-society.
3. Promoting Armenian enterprises and increasing their competitiveness in global markets.
4. Creating new channels for attracting foreign direct investment to Armenia.
5. Building linkages with business and research communities in key technology markets.
6. Fostering formation of startups and their further development.
7. Developing managerial and professional workforce and fostering productivity improvement in Armenian companies.
8. Improving access of local firms to best international practices and experience.

#### (2) Gyumri Technology Center[17] and Vanadzor Technology Center[18]

Gyumri and Vanadzor Technology Centers are established by the EIF with the support of the Government of Armenia and the World Bank, in Armenia's second (Gyumri) and third (Vanadzor) largest cities. They are expected to be the main drivers for the development of ICT sector in the regions. The goals of these centers include development of technical and business skills, promotion of technological entrepreneurship, commercialization of innovative research undertakings, creation of new technology companies, attracting of foreign investment and others.

#### (3) Armenian-Indian Center for Excellence in ICT[19]

The Armenian-Indian Center for Excellence in ICT provides a specialized infrastructure and high-performance facility for the delivery of IT-related training and R&D programs that create new

[16] https://www.eif.am
[17] https://gtc.am/
[18] https://vtc.am/
[19] http://www.armindia.am/

opportunities for the development of IT workforce skills in Armenia. It is a joint project of the Governments of Armenia and India, which is implemented by EIF (from Armenian side) and C-DAC center[20] (from Indian side). The Center was officially launched on 7 November 2011. The center is located at Yerevan State University and has large/small conference rooms, five computer training rooms, and an IT library, and conducts IT-related training, training of trainers, exchange programs, and joint R&D projects in collaboration with the Indian side.

#### (4) Innovative Solutions and Technologies Center (ISTC)[21]

ISTC is one of the leading innovation centers in Armenia, founded by joint initiative of IBM, USAID, Armenian Government and EIF since 2015 and was legally registered in 2018. The goals of ISTC foundation are:

1. Developing and strengthening the educational capabilities of Armenian higher educational institutions through joint master programs, training programs and ToTs.
2. Enhancing local research potential, by leveraging microfinancing mechanisms and network of US research institutions.
3. Supporting technical and managerial workforce to form viable startups by providing incubation/ acceleration programs, infrastructure, access to financing and promotion in global markets.

#### (5) Armenian National Engineering Laboratories (ANEL)[22]

ANEL was founded in 2013 by EIF, RA Government, USAID and State Engineering University of Armenia. The main goal of ANEL is to meet the demands of the engineering industry in quality specialists and graduates educated on up-to-date technological base to confront the employee shortage and to increase value-added and innovativeness of Armenian high tech businesses, thus increasing their international competitiveness.

## 2.2 Efforts in Private Sector and Relevant Organizations

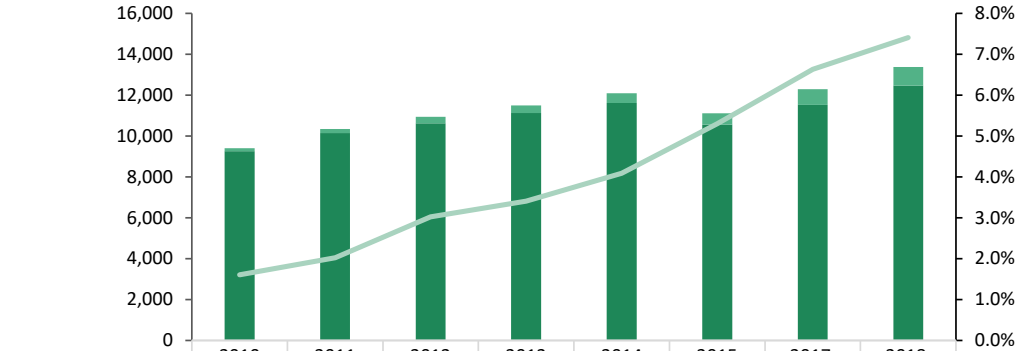
### 2.2.1 ICT Market Overview

The information and communication technology (ICT) sector is one of the most productive areas in Armenia. The government declared the ICT industry as one of the development priorities for Armenia's economy in 2000, and enacted ICT Master Strategy to support ICT companies to be more competitive in the overseas market. The government, with the collaboration of various related organizations, has been implementing numerous initiatives to support the growth of the industry.

Thanks to the Government's continuous and focused efforts, Armenia's ICT industry has been steadily growing over the past years. According to EIF, the average annual growth rate of the ICT sector marked

[20] https://www.cdac.in/
[21] https://istc.am/
[22] https://anel.am/

25.6% during 2010-2018 period, significantly exceeding that of GDP at 4% in the same period[23]. It is also notable that the share of the ICT sector in GDP has grown remarkably. As Figure-5 presents, the share reached 7.4% in 2018, indicating the growing importance of the ICT sector to the nation's economy.

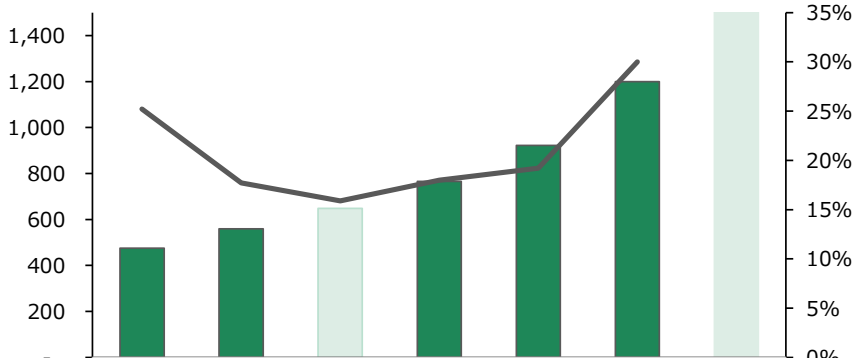



| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|
| ICT turnover | 148.9 | 205.1 | 320.9 | 379.3 | 474.9 | 559.1 | 764.8 | 922.3 |
| GDP | 9,260 | 10,142 | 10,619 | 11,121 | 11,610 | 10,553 | 11,527 | 12,458 |
| % Share in GDP | 1.6% | 2.0% | 3.0% | 3.4% | 4.1% | 5.3% | 6.6% | 7.4% |

Figure-5 Share of ICT turnover in GDP (USD million)[24]

Under the Armenian Development Strategy 2014-2015 enacted in 2014, the goal for the ICT sector was set to achieve 6 to 7% revenue share in GDP by 2025. However, the goal has already been achieved by 2018, indicating the ICT sector has realized far more dynamic growth than expected.

Armenia saw an almost sixfold increase in ICT sector turnover between 2010 and 2018, reaching USD 922.3 million in 2018. According to the Minister of High-Tech Industry, the total ICT turnover realized remarkable growth at around 30% in 2019, and it will be doubled by 2024[25], as seen in Figure-6.




| | 2014 | 2015 | 2016E | 2017 | 2018 | 2019 | 2024F |
|---|---|---|---|---|---|---|---|
| IT Market | 475 | 559 | 648 | 765 | 922 | 1,199 | 2,400 |
| YoY Growth | 25.2% | 17.7% | 15.9% | 18.0% | 19.2% | 30.0% | |

Note: Year 2016 data was not available. Estimation was made based on the yoy growth rate of 2015 and the turnover in 2017.

Figure-6 Armenia's ICT turnover between 2014-2024 (USD million)[26]

[23] Armenian ICT Sector Report. 2019. EIF
[24] Armenian ICT Sector Report. 2013-2018. EIF
[25] https://massispost.com/2019/12/armenias-tech-sector-continues-rapid-growth/
[26] Armenian ICT Sector Report. 2013-2018. EIF

### 2.2.2 ICT Market Segments

The activities in Armenian ICT sector are normally grouped into two main segments; The Software and Services segment, and Internet Services Provider segment, using NACE rev2 [27] classification as follows[28].

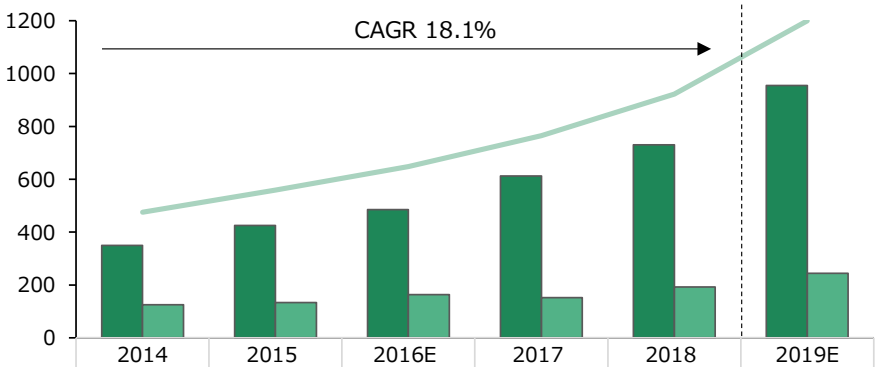
**Software and Services:**

Software development, programming services, consulting and integration, computer graphics, animation and multimedia programs, microcircuits design, engineering, research, and experimental services

**Internet Service Provider:**

Internet applications and e-commerce, databases and management systems, accounting, finance, banking, and networking systems

As Figure-7 presents, the overall industry has been growing at CAGR 18.0% between 2014 and 2018, and both the Software and Services segment and Internet Service Provider segment were demonstrating a constant growth and contributed USD 730.2 million and USD 192.3 million respectively in 2018.




| | 2014 | 2015 | 2016E | 2017 | 2018 | 2019E |
|---|---|---|---|---|---|---|
| Software & Services | 349 | 426 | 485 | 613 | 730 | 955 |
| Internet Service Providers | 126 | 134 | 163 | 152 | 192 | 244 |
| Total | 475 | 559 | 648 | 765 | 922 | 1199 |

Figure-7 Revenue distribution by segments (USD million)[29]

The revenue distribution by segments showed no significant change over the years, the Software and Services segment remain dominant, which represents about 80% of the industry over past six years, as shown in Figure-8.

[27] https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF
[28] Tech and Entrepreneurial Ecosystem Mapping report. Catalyst
[29] Armenian ICT Sector Report. 2014-2018. EIF

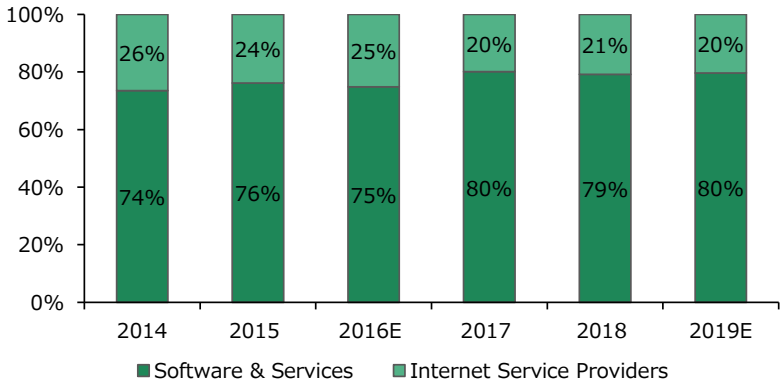



Figure-8 Revenue distribution by segments (%)[30]

Since the Armenian ICT sector has been growing as the outsourcing center for customized software, it still is the most strong and dominant specialization both in terms of revenue share and the number of companies, as shown in Figure-9.

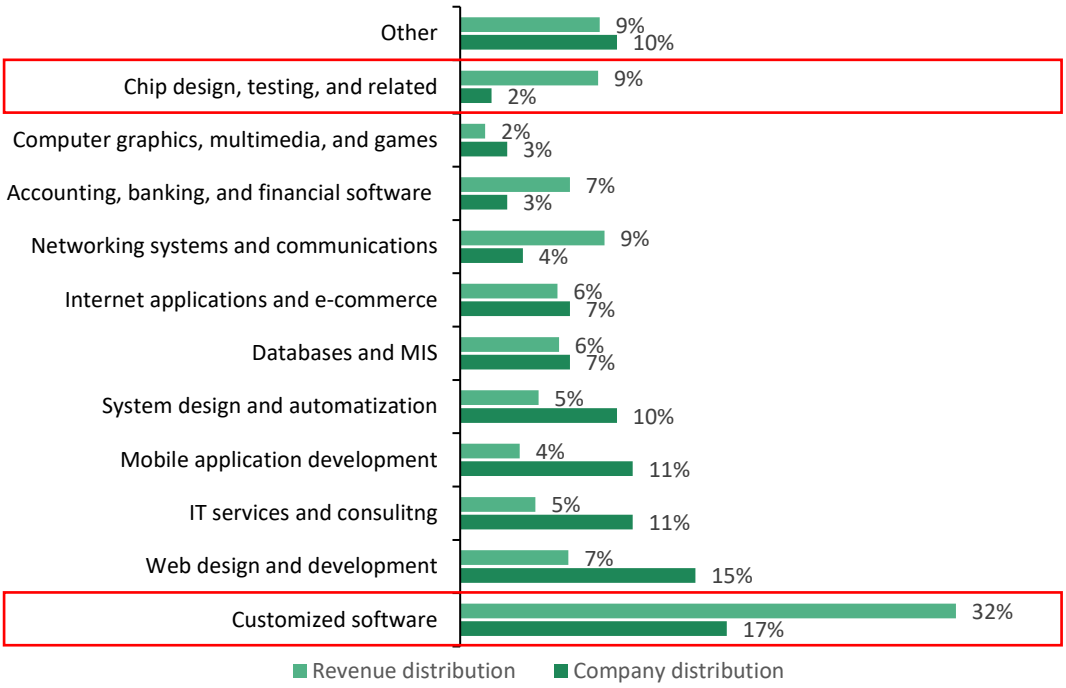



Figure-9 Revenue distribution and company distribution by specialization[31]

The customized software segment showed a strong growth and marked a 94% increase from 2017 while the number of companies dropped by 4% in the same period. This indicates the firms in the customized software segment are engaging in more complex and value-added projects, making the segment more attractive for foreign venture and angel investors.

[30] Armenian ICT Sector Report. 2014-2018. EIF
[31] Armenian ICT Sector Report. 2018. EIF

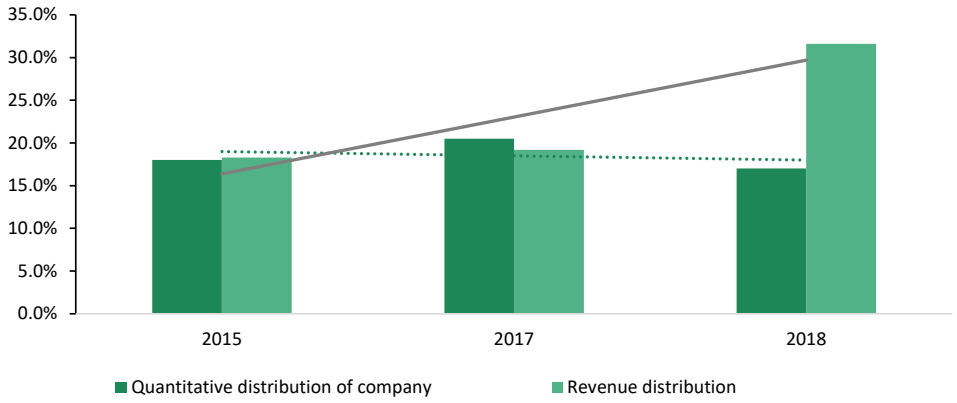



Figure-10 Growth of the customized software segment[32]

Chip design is another strength of the Armenian ICT sector. Being the outsourcing and R&D center of the world's leaders in semiconductor design and production, Armenia has been making significant gains. Although the chip design segment makes up only 2% of the total numbers of ICT companies, it contributes 9% of total ICT turnover in 2018.

As for the distribution of the ICT companies by ownership geography, of all 800 active ICT companies, 243 companies (30.4%) were foreign-owned as shown in Figure-11. US and Canada-owned companies constitute the majority (53.9%), followed by European companies (23.0%), and Russia/CIS-owned companies (17.3%).

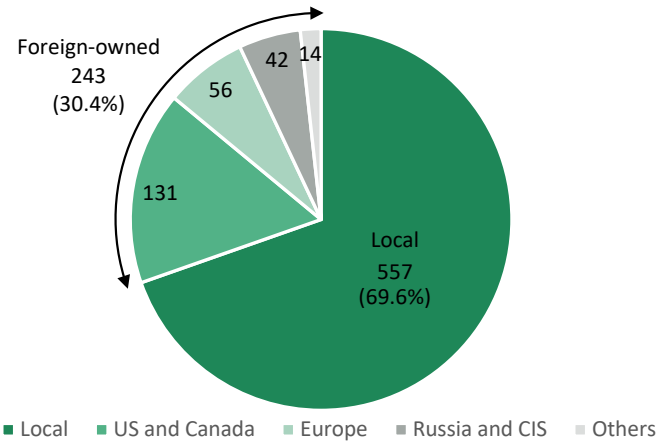
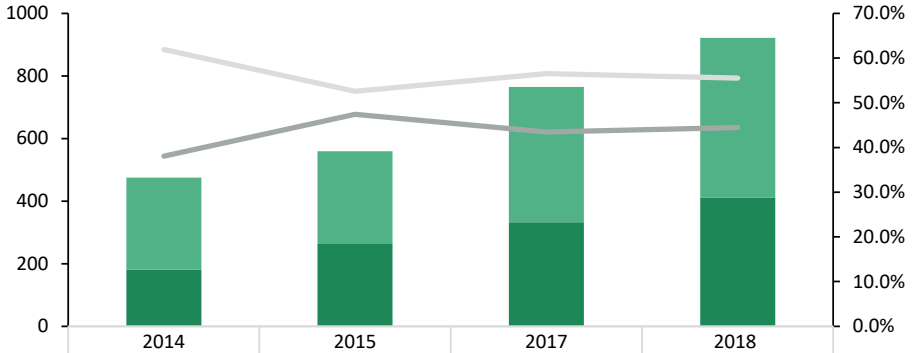



Figure-11 Distribution of ICT companies by ownership geography[33]

The share of company distribution by ownership geography is closely related to the distribution of the ICT exports by destination. The large part of the ICT exports go to the USA and Canada (45%) and Europe (25%) because the parent companies of the majority of foreign-owned companies are located in those regions.

[32] Armenian ICT Sector Report. 2015-2018. EIF
[33] Armenian ICT Sector Report. 2018. EIF

It is also notable that the contribution rate of foreign-owned companies is quite high. Although the number of foreign-owned companies makes up only 30.4% of the total industry, they have generated more than half of total turnover of the industry, contributing USD 512.1 million in 2018, as shown in Figure-12.



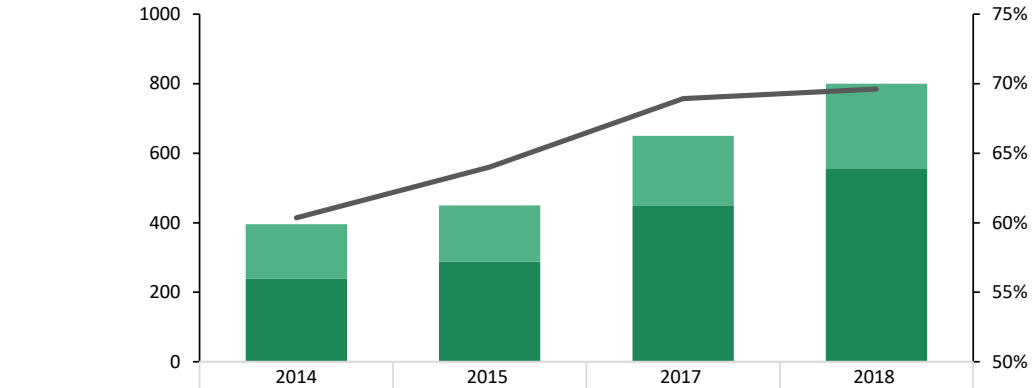

| | 2014 | 2015 | 2017 | 2018 |
|---|---|---|---|---|
| Foreign-owned | 294.0 | 293.9 | 432.4 | 512.1 |
| Local | 180.9 | 265.2 | 332.7 | 410.2 |
| Total | 474.9 | 559.1 | 765.1 | 922.3 |
| % share of Local | 38.1% | 47.4% | 43.5% | 44.5% |
| % share of Foreign | 61.9% | 52.6% | 56.5% | 55.5% |

Figure-12 Revenue distribution by local and foreign-owned companies (USD million)[34]

Armenia's ICT industry has been initially growing by being an offshore development center for foreign parent companies. The share of foreign-owned companies used to be higher, at around 40% in 2014, as seen on Figure-13. Then, as the industry started to mature and started to shift toward product creation rather than being an outsourcing center, the demand for IT services in the domestic market started to grow.

However, the growth of domestic demand for IT is relatively slow and small. To support the domestic market to grow, the government has been taking initiatives through government-sponsored programs and procurement activities such as e-commerce and e-government programs that employ local suppliers and developers. It certainly helped the growth of the domestic market, and the number of local companies demonstrated a gradual but constant increase in recent years, reaching 70% of the total industry in 2018, as shown in Figure-13.

[34] Armenian ICT Sector Report. 2014-2018. EIF



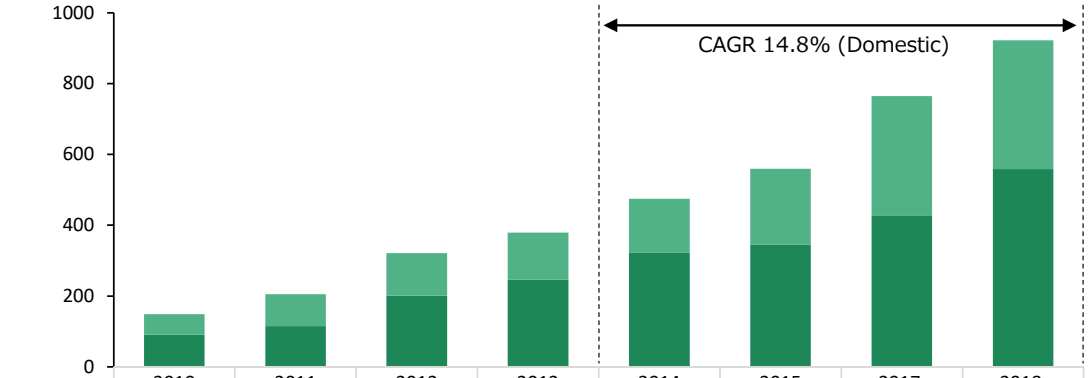

| | 2014 | 2015 | 2017 | 2018 |
|---|---|---|---|---|
| Foreign | 157 | 162 | 202 | 243 |
| Local | 239 | 288 | 448 | 557 |
| % share of Local | 60% | 64% | 69% | 70% |

Figure-13 Growth in the number of local companies and its share (USD million)[35]

As mentioned above, the proportion has changed a little more to the local-based companies, but it must be noted that the number of foreign-owned companies has also been making a healthy growth. As said before, foreign-owned companies have been primarily outsourcing centers. Thus, only a small portion of revenue generated by these foreign branches remains in the country (typically only salaries and other overhead costs). Nevertheless, this branch model is still relevant for Armenia and has a visibly positive effect on the industry and the overall economy[36]. The healthy growth of both local and foreign-owned companies indicates the Armenian ICT industry is a favorable and attractive business environment for both local and foreign entrepreneurs.

In terms of revenue breakdown, the domestic market has shown a rapid growth in recent years. As Figure-14 presents, the domestic market volume reached USD 558.4 million, comprising 60.5% of the industry's total value. Also, it marked a 31% increase compared to 2017, and growing at CAGR 14.8% between 2014 and 2018. The growth of the domestic market was primarily due to the growing demand for ICT services in other sectors of the Armenian market, the government initiatives to promote the domestic growth, and the shift to high-value products as addressed earlier. A large percentage of the software package sold in the domestic market have been general products such as accounting and financial software. In recent years, development in more high-tech and innovative fields such as Artificial Intelligence (AI), Machine Learning (ML), and IoT, has been gaining momentum. This shift from general and low-value products to high-value products is expected to bring further growth to the industry.

[35] Armenian ICT Sector Report. 2014-2018. EIF
[36] Armenian ICT Sector Report. 2018. EIF




| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|
| Export | 58.2 | 89.7 | 119.6 | 133.4 | 153.2 | 214.4 | 338.6 | 363.9 |
| Domestic | 90.7 | 115.4 | 201.3 | 245.7 | 321.7 | 344.7 | 426.2 | 558.4 |

Figure-14 Revenue breakdown by markets (USD million)[37]

### 2.2.3 Trend Analysis on ICT Market

In recent years, Armenia's ICT industry has been shifting toward becoming a hub for innovation and technology development rather than just an outsourcing destination for its competitive labor cost. The majority of foreign branches used to be purely development centers for the parent companies abroad. And "brain drain," whereby skilled engineers migrate overseas for better-paid jobs, has been a severe issue for the industry.

But now, the new movement is emerging among the Armenians. With the new government, various initiatives actively work on repatriation and talent inflow. And an increasing number of Armenian ICT companies started to create their own products or services and invest in R&D along with the support of Government's tax incentives. This clearly indicates that Armenia's ICT industry is moving up a step higher and gearing up for more complex and value-added projects.

Armenia's ICT industry is at a real turning point. With the arrival of the Fourth Industrial Revolution, startups focused on the next-gen technology such as AI, machine learning, and robotics have been born one after another. Leveraging the country's and the industry's competitive strength, Armenia is now gaining back their once separated mature and highly-skilled workforce from abroad, and transforming into a home of talent or so-called high-tech startup hub, "Silicon Mountain".

### 2.2.4 Access to Capital

Armenia's growth used to be constrained by limited access to external sources of capital due to the lack of domestic venture capital funds, angel investors, incubators, and accelerators. After the first Armenian venture capital, Granatus Ventures, appeared in 2013, numerous funding vehicles were launched and available in the ecosystem. Also, various incubation and acceleration programs and events have been contributing to facilitate the access to capital. The examples of main funding vehicles are as follows:

[37] Armenian ICT Sector Report. 2010-2018. EIF

Granatus Venture[38]

The first Armenian VC launched in 2013. It has been investing worldwide in those startups that have core value-add activities in Armenia. The fund engages in the early life of a company providing startups with initial seed capital and following on with additional investments as the company mature.

**SmartGateVC[39]**

It is a Sillicon Valley pre-seed VC fund. The fund provides its portfolio startups with resources, networks and hands-on support to transform ideas into global ventures by taking them from Armenia to the US market. The key focus area are Artificial Intelligence (AI), Security, IoT, Biotech, Quantum Computing and Blockchain. The first closing was made in 2018, since then, 15 deep tech companies were backed up by the fund.

**Business Angel Network of Armenia (BANA)[40]**

BANA provides a platform for investors to meet and cooperate with their peers, as well as connect them with aspiring startups and entrepreneurs in need of investment and expertise in Armenia. Currently 8 startups have been funded and 2 deals in process.

**Angel Investor Club of Armenia (AICA)[41]**

AICA is a non-profit organization designed to foster the development of entrepreneurial environment in Armenia. AICA's portfolio includes, Embry Tech, Omega Coding, Illuria Security, D'efekt, and aExpper Technologies.

There are also many international VCs working in Armenia such as Sequoia, Sutter HIll Ventures, and DCM. In addition, startup support programs such as Armenia Startup Academy, Entrepreneurship and Product Innovation Center (EPIC) and Beeline Startup Incubator have been launched, and startup related events are being held regularly and IT startups and entrepreneurship is revitalizing.

### 2.2.5 Access to International Market

Armenia is located in the eastern end of Europe and the western end of Asia. The southern end of the country is facing Iran, the entrance to the Middle Eastern countries. Although Armenia is strategically located, access to international market has been limited due to the hostile situation with Turkey and Azerbaijan. However, the Armenian government has been gaining access to international markets by building international relationships through multiple trade-related agreements and memberships. These agreements provide access to the countries in the EU, EEU, CIS, and EAEU, and also the United States,

38 https://www.granatusventures.com/
39 https://www.smartgate.vc/
40 https://bana.am/
41 https://aica.social/

Canada, Switzerland, Japan, and Norway, meaning Armenia has access to Europe, Middle East, the Americas and Asia. With the trading relationships built around the globe, Armenia will be a perfect hub for foreign companies looking into expanding into these countries.

Below is the list of major trade-related agreements and memberships Armenia has signed for.

- Preferential Trade Agreements (PTAs) with Europe, US
- Free Trade Agreement with most of CIS states
- Generalized Scheme of Preferences (GSP) beneficiary status with Canada, Japan, Norway, Switzerland, the United States, and the EU
- Free Trade Agreement with Georgia
- WTO (the World Trade Organization) membership
- Eurasian Economic Union (EAEU) membership
  It provides direct access to a total market of more than 175 million people and a combined GDP of 2.2 trillion USD.
- Comprehensive and Enhanced Partnership Agreement (CEPA) with EU
  It aims at improving the investment climate in Armenia and creating a better regulatory environment for businesses to grow.
- Trade and Investment Framework Agreement (TIFA) with the US
  It aims to improve the cooperation between countries and to create opportunities for investment and trade
- Armenia established FEZ in the border area with Iran.
  It is an area that not only trades with Iran, but also serves as an export base for the Middle East. This FEZ will work as a hub connecting the Eurasian Economic Union (EAEU) member countries and their market.
- The Agreement between the Republic of Armenia and Japan for the Liberalization, Promotion and Protection of Investments (2018)
  It aims at promotion and mutual protection of investments and facilitate economic collaboration between two countries.

For the investment promotion, 'Enterprise Armenia'[42] (Investment Support Center) is the national investment promotion authority of Armenia. The primary mission of the Center is promoting and facilitating foreign and domestic investments, providing aftercare services.

[42] https://enterprisearmenia.am/en

### 2.2.6 Relevant Non-government Organizations

There are following relevant non-government organizations for the promotion of advanced ICT sector.

#### (1) TUMO Center[43]

Another initiative promoting the ICT sector is the TUMO Center for creative technologies which is a non-profit venture founded through the Simonian Educational Foundation. Though it is not a government initiative, its activities are important in the development of ICT sector in Armenia. There are now four TUMO Centers in Armenia - Yerevan, Dilijan, Gyumri, and Stepanakert. There are also two international centers in Beirut and Moscow. More centers are planned in Koghb, Masis, and other locations in Armenia and abroad. There is no direct government involvement in the activities, but the government supports the activities of the TUMO Center, and representatives from the government participate in important events.

TUMO offers extracurricular, innovative education programs in design and technology, providing teenagers with the space and equipment to advance their education while developing technical skills. One unique aspect of TUMO's education model concerns the TUMO Path, a software program developed in-house that places beginning students on a learning plan based on the students' expressed areas of interest, showing the students' rate of progress and letting them know which tasks they need to complete to move on to the next level. TUMO's curriculum consists of self-learning exercises, workshops and learning labs in 14 learning targets shown below (ICT-related targets are indicated in italic).

*Animation*/ *Game Development*/ Filmmaking/ *Web Development*/ Music/ Writing/ Drawing/ Graphic Design/ *3D Modeling*/ *Programming*/ *Robotics*/ *Motion Graphics*/ Photography/ New Media

In March 2019, TUMO and EU launched their partnership to create a new "Convergence Center for Engineering and Applied Science"[44]. This center will be a state of the art education and startup hub for students and young professionals. It is planned to start construction in 2021 and will be completed within two years.

#### (2) Union of Advanced Technology Enterprises (UATE)[45]

The Union of Advanced Technology Enterprises (UATE) is a non-government, non-for-profit entity of IT and High-Tech companies, multinational corporations, organizations and institutions operating in Armenia. The mission of UATE is to position Armenia as one of the International High-Tech market leaders by supporting a favorable business environment, implementing lobbing

[43] https://tumo.org/
[44] https://www.convergence.center/
[45] https://www.uate.org/

and development projects, supporting High-Tech education and consolidating field players. Many high-tech enterprises including major IT solution companies in Armenia are the members of UATE. Main strategic directions of UATE are:

- High-tech Education & Workforce Development
- Promote Armenian High-Tech Brand (Why Armenia[46])
- Private Sector & Government Cooperation
- Military Industry
- Industry Lobbing
- Business and Entrepreneurship Development
- Development of UATE itself

### (3) Armath Laboratories[47]

Since 2011 the UATE undertakes to establish the Armath Engineering Laboratories educational program, and has started the process of exporting the Armenian model of technology education all over the world. As of January 2020, 575 engineering laboratories operate on the territory of Armenia, Artsakh and Georgia. Around 15,000 students get free engineering education.

At Armath Laboratories kids aged 10-18 are introduced to science, technology, engineering, and math (STEM) education through interactive after-school classes, exciting competitions, innovative camps and more. These young engineers are given the opportunity to design, build, test, and improve their own creations in a safe and fun environment while making new friends and creating startups.

### (4) Catalyst foundation[48]

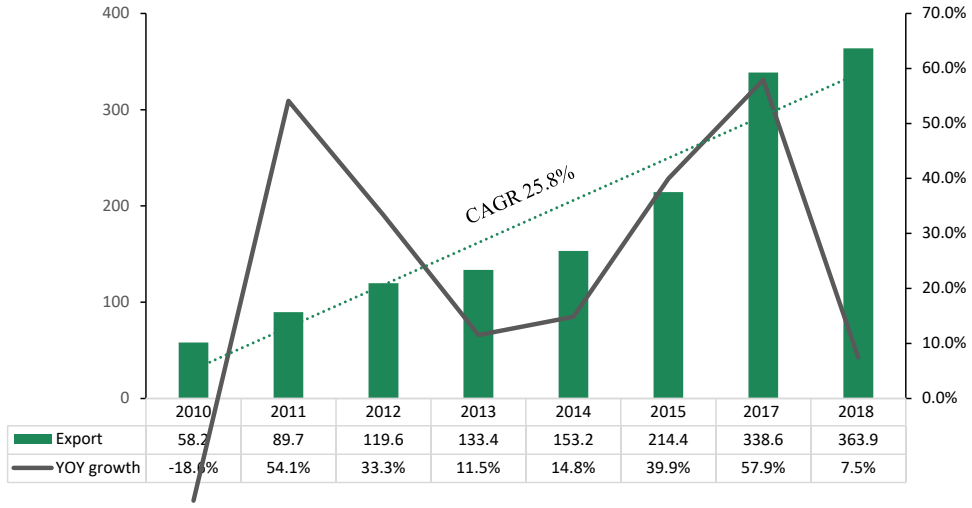
Catalyst Foundation is established by the founding partners of SmartGateVC for running innovative programs which will feed the Armenian startup ecosystem with relevant skillset and pipeline of capable companies. It has several startup supporting initiatives such as Armenia Startup Academy[49], originally started by EU4Business[50] and GIZ, that provides entrepreneurship and startup education program, which aims to prepare startups to raise their pre-seed rounds and expand to global markets through its Pre-acceleration and Traction (intensive mentorship-based program) programs.

46 http://whyarmenia.am/
47 https://armath.am/
48 https://www.catalyst.am/
49 https://www.startupacademy.am/
50 https://eu4business.eu/

## 2.3 Export Status of ICT Sector

### 2.3.1 Achievements

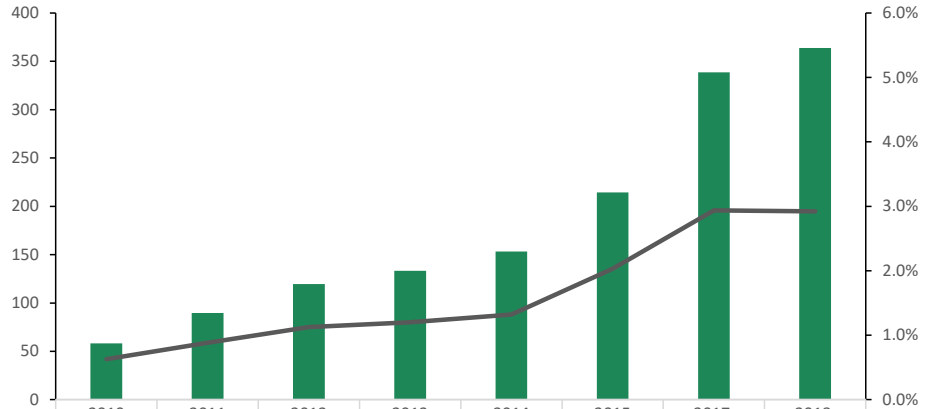
The ICT sector is one of the Armenia's most dynamic sectors and has been largely export-oriented. ICT exports is a government's priority sector for development under the government's "Export-led Industrial Policy" adopted in 2011[51]. The government's initiatives combined with active participation of the private sector resulted in the growth of ICT exports in recent years. The turnover of ICT exports has been growing significantly at CAGR 25.8% during 2010 and 2018, and reached USD 363.9 million in 2018, as seen on Figure-15.




| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|
| Export | 58.2 | 89.7 | 119.6 | 133.4 | 153.2 | 214.4 | 338.6 | 363.9 |
| YOY growth | -18.0% | 54.1% | 33.3% | 11.5% | 14.8% | 39.9% | 57.9% | 7.5% |

Figure-15 Turnover of ICT exports (USD million) [52]

Furthermore, the share of ICT exports in GDP has been making a gradual but healthy growth and reached 2.9% in 2018 compared to 0.6% in 2010, as Figure-16 presents.

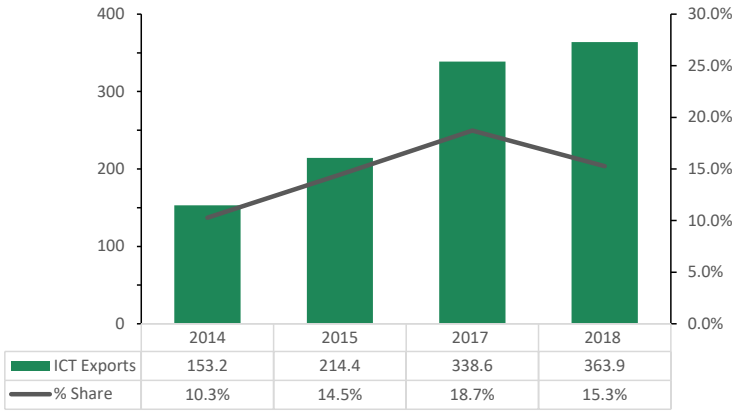



| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|
| ICT Exports | 58.2 | 89.7 | 119.6 | 133.4 | 153.2 | 214.4 | 338.6 | 363.9 |
| % Share in GDP | 0.6% | 0.9% | 1.1% | 1.2% | 1.3% | 2.0% | 2.9% | 2.9% |

Figure-16 Growth of ICT exports and % share in GDP[53]

[51] Export-Led Industrial Development Strategy. 2015. World Data Bank
[52] Armenian ICT Sector Report. 2010-2018. EIF
[53] Armenian ICT Sector Report. 2010-2018. EIF

Figure-17 depicts ICT exports and it's share in total exports. ICT has been keeping its share in total exports at an average of 15%. ICT exports accounts for a not significant but sizable share in total exports. Since the share of ICT exports is still around 15%, Armenia's ICT exports still has a large room for growth and is expected to deliver solid growth as the government's efforts to promote ICT exports, introduction of FEZs for example, starts to deliver more results.




| | 2014 | 2015 | 2017 | 2018 |
|---|---|---|---|---|
| ICT Exports | 153.2 | 214.4 | 338.6 | 363.9 |
| % Share | 10.3% | 14.5% | 18.7% | 15.3% |

Figure-17 ICT Exports and % share in total export[54]

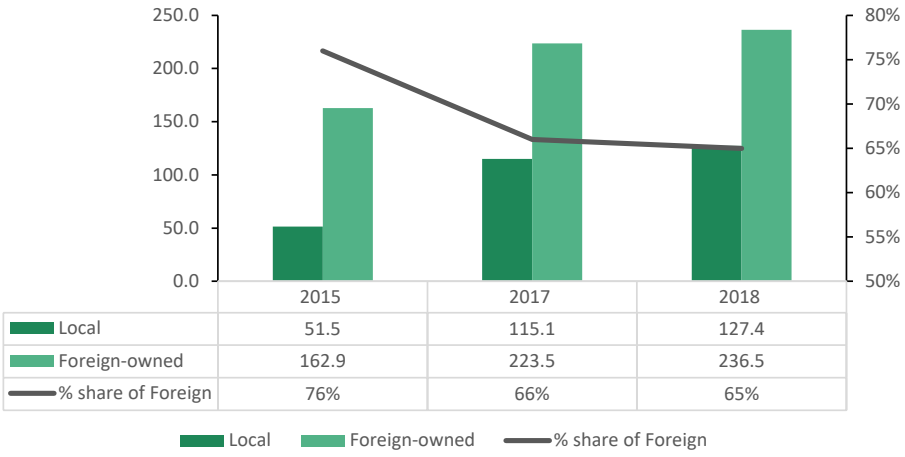
### 2.3.2 Breakdown by Segments

For Armenia ICT services exports and ICT goods exports amount to 98% and 2% of total ICT exports respectively in 2018. Although ICT exports has been showing a healthy growth, there is no considerable change in ICT goods exports over years, remaining 1～2% during past years; therefore, we mainly focus on ICT service exports in this report. Also, since Internet Service Provider segment basically provides their services to domestic market only, it must be noted that the ICT exports is primarily oriented toward export of output from Software and Services segment.

Foreign-owned companies is dominant in ICT exports and it accounted for 65% of the export share in 2018. The major contributors were the large-size companies in the Software and Services segment, who were branches of international firms, and they normally export most of all output to their parent companies overseas. In recent years, many domestic companies also started to export a significant portion of their products and services.

As Figure-18 presents, while export value of both local and foreign-owned companies have been increasing, the percentage of foreign companies in export share decreased by 11% from 76% to 65%, which indicates; local companies have become more active in ICT export activities in recent years, and local companies started to produce value-added products necessary to compete in the global market.

[54] Armenian ICT Sector Report. 2014-2018. EIF




| | 2015 | 2017 | 2018 |
|---|---|---|---|
| Local | 51.5 | 115.1 | 127.4 |
| Foreign-owned | 162.9 | 223.5 | 236.5 |
| % share of Foreign | 76% | 66% | 65% |

Figure-18 Distribution of ICT Exports by Local/Foreign-owned companies (USD million) and Foreign-owned companies' share[55]

As for export destination, the largest export destination has been the United States and Canada, accounting for 45% of total exports, followed by Europe at 25%, Asia at 11%, Russia and CIS countries at 10%, and 9% to Cyprus, India, South American and other countries, as seen in Figure-19.

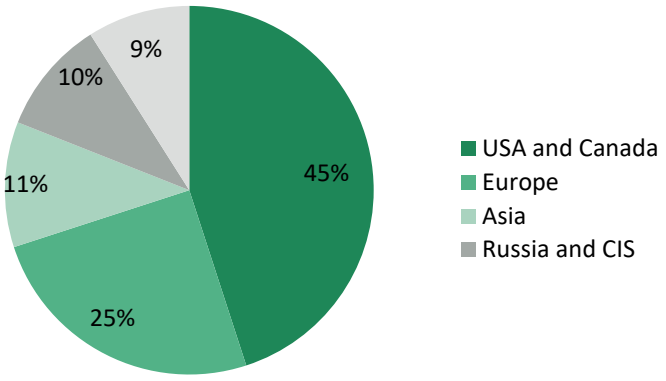



Figure-19 Revenue breakdown by export destination[56]

In recent years, the proportion of export destination has been changed. 11% of the ICT exports were now destined for Asia. It was, mainly, due to the new government's effort to be more active and an equal partner to the members of the Eurasian Economic Union (EEU), which Armenia entered back in 2015. The new government realized the importance of Asian market and decided to increase the scope of EEU partnership with Asian countries, aiming to make better use of the EEU partnership. It has successfully reflected in the current export geography as shown in Figure-20.

[55] Armenian ICT Sector Report. 2015-2018. EIF
[56] Armenian ICT Sector Report. 2018. EIF

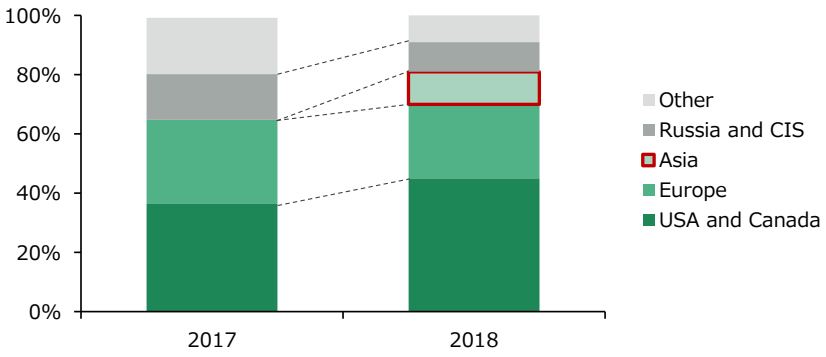



Figure-20 Change in the proportion of export destination[57]

Another factor that contributed to the growth of the ICT exports was the introduction of the Free Economic Zone (FEZ). The government founded the first FEZ, Alliance FEZ", in 2012, aiming to increase the export volumes and contributing to the development of the economy. Alliance FEZ focus on the production and export of high and innovative technologies in the area of IT, precision engineering, electronic, industrial design, pharmaceutics, biotechnologies, etc. And the third FEZ, Meghri FEZ was established to deepened relations with Iran, making it a strategic cooperation point.

Currently, Armenia has three working FEZ, with a fourth to open in Hrazdan. These FEZs will support continuous and further growth in ICT exports combining with the opened channel to Asia by EEU partnership.

### 2.3.3 Core Competence of ICT Sector

Armenia is often considered to be the next potential startup nation, due to an abundance of brainpower and technical ingenuity. Although the population of Armenia is just around 3 million, about 7 million Diaspora Armenian live in the world, making a global network. Utilizing this diaspora network could be an advantage to develop business in third countries. The government's open-door policy toward foreign investments, along with tax privileges、access to the international market, and support from the diaspora network, Armenia's ICT sector has seen tremendous growth in the recent years. The table below shows Armenia's competitive advantages relative to other countries of the region.

Table-3 Armenia's competitive advantages relative to other countries of the region[58]

| |
|---|
| • World-class R & D capabilities in engineering, computer science, physics, and mathematics<br>• Well-educated and talented workforce with technical skills and English language proficiency<br>• Strong university programs with specializations in IT and related sciences<br>• Highly competitive labor costs and low operating costs<br>• Solid government support for the sector and commitment to improving the investment climate<br>• Sustainable and continuous growth in the IT sector<br>• Strong and successful Diaspora in Europe and North America<br>• Extensive experience with large multinational companies<br>• IP protection laws and regulations that meet international standards |

[57] Armenian ICT Sector Report. 2018. EIF
[58] Armenian ICT Sector Report. 2018. EIF

According to the World Bank's Doing Business 2020 report, Armenia is ranked 47th among 190 countries for the ease of doing business, 10th for the ease of starting a business, and 13th for registering a property. As seen in Table-4, Armenia demonstrates an attractive destination for foreign investment and entrepreneurship comparing to the other regions.

Table-4 Key indicators for establishing and operating a business for 2018[59]

| Indicator | Armenia | Europe and Central Asia | OECD Countries |
|---|---|---|---|
| Starting and registering a business: Time (days) | 4.5 | 10.1 | 8.6 |
| Starting a business: Cost (% of income per capita) | 0.9 | 4.2 | 3.2 |
| Enforcing contracts: Time (days) | 570 | 478 | 558.2 |
| Enforcing contracts: Cost (% of claim) | 16 | 25.5 | 22.2 |
| Total tax rate (% profit) | 18.5 | 34.2 | 40.7 |

The core competence presented here shows Armenia's current and potential competitive advantage in the specific technology area compared to other emerging countries. Since quantitative data was not available, selection was basically made based on qualitative data and information collected through the research process, sourced from industry reports, investment reports, news articles, statistics, research papers, and other relevant sources. The criteria we used for the analysis as follows:

**Qualitative**: Existence of notable startups (top-funded, award winning and others), the government's focus and strategy, educational focus and strategy, recent sector developments, existence of formal/informal community in development of the specific technology.

### (1) Semiconductor design

Semiconductor design has been the strength of the Armenian ICT sector since the Soviet time. Armenia has been making significant gains in semiconductor design, which are registered as Intellectual Property. Armenia's considerable experience and expertise in the field of chip design attracted the global leaders in electronic design automation (EDA) and VLSI design, such as Synopsys and Mentor Graphics. These multinational giants had entered into Armenian ICT sector by acquiring local companies and their presence in Armenia made Armenian ICT sector attractive to busines in. Semiconductor design segment is a high-value segment and has been making significant contributions to the industry. In 2018, Semiconductor design contributed to about 9% of the total turnover of the Armenian ICT industry.

Synopsys has been Armenia's largest ICT employer, with 800 employees. By being the part of the world's top players in the Semiconductor design field, Armenia gained core capability in EDA software.

[59] Armenian ICT Sector Report. 2018. EIF

The Armenian government recognizes “Chip design” as one of the strengths of the Armenian ICT sector. With the core capability to build EDA software, Armenia has an attractive prospect to move into fabless semiconductor design which will result in intellectual property development.

### (2) Cybersecurity

Cybersecurity has been one of the national ICT R&D priorities towards 2020. The Ministry of High-Tech Industry puts great emphasis on cybersecurity under the ICT development strategy. Different Armenian enterprises has been working in information security. The ArmSec Foundation[60], one of the key players in the cybersecurity community, brings cybersecurity specialists together to tackle security issues in cooperation with the government. Concerned about the frequency of annual data breaches and cyber-attacks in Armenia, the ArmSec provides services and solutions to military, defense systems, and other institutions that need data and communication security.

### (3) Robotics

In Armenia, business in the field of robotics is still premature; however, Robotics education has been booming now. The development of ICT education has been one of the priorities of the government to ensure a sustainable growth of the ICT sector. The remarkable development was the launch of the Armath Engineering Laboratories (Armath Lab) in the general schooling system of Armenia. With a backing of the Armenian government, the Yerevan-based Union of Advanced Technology Enterprises (UATE) began organizing extracurricular robotics and computer programming courses for schoolchildren in 2008 in an effort to alleviate a shortage of skilled personnel widely seen as the main challenge facing the Armenian IT industry. It helps the development of interest in the field of robotics and engineering profession, and subsequently promoting the development of the ICT sector.

Armath Lab is a STEM education and interactive after-school program for kids aged 10-18, providing training in programming, robotics, design skills, and 3D-modeling for free. Last year, the government has allocated USD 1.7 million in additional funding to UATE to help double the number of engineering labs in public schools across the country. Today, the number of Armath lab in Armenia reached 575, providing 15,000 children the opportunity of free engineering education[61].

Also, UATE has been trying to make Armenia recognizable in the Robotic field by launching Robotex[62], an annual international robotics competition, in Armenia. In November 2019, Robotex took place for the first time in Yerevan, with the participation of over 40 teams from around the

[60] https://armsec.org/
[61] https://uate.org/en/education-workforce
[62] https://robotex.international/

world. Holding annual Robotex competition in Armenia will help to gain recognition from the people and firms in the field and making Armenia a step toward the center of Robotics.

### (4) Artificial Intelligence and Machine Learning

In recent years, developments in Artificial Intelligence (AI) and Machine Learning (ML) have been gaining momentum. "IT is Armenia"[63], for example, is a website designed to showcase Armenian ICT startups and attract global IT professionals to contribute to the growth of the technology ecosystem in Armenia. "IT is Armenia" currently features 18 IT companies, and 12 of those are companies provide AI-driven products and services.

And there are numerous top-funded AI/ML-driven startups namely, CodeSignal (HR/raised USD 12.5M), Renderforest (Media/raised USD 8.1M), Aarki (Media/In 2018 Aarki was ranked number 19 on Deloitte's Technology Fast 500), Teamable (HR/raised USD 10M), IntelinAir (Computer vision/raised USD 10M), and Krisp (AI/raised USD 3.5M).

Also, there are many communities in ML & AI field that have been gaining world recognition such as ML EVN[64] and Yerevan NN[65]. ML EVN is the largest informal community in ML with 200+ professionals, and YerevaNN is a ML research lab based in Yerevan and promoting developing high-quality educational programs in ML and related disciplines.

In recent years, some tech companies, such as Microsoft and PicsArt, have been providing training courses focused on AI and ML in Armenia.

All these movements indicate the future importance of AI and ML technologies, and the industry is preparing for a rising demand.

### (5) Blockchain

Armenia's Blockchain sector is still in its infancy. Its ecosystem is tiny, but at the global level, many leaders and experts who specialize in this sector are Armenians. Armenian's fundamental strength in mathematics and basic science has been an advantage in the development of Blockchain technology.

The Armenian government has a focus on Blockchain as an important future technology. Currently, the forth FEZ, ECOS FEZ, is under construction in the city of Hrazdan, aiming for stimulating the development of the digital business environment and the production of innovative technological products and services. ECOS FEZ is specially designed for AI and Blockchain, and it will bring together Blockchain and AI technology professionals, investors and government figures.

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63 http://itis.am/

64 https://mlevn.org/

65 https://yerevann.com/

Today, many vibrant communities are evolving in the field of Blockchain technology, which made up of creative thinkers and entrepreneurs in the field, and they are gaining global recognition. Nooor Blockchain Association[66], for example, is a non-profit organization that unites and supports Blockchain enthusiasts, experts, developers, businesses, startups from various spheres helping them integrate into the international Blockchain network. Noor is the organizer of the International Blockchain Conference, ChainPoint, which is held annually in Yerevan since 2018, and more than 500 people and 50 speakers across the globe participated in the conference in 2019.

yLedger[67] is the first Blockchain development consortium in Armenia, uniting Blockchain development companies to increase Blockchain development capacity through educational programs and regular events. It aims to create a sustainable Blockchain community with experienced trainers, continuous trainings, workshops, and recurring meetups. yLedger initiated a unique series of weekly meetups called Blockchain Days, where Blockchain professionals share different topics about the Blockchain. The first Blockchain hackathon was also organized by yLedger.

According to Nooor, there are about 10-15 Blockchain-related startups as of 2018 in Armenia, mostly outsourcing services companies. As the growth of the vibrant community in the Blockchain field proves, this sector is expected to grow with the importance of the technology grows in the industry.

### 2.3.4 Future Trends

The Armenian economy has traditionally been driven by industrial investment. During the Soviet era, Armenia had one of the best-developed industrial sectors in the USSR. The industrial sector is still considered as one of the most important sectors of the economy; however, the government of Armenia has decided to shift for a knowledge-based and export-led economy as the future of Armenia, which could bring more sustainable economic growth to the country. Under this initiative, ICT sector has been selected as a priority sector to develop on, and various strategic actions have been undertaken since then, as discussed earlier in this section. ICT exports have been demonstrating a consistent growth and are expected to deliver further solid growth as the government' efforts to increase competitiveness start to deliver more results.

## 2.4 Export Status to Japan

### 2.4.1 Achievements

Diplomatic relations between Armenia and Japan were established in September 1992, a year after Armenia declared its independence. The Embassy of Japan finally opened in Yerevan on January 1, 2015. There were only five Japanese companies offices and 30 Japanese residents in Armenia as of

66 https://nooor.io/
67 https://www.facebook.com/yledger/

October 2018 . On the other hand, there were 66 Armenians living in Japan as of June 2019. In terms of trading, in 2019, total export from Japan is 2.54 billion yen, comprised of automobiles, rubber tires and tubes, construction and mining machinery, scientific optical equipment, and others. Total imports from Japan are 2.21 billion yen, the items being clothing, aluminum and its alloys, electrical equipment, pharmaceuticals, non-ferrous base metal scraps, and others. Although the relationship between the two countries is still remote, in February 2018, an investment agreement, "Agreement between Japan and the Republic of Armenia for the liberalization, promotion and protection of investment" was signed. This investment agreement is expected to ensure the free and stable activities of Japanese companies in Armenia, expand investment and further develop economic relations. The basic environment for Japanese companies to do business in Armenia has been finally established.

In 2013 and 2016, a seminar titled "IT's in Armenia" was held in Tokyo by the Embassy of the Republic of Armenia in collaboration with JETRO. In the seminars, representatives from local entities such as Enterprise Incubator Foundation (EIF) director and Instigate (family of IT and Engineering companies) CEO presented Armenia's IT sector. As an example of ICT company expanding into Japan now, MAIA Co., Ltd., a Japanese Armenian company, provides services using Blockchain and AI technology by Armenian diaspora engineers.

### 2.4.2 Issues on Export Promotion

#### (1) ICT workforce

The shortage of ICT professionals is widely seen as the main challenge facing ICT companies in the country. Though 13% of the total student population at all Armenian universities were enrolled in departments related to ICT, many of their students require additional training after graduation. Currently many companies such as Microsoft, IBM, Samsung are involved in organizing special training, courses, and internship programs for students to provide them sufficient skills and knowledge to obtain jobs in the industry. There are also many opportunities for ICT training for young people, such as TUMO Center for Creative Technologies, a free after-school program that gives teens programs such as animation, web design, robotics, 3D modelling, game development and filmmaking, and Armath Engineering Laboratories, where kids aged 10-18 are introduced to science, technology, engineering, and math education. ICT training opportunities for young people are satisfactory, but opportunities for developing professionals are still not enough.

#### (2) Relationship with Russia

Historically, Armenia has not been on good terms with two neighboring countries, Turkey and Azerbaijan. After the collapse of the Soviet Union, Armenia has to depend heavily on Russia for national security, energy sources, and capital inflow from Armenian diaspora living in Russia. Armenia has been closely linked to and affected by Russian trends.

Russia is the major foreign investor in Armenian economy, with capital investments made since 1991 amounting for almost USD 4 billion. According to United Nation COMTRADE, in 2019, it is also the largest export partner with 27% of total share. Also, as a diaspora of 2.5 million Armenians lives in Russia, the country is the source of biggest money transfer (45%) to Armenia in 2019. Depending on Russian economic conditions, Armenian investment, trade, and money inflow will fluctuate significantly.

There is a big dilemma that Armenia needs to continue to ensure its security while correcting its over-reliance on Russia and putting relations with Moscow on a more equal footing. Considering the current hostile situation with Turkey and Azerbaijan, it is getting harder to balance the relationship with Russia in a more 'Armenia-centric' way the Armenian new government wants.

#### (3) Overseas Incorporation

Armenian firms often incorporate abroad to attract investment; therefore, the revenue contribution to the local market is limited. Due to the lack of early stage financing in Armenia, many Armenian ICT firms have ended up seeking investment abroad, especially US due to strong diaspora links. Usually, investors clearly request investees to incorporate under laws that the investors are familiar with. That is one of the reasons why most Armenian tech startups are incorporated in the United States, even if their US headquarters are virtual or only nominally staffed. This company structure keeps the Armenian entity in subsidiary status. Hence any investment they receive remains in the US account and U.S. dollar transfers are limited to operational costs, salaries, and overheads.

Note: As of the end of October 2020, Armenia was in the midst of military conflict with Azerbaijan. However, combat areas are limited, and many areas including the capital Yerevan have little impact from the combat.

# 3 Needs for Advanced IT Solution Services in Japanese Industries

## 3.1 Needs in Major Japanese Industries

It is expected that there are many Japanese industries that have the needs for advanced ICT solutions. In order to grab those potential needs, the Survey Team has picked up 91 industry associations in 20 industries/sectors in Japan (see Appendix 2 for the list) that may have the potential for business matching with the advanced ICT solution company of the target countries. Then the Survey Team made contacts with all these associations by providing information on the Survey as well as the strength and characteristics of ICT industry in the target countries, and ask them to distribute the information to member companies of the association and to participate in the Webinar for introducing ICT companies of the target countries (See 5.3 for the detail of the Webinar).

There are, however, very few meaningful responses from these industry associations so far. Among 91 industry associations, 30 of them have responded that they acknowledged our contact, but only two of

them had actually responded that they have circulated the information to member companies. There is no concrete progress for the business matching with these industry associations and their members up to now. However, some companies have come to attend our Webinar for introducing target country's ICT companies (see 5.3 for detail) as well as to join our Pilot Program for trial business collaboration (See 5.5 for detail).

## 3.2 Current Status/Issues/Needs in Collaboration with Overseas IT Companies

Based on these circumstances, the Survey Team have picked up the most probable industries that should have needs for advanced ICT solutions, i.e., Medical equipment, Smart Agriculture, and Manufacturing industry, and tried to contact individual companies in those industries directly in order to get information on current status, issues, and needs in collaboration with overseas IT companies.

### 3.2.1 Medical Equipment

In the implementation plan document of the Survey, we proposed 1) "Medical Equipment", 2) "Biochemical Analysis", and 3) "Pharmaceutical Development" as the priority fields in the health and medical-related industries in Japan, which have the possibility of collaboration with ICT industry in the three target countries. In addition, 4) "Health-Tech" utilizing big data has been greatly developed in recent years in the health and medical sector, and 5) advanced "Medical ICT System" including telemedicine, which has become increasingly significant amidst the pandemic of COVID-19, are also regarded as growing industries. So, we added those two fields to the above-mentioned three fields.

Of the five fields mentioned above, we conducted interview sessions with the following Japanese enterprises who responded our contact: one enterprise in "Medical Equipment"; one enterprise in "Biochemical Analysis"; one enterprise in "Health Tech"; and two enterprises in "Medical ICT System".

Concerning "Pharmaceutical Development", in particular, it is "drug discovery" that requires sophisticated ICT technology. Since "drug discovery" is the most important technology field for pharmaceutical manufacturers, in most cases, those related technologies such as advanced pharmacological substance screening, chemical modification, various simulation techniques, etc., are regarded as protected technologies by pharmaceutical manufacturers. Having said that, as pharmaceutical manufacturers sometimes incorporate enterprises with special technologies related to drug discovery through acquisition, etc., we only approached pharmaceutical manufacturers through industry groups.

The table below provides a summary of the contents of the interviews for the five Japanese enterprises with which we actually conducted the interview survey. Note that the company names are not shown for their privacy.

Table-5 List of interviewed companies in medical sector

| Company | Industry/Sector | Needs for advanced ICT solution |
|---|---|---|
| A | Medical equipment | The company itself does not require advanced technology development at this time (assuming the level that can be developed in-house). However, they did not eliminate the possibility of collaboration with overseas enterprises with high ICT technology in future, and they indicated their intention to participate in the event. |
| B | Biochemical Analysis | They have been taking approaches mainly based on the Health-Tech data business using biochemical analyzers developed by them, but it has stopped due to the effects of COVID-19 pandemic. Currently, they have developed and published a number of SARS-Cov-2 antibody-detecting and antigen-detecting methods using ELISA and immuno-chromatography, by utilizing their special expertise. They restructured their organization in the situation described above, they also mentioned the possibility of outsourcing the system development and so on. |
| C | Health tech | At present, the CIO does not indicate any needs for product development through collaboration with overseas enterprises. On the other hand, he also set up an enterprise that specifically matches with American Silicon Valley-based enterprises and is working as a mentor to Japanese start-up enterprises, recognized as an influencer in the entrepreneurial community. |
| D | Medical ICT system | The president of the company demonstrated that the possibility of collaboration with overseas companies can be considered given that they are ICT enterprises with high technologies. As they have some ideas, they would like to consult with the Survey Team once they could make it a practical plan for product development. |
| E | Medical ICT system | The company participates in joint research on AI-based detection of oral cancer biomarkers with a certain hospital to develop detection devices after biomarkers have been identified, but there is currently no urgent need for direct collaboration with overseas enterprises. |
| F | Electronics | Major manufacturer and distributor of precision machinery and equipment. Also engaged in medical products and solutions business. Needs in enhancing DX related to medical image related solutions utilizing AI, etc. |

All interviewed companies were those who have responded to the contact from the Survey team, but none were originally supposed to cooperate with overseas enterprises. Naturally, only one out of five enterprises showed the possibility of future collaboration with ICT enterprises in the three target countries at this moment. Other enterprises said they had no knowledge about the existence of companies with high ICT technology in the three target countries; in particular, two companies asked us to distribute related information through social media, etc. Through such collaboration, it is believed that a certain level of positive impact could be made to improving awareness of Japanese companies of the target three countries, which is one of the objectives of the Survey.

Apart from individual contacts described above, we found eight health and medical related enterprises in the list of 193 Japanese enterprises participated in the Morning Pitch seminar featuring Armenian/Pakistani/Sri Lankan ICT enterprises held on the 8th and 23rd of September 2020 (see 5.3 for the detail). Breaking this down, two were enterprises that Survey Team offered consultation through individual interviews (one is Medical Equipment/Medical ICT and the other is Medical ICT), two were pharmaceutical manufacturers, one was a pharmaceutical and medical device trading company that also conducts in-house development, and one was a medical management consulting and pharmacy

management company. These companies were continuously invited to seminars and other events, and follow-up activities (e.g., request for interviews) have been conducted to achieve matching with ICT enterprises in the three target countries.

### 3.2.2 Smart Agriculture

For the technical field of smart agriculture, we contacted five agricultural machinery manufactures (three agro-machinery companies and two post-harvest machinery companies), nine agriculture-related companies (food companies, horticultural company, software companies, etc.), and five agriculture-related organizations (including Japan Agricultural Cooperatives). Also, we contacted drone-related companies as a link to smart agriculture (see 3.2.4 for the detail). As a result, two companies accepted our request for interview as shown in the table below.

Table-6 List of interviewed companies in smart agriculture sector

| Company | Industry/Sector | Needs for advanced ICT solution |
|---|---|---|
| G | Agricultural machinery | Currently, several agricultural machinery development projects are underway. Current issues include cost reduction in the development of harvesting robots and rice sowing machinery and insufficient budget. They are planning to apply for a smart agricultural subsidy from the Ministry of Agriculture, Forestry and Fisheries Japan, and if they get it, they would like to cooperate with overseas companies for the purpose of cost reduction. There is also a desire to expand overseas through drone surveying and pesticide spraying, so they seem to be interested in the PoC scheme of the Survey. |
| H | Smart Agriculture | Currently, we are training IT human resources in Nepal and Myanmar in Japan (in collaboration with Ritsumeikan Asia Pacific University). They visited Latvia last year and think that there is a possibility of developing technologies that are not yet available in Japan, such as forestry IT solutions that are being advanced locally. |

Also, one large agro-machinery manufacturer and one agriculture-related organization participated in the pitch event held in September 2020. Also, one Japanese leading automotive supplier and one Japanese automotive finance company participated in this event.

### 3.2.3 Manufacturing

We contacted total of seven automotive manufacturers and automotive suppliers for potential business collaboration in the field of sensing, autonomous driving, etc. However, they told us that these advanced ICT fields are mostly developed inhouse or through collaboration with high-tech ICT companies in Japan and US, thus there is no immediate needs for the business collaboration with ICT companies of the three target countries. We also contacted several other manufacturing companies and had interviewed four of them listed in the table below. Of these, the Survey Team tried to match Company J, which develops biometric devices, with several companies in the target countries, but could not find any company in the target countries that were interested in collaboration because the content of the match was joint development and sales of a system incorporating Company J's products. Company L applied for trial business collaboration program.

Table-7 List of interviewed companies in manufacturing sector

| Company | Industry/Sector | Needs for advanced ICT solution |
|---|---|---|
| I | Tea manufacturing machinery | The company develops and sells machinery for tea manufacturing and is considering whether to upgrade their machinery by advanced ICT such as AI image recognition or not. But there is no immediate needs yet. Communication in English would be the biggest problem. |
| J | Biometrics device | The company develops and sells vein-based biometrics devices and is seeking the partner in other countries to jointly develop security system that utilizes their biometrics device. |
| K | Energy | One of the largest energy companies in Japan. Specific needs in increasing efficiency and cost reduction in maintenance of infrastructure such as pipes utilizing AI. |
| L | Steel tube | Pipe manufacturing company. Specific needs in reducing defective products generated in the manufacturing process, utilizing AI. |

Our initial assumption was that SMEs in manufacturing industry might also have needs for advanced ICT solutions for digitalizing manufacturing processes and KAIZEN activities according to the global trend of Industry 4.0 movement. Through several interviews with manufacturing SME representatives and SME consultants, however, most of SME manufacturers are still in the early stage of DX that their current typical needs are for general office digitalization, not the needs for advanced ICT solutions. Another serious obstacle for SMEs is language barrier because typical SMEs have very limited human resources who are fluent in English.

Still, there should be some leading SMEs who are more determined to implement advanced digitalization as well as more active for collaborating with overseas companies. In order to find such SMEs, the Survey Team contacted southern branch of Tokyo Small and Medium Enterprise management Consultant Association where there are many manufacturing SMEs. The association explained that their client SMEs also include many ICT solution providers that would compete with those from the target countries, so it is not possible to introduce manufacturing SMEs to the Survey Team. But the association allowed the Survey Team to have a seminar for members of the association to introduce the ICT industry of target countries.

The Survey Team also contacted SME Support Japan (SMRJ)[68] who runs Web business matching portal called J-GoodTech[69] for Japanese SMEs who wish to collaborate with overseas industries and export their products. SMRJ explained that there are several possibilities to find good SMEs for collaborating with ICT solution providers of the target countries. The first one is to use J-GoodTech matching portal by ICT solution providers, though it requires to get recommendation letter form the government of the target countries. The second possibility is to ask some experts in SMRJ for overseas business matching since they know companies who want to have relationship with foreign partners (but they are not limited to IT companies). The third possibility is to ask experts of domestic IT support in SMRJ who know companies who want to develop information systems, but because of their limited resources it was not possible. Based on further discussions with SMRJ experts, however, we came to know that it might be

[68] https://www.smrj.go.jp/english/index.html
[69] https://jgoodtech.jp/pub/en/

difficult to find Japanese SMEs who are willing to cooperate with foreign ICT companies due to their lack of English proficiency.

### 3.2.4 Drone

During the course of contacting agriculture and manufacturing industry, we have found that Drone industry also has specific needs for advanced ICT solutions especially for semiconductor design of FPGA or ASIC, so we have done further survey on this industry. We have contacted 23 drone-related companies. Six of them are companies that have drone-related business, 11 of them are companies that provide customized drone hardware to specific industries such as agriculture, and six of them are startups that design and develop drone hardware/software.

Among 23 companies, seven showed interest in the Survey and two of them accepted interview by the Survey Team as summarized in the table below.

Table-8 List of interviewed companies in drone sector

| Company | Industry/Sector | Needs for advanced ICT solution |
|---|---|---|
| M | Drone software | Mainly engaging in the development of spatial recognition, AI, etc. using drones. Proposing the use of drones to local governments such as Osaka Prefecture and Kobe City. In specific, now considering demonstration the use of drones to manage the condition of landfills in Kobe City using temperature sensors and are interested in developing new software. Although there is no immediate idea of collaboration, the drone industry is looking for collaboration with third countries as China plus one. |
| N | Agriculture/civil engineering using drones | Working on the development of agricultural drones (surveying, civil engineering, 3D). They are interested in visualizing semiconductor design data and are looking for a collaborator, hoping that there is something that can be made 3D in real time. When they heard of the Survey, they wanted to know companies who make good use of the technology of the other party in Japan through licensing and loyalty business, rather than collaborating on consignment. There is also a Fintech department, so if there is useful information, we want to share it internally. I'm also interested in PoC, but it's usually tens of millions of yen, so is it too small? |

### 3.2.5 Others

The Survey Team also interviewed following Japanese companies from other sectors for the needs of advanced ICT solutions.

Table-9 List of interviewed companies in other sectors

| Company | Industry/Sector | Needs for advanced ICT solution |
|---|---|---|
| O | Software, semiconductor, electronic equipment | Software development company which supports the design of electronic circuits, semiconductor integrated circuits, liquid crystal modules, etc. The company has needs to simulate the characteristics of display devices with high speed, high accuracy, and memory saving; however, there are no available engineers in-house and impossible to hire such high-level human resource. |
| P | Construction | Large construction company with industry top number of rental housings managed and supplied. Searching for innovative IoT/home security solutions for rental housings. |
| Q | AI | Developed OCR service, however, needs in reducing time and cost spent on annotation in the AI learning process. |

# 4 Potential of Business Matching between Advanced IT Solution Companies in Pakistan and Japanese Industry

## 4.1 Analysis of Matching Possibility

Based on the core competence of Armenian ICT industry described in 2.3.3, result of needs in Japanese industries described in Chapter 3, and the past effort for approaching to Japanese ICT market described in 2.4, we analyzed and summarized the matching possibility into the matrix shown in the table below.

Table-10 Matching possibility matrix

(Core competence of Armenian ICT industry vs. Japanese industry in needs)

| Core Cp. / J. Ind. | Semiconductor design | Cybersecurity | Robotics | AI and ML | Blockchain |
|---|---|---|---|---|---|
| Finance | ○ | ◎ | | ⊙ | ◎ |
| Securities | | | | ○ | ⊙ |
| Insurance | ○ | ⊙ | | ⊙ | ◎ |
| Medical | ◎ | ◎ | ⊙ | ◎ | ○ |
| Healthcare | ⊙ | ⊙ | | ⊙ | ○ |
| Machine tools | ⊙ | | ◎ | | |
| Automobile | ⊙ | ⊙ | ◎ | | ○ |
| Manufacturing | ◎ | ⊙ | ◎ | ◎ | ○ |
| Distribution | ○ | ○ | | ◎ | ◎ |
| Aerospace | ⊙ | ○ | ⊙ | | |
| Material science | | | | ○ | |
| Biochemical analysis | | | | ○ | |
| Drug discovery/ pharmaceutical | | | | | |
| Resource exploration | ⊙ | | ⊙ | ⊙ | |
| Plant control | ○ | ⊙ | ⊙ | ⊙ | |
| Information security/ Physical security | ⊙ | ◎ | | ⊙ | ○ |
| Agriculture | ◎ | | ◎ | ⊙ | |
| Tourism | | ○ | | | ○ |
| Education/ Training | | | | ○ | ○ |
| Research | ◎ | ○ | ⊙ | ⊙ | |
| Clothing/Fashion | | | | | |
| Environment | ⊙ | | | | |
| Others | | | | | |

◎: High possibility of matching with clear technological advantage from other emerging countries in the world.
⊙: Rather high possibility of matching with on a par technological advantage with other emerging countries in the world.
○: Has possibility of matching in a certain condition such as needs for geographical position of Armenia

## 4.2 Hypothesis on Promoting Business Collaboration

There are the following hypotheses for promoting business collaboration between advanced Armenian ICT industry and Japanese industry with advanced ICT needs.

### 4.2.1 Regular Pitch Event to Showcase Armenian ICT Startups towards Japanese Companies

Armenia has been achieving significant development of startups in the field of advanced technology that have emerged one after another within the country, then been acquired by large global ICT enterprises, and remained in the country as their R&D centers. The following table shows examples of global ICT enterprises that have entered Armenia and their acquired local advanced technology companies.

Table-11 Global ICT enterprises that established R&D center in Armenia

| Global ICT enterprise | Year | Product | Armenian companies acquired by them upon entry |
|---|---|---|---|
| Synopsys | 2004 | EDA | Monterey Arset, Leda Design, HPLA, Virage Logic (All EDA-related) |
| National Instruments | 2005 | Measuring and control equipment | |
| D-Link | 2007 | Network equipment | |
| Mentor Graphics (→ Siemens) | 2008 | EDA | Ponte Solutions (Semiconductor manufacturing process analysis software) |
| VMware | 2010 | Virtualization platform | Integrien (Real-time performance analysis and prediction technology) |
| Cisco Systems | 2014 | Network equipment | Memoir Systems (High-speed on-chip memory technology for ASICs) |
| Oracle | 2014 | Database | LiveLook (Cloud-based screen sharing technology) |
| Xilinx | 2019 | FPGA | |

Armenia is rapidly developing as a new tech-hub, producing startups such as Develandoo and Super Annotate with competitive advantages globally in fields such as AI, data science, etc. While Armenia's startup ecosystem is developing, Armenia's domestic market is extremely small and the number of investors is limited, so access to foreign investors and foreign markets is essential for growth of Armenian IT startups. Armenian startups have some access to Europe and the US due to the existence of the diaspora, but they are not yet recognized by Japanese investors and companies.

Therefore, by holding a pitch event about once a year to showcase Armenian startups with cutting-edge technology to Japanese investors and companies, opportunities could be created for Armenian startups to raise funds, develop alliances with Japanese companies, and enter the Japanese market. Such pitch events could be held in collaboration with VCs or accelerators such as Granatus Ventures or EIF to source cutting-edge startups, and in the Japan side, it could be held in collaboration with open innovation consultants who have a network of clients looking for cutting-edge solutions, Armenian embassy and JETRO to attract an audience. In addition, since there could be psychological hurdles for Japanese

companies to develop alliance with Armenia, which is not a common partner yet in Japan, it could be effective to combine the event with a trial or PoC subsidy project.

Also, one of the objectives for Japanese companies to partner with foreign companies is the access to local and neighboring markets of the partner companies. When looking at the distribution of diaspora, many diaspora reside especially in Russia, US, Europe, Iran, Argentina, and Australia. As a result, Armenian companies have gained experience in doing business with such countries and hold a good understanding of such countries' business practices. In such regard, it is important not only to showcase the technology but also to create opportunities to actively appeal to such aspects as well.

### 4.2.2 A "Technology" Oriented Business Matching System/Platform

It is observed that for most Japanese companies, Armenia is still only an option for outsourcing destination, and those Japanese companies who have clear needs for specific advanced ICT solutions cannot think of Armenia as the "only" option for the collaboration because there are many other countries to consider for advanced ICT such as China, India, Israel, etc. However, there may be cases where only a specific Armenian company could provide solution to specific technological needs of Japanese companies.

In order to provide matching opportunities for such specific individual technology needs, it would be helpful to establish a kind of "official" business marching system/platform by Japanese public organization (or by private company who is delegated the management of such system from the government of Japan) so that Japanese companies can post specific technology needs onto the system without having to specify the company or country of origin for the solution. ICT solution providers from Armenia (as well as from any other country) can also register to the system, then can browse the needs posted by Japanese companies. If an Armenian solution provider finds a need that the company can provide solutions for, then the company can start contacting the Japanese company who posted the needs. It is also possible that the system and /or assigned advisors to the system can help in choosing the matching ICT companies. This kind of system is also effective where Japanese companies are not good at directly communicating in English.

The system/platform should be established in Japan rather than in the target country because it is not convenient for Japanese companies to visit individual business matching system in each country. Japan already has a similar system, J-GoodTech, as mentioned in 3.2.3, but since its main purpose is to introduce Japanese companies' technologies overseas, it cannot be used for the purpose described here. The figure below shows a concept of such required system/platform.

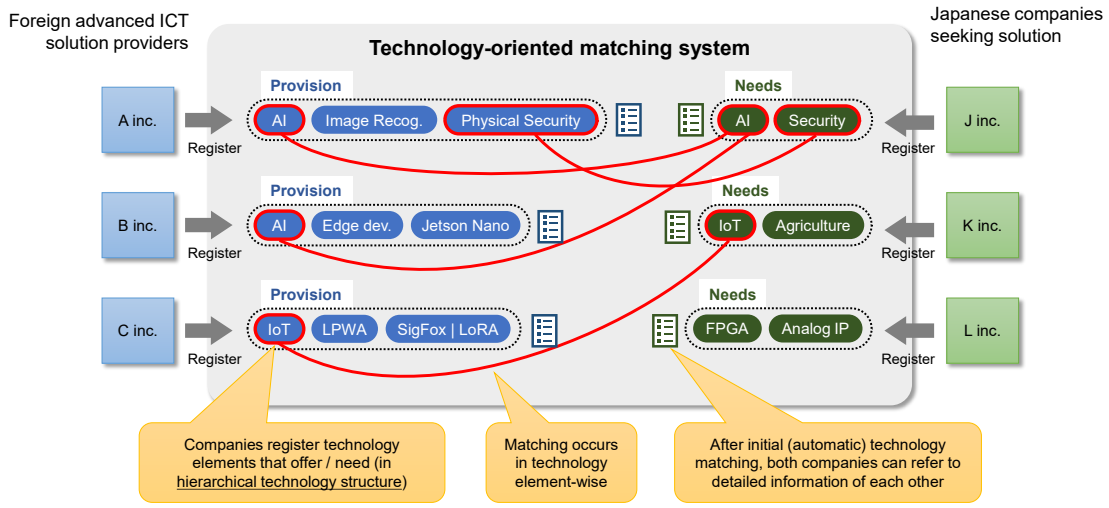



Figure-21 A concept of technology-oriented matching system/platform

### 4.2.3 Involvement in Japanese Industry Technology/Research Associations

In Japan, most applied technology cooperation among private companies are done through various technology associations in each industry. These associations are not academic association which focuses more on research topics, but are rather focused on application of technologies so that many technological joint ventures/programs among multiple private companies occur here. These associations are extremely common and unique in Japan, and many of them also accept membership from foreign private companies. So, it is a good idea for Armenian ICT company who have clear technological edges to join these industry-specific technology associations for getting the latest trend in specific Japanese industry as well as for finding opportunities to start collaboration with Japanese companies. The table below shows some of the examples of such industry-specific technology associations in Japan.

Table-12 Examples of industry-specific technology associations in Japan

| Industry | Name of Association | URL |
|---|---|---|
| Deep Learning | Japan Deep Learning Association | https://www.jdla.org/ |
| Robotics/IoT | Robot Revolution & Industrial IoT Initiative | https://www.jmfrri.gr.jp/ |
| Embedded systems | Japan Embedded Systems Technology Association | https://www.jasa.or.jp/ |
| Fintech | FinTech association of Japan | https://fintechjapan.org/ |
| Computer software | Computer Software Association of Japan | https://www.csaj.jp/ |

### 4.2.4 Trust Building for Japanese Industry

Since Armenia is a small country that is not well known to Japan yet, it is important to establish a trustworthy image of the country and its ICT industry. Recently, similar small countries in Europe such as Estonia and Georgia have succeeded to build their perception in Japan as leading IT-driven nation or as friendly environment for starting business, so Armenia should also try to build trustworthy perception to Japanese industry. In order to establish such a perception, it is important to accumulate (even small) successful cases of business collaboration between Armenia and Japan because Japanese business culture heavily depends on “reputation” from the known and trusted friend or party.

# 5 Pilot Activities to Promote Business Matching

## 5.1 Initial Plan and the Changes due to COVID-19 Pandemic

At the beginning of the Survey, following activities were planned for the pilot promotion of business matching (as described earlier in our Inception Report in May 2020).

- Individual visits to selected local ICT companies in the target country
- Invitation program to Japan for government officials of the target country
- Business matching seminar for ICT companies in the target countries and Japanese companies
- Visiting program to the target country by Japanese companies

Due to COVID-19 pandemic, however, all these activities that require visiting to/from the target countries must be canceled, and following activities are added instead of the canceled activities.

- All individual surveys and interviews to the government, organization, and ICT companies of the target countries are done through online methods.
- Implement a competition for PoC (Proof of Concept) of business collaboration between ICT solution companies in the target countries and Japanese industry.
- Create a promotion video of the ICT industry of each target country specifically targeting the Japanese potential market based on the proposal of branding and marketing strategy that is being created in the Survey.

## 5.2 Website and SNS for Information Dissemination

The Survey Team created a Website[70] to disseminate information on activities of the Survey as well as to introduce selected ICT companies of the target countries to potential Japanese industries. The Survey Team also used SNS (Facebook[71] and Twitter[72]) to disseminate information on each selected ICT company and launched SNS advertisement to reach potential Japanese companies to participate in the trial business collaboration program (described in 5.5), etc.

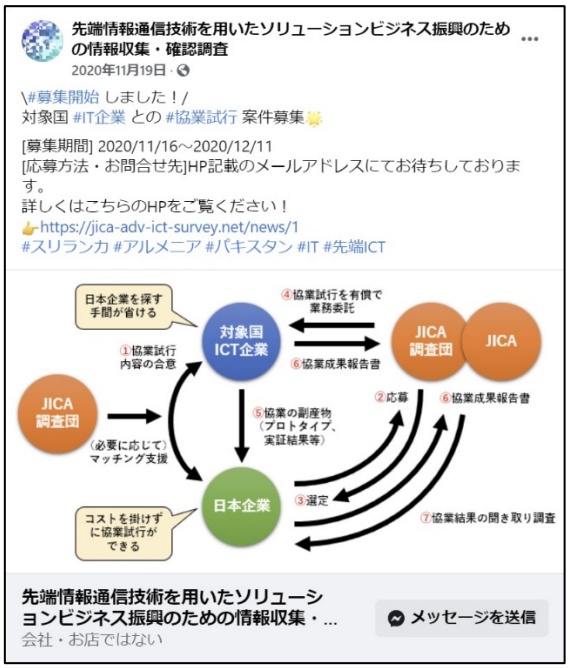
The result of using SNS advertising was considered effective as many Japanese companies showed their interest in the trial business collaboration program, and some of them actually applied to the program. Below is the overview of SNS advertisement the Survey Team launched.

[70] https://jica-adv-ict-survey.net/

[71] https://www.facebook.com/先端情報通信技術を用いたソリューションビジネス振興のための情報収集確認調査-103439194853226

[72] https://twitter.com/ICT53038019

Table-13 Overview of launched SNS advertisement

| | |
|---|---|
| Ad 1 | • Ad for 5.4 “Seminar on Introducing Japanese Market to Local IT Companies”<br>• Ad article (Facebook)<br>  <br>• Target audience: CEO, Programmers, Solution architect of target countries<br>• Target Age: 18 and above<br>• Cost: 1,000 JPY for 2 days (Ad cost only. Article was created by Survey Team with no cost)<br>• Result: Reached (Ad shown to) 9,272 people in 2 days. Among them, 192 responded “Interested”.<br>• Location: Pakistan: around 8,000, Sri Lanka: around 800, Armenia: around 200 |
| Ad 2 | • Ad for 5.5 “Pilot Program for Trial Business Collaboration with Japanese Companies”<br>• Ad article (Facebook)<br>  <br>• Target Industry: Administrative Services, IT and Technical Services, Education and Libraries, Business and Finance, Management, Architecture and Engineering, Food and Restaurants, Construction and Extraction, Production, Healthcare and Medical Services, Installation and Repair Services, Life, Physical and Social Sciences, Protective Services, Farming, Fishing and Forestry, Cleaning and Maintenance Services or Transportation and Moving<br>• Target Age: 20 and above<br>• Cost: 4,000 JPY for 1 week (Ad cost only. Article was created by Survey Team with no cost)<br>• Result: Reached (Ad shown to) 489 people in 1 week. Among them, 15 responded (clicked the link, etc.)<br>• Japanese company applied for the trial business collaboration by seeing the ad: 2 |

Note: Information on the participating Armenian companies is provided in Appendix 1.

## 5.3 Seminar on Introducing Advanced Armenian IT Companies to Japan

Two IT industry introduction seminars were held to provide Japanese companies with information on the strengths and characteristics of IT industries in the target countries, and to grasp the needs of Japanese companies concerning the possibility of cooperation with IT companies in the target countries. The objective of the Survey is not just to enhance mere collaboration as offshore development, but aims to promote matching in advanced IT areas that are difficult for Japanese IT solutions companies to provide. Therefore, the event was held as a part of Morning Pitch, an open innovation platform by Deloitte Tohmatsu Venture Support, which has more than 14,000 registered members mainly consisting of new business development managers from large companies searching for advanced technologies and new business creation partners. The event was cohosted by JICA with cooperation from JETRO for reaching potential participants. Due to COVID -19, the seminar was held as a webinar on Zoom.

### 5.3.1 Summary of the Event

Table-14 Outline of the seminar on introducing advanced Armenian IT companies to Japan

| | |
|---|---|
| Seminar Title | Morning Pitch Global - ICT Sector in Armenia - |
| Date/Time | September 8th (Tue), 2020 19:00 – 21:00 (Japan Standard Time) |
| Format | Online (Zoom Webinar) |
| Purpose | • Promote Japanese companies' understanding of the strengths of Armenian IT companies and draw attention to IT enterprises in the target countries<br>• Identify the interests and needs of Japanese companies |
| Target | Japanese companies that are highly interested in open innovation, Japanese companies that are interested in collaborating with overseas IT companies, and Japanese companies that wish to develop overseas markets through collaboration with Caucasian companies |
| Summary | In recent years, Armenia has rapidly increased its presence as a new hub of technology and innovation. Located in the Caucasus Mountains between Asia and Europe, the country was called the "Silicon Valley in the Soviet Union" when it was a member of the former Soviet Union, contributing to much of the military's electronics innovation. Armenians also have a history of the diaspora (ethnic separation), and while the population of Armenia is about 2.9 million, the number of Armenian diaspora living abroad is about 7 million, more than twice that of their native country.<br>Today's rapid growth in the technology sector is driven by the activities of many startups in the country and the entry of global technology companies into the country to develop their technologies and human resources, supported by a network of diaspora, a strong IT education system, and generous government support.<br>Global technology companies in Armenia include Synopsys, VMware, Oracle and Cisco, which are acquiring Armenia's startups. Ranked 8th for ease of estabilishing a startup, according to a World Bank survey, the country is active in startup activity, with notable companies already established in Japan, such as PicsArt (The No.1 photo processing and video editing application in the world with more than 700 million downloads), Sololearn (World's Largest Mobile Programming Learning Service with 17 million Users), and Krisp (AI software that reduces ambient noise in web conferences such as Zoom), and many software development companies are collaborating with Western companies as specialized development partners beyond general offshore outsourcing.<br>In this program, we introduce software development companies with high expertise and development technologies that solve problems such as the shortage of human resources for AI and FPGA development in Japan, and startups that develop advanced IT technologies, so that we can share a part of the actual situation of the IT industry in Armenia. |

| | | |
|---|---|---|
| Program | 19:00-19:15 | Armenia IT Ecosystem Overview |
| | 19:15-20:55 | Company Pitch<br>(Company Introduction (moderator) 1 minute + Pitch 4 minutes + Q & A 9 minutes x 6 companies)<br>List of companies<br>**Instigate Group**:<br>Armenia's largest IT company providing software engineering services<br>**Essential Solutions**:<br>Software engineering services in highly specialized areas<br>**Grovf**:<br>FPGA hardware acceleration for AI and big data analysis<br>**Arloopa**:<br>AR Development Platform for Smartphone Apps with Strong Geolocation Functions<br>**SmartClick**:<br>Visual authentication technology "Smart Vision" with strengths in image recognition and data analysis<br>**IntelinAir**:<br>Agricultural AI "AGMRI" featuring the world's largest high-resolution agricultural aerial imagery database and computer vision |
| | 20:55-21:00 | Closing |

### 5.3.2 Results of the Event

#### (1) Participants

193 people applied for the event and 94 people participated on the day. The breakdown of the participants was as follows: 61% were from business companies, 18% from financial institutions (banks & VCs), 4% from media companies, 5% from public agencies, and 12% from others.

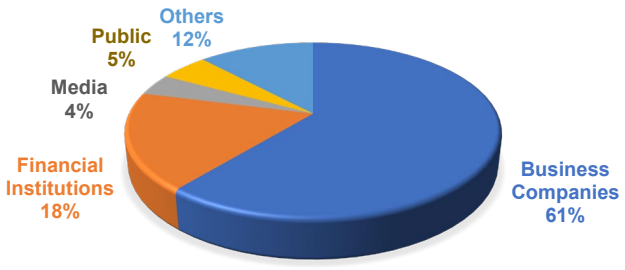



Figure-22 Breakdown of p-articipants (Seminar on introducing advanced Armenian IT companies)

#### (2) Results of the questionnaire

The questionnaire function of the webinar was utilized on the day, and the following questionnaire was carried out.

Table-15 Question items in the seminar

| # | Question item | Timing of the questionnaire |
|---|---|---|
| 1 | What is your first impression of Armenian IT companies? | Ecosystem overview |
| 2 | What are your company's ICT needs and challenges? | Ecosystem overview |
| 3 | Are you interested in (company name) company? | After each company's pitch |
| 4 | Which company would you like to talk to among the companies that pitchedtoday? | Before event ends |

The results of the questionnaire are as follows.

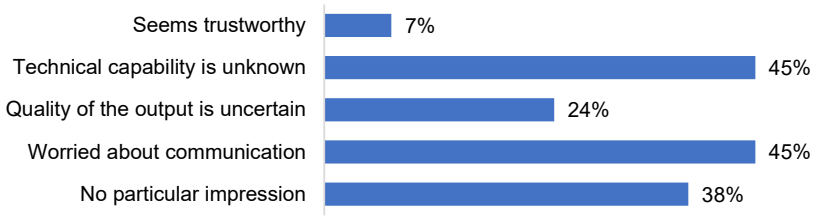



Figure-23 First impression of Armenian IT Companies

Regarding their first impressions of Armenian IT companies, 45% of the respondents are either worrying about the communication or are unsure of the technical capabilities, while 38% of the respondents have no particular impression. Only 7% of the respondents answered that they seem trustworthy, indicating that the Armenian IT industry is not well recognized in Japan and that many are not aware about the fact that communication with IT companies is possible in English.

As for the needs and issues related to ICT in the company, 36% of the respondents answered that "Shortage of human resources that are capable of handling leading-edge technologies" is the biggest issue.

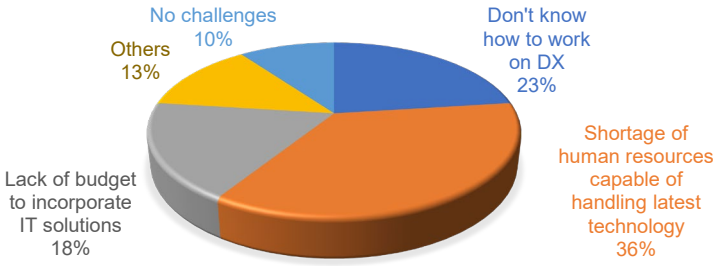



Figure-24 Participants' perception of their ICT related issues

Interest in Armenian IT companies was as follows, and participants confirmed a certain level of interest in Armenian IT companies. One of the reasons why Arloopa attracted the most interest is that the application of AR technology is highly versatile.

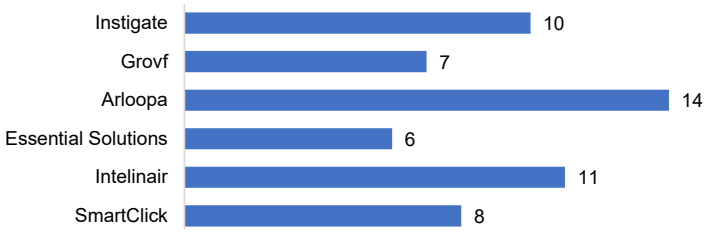



Figure-25 Participants interested in Armanian companies

Table-16 Industries of participants that showed interest in companies presented in the seminar.

| Company | Industries of interested participants |
|---|---|
| Instigate | Energy, construction, information and communications, media, and open innovation |
| Grovf | Advertising agencies, construction, telecommunications, media, finance, and open innovation |
| Arloopa | Advertising agencies, real estate, land transportation, construction, electrical equipment, telecommunications, media, finance, and open innovation |
| Essential Solution | Advertising agencies, energy, construction, media, and open innovation |
| Intelinair | Advertising agencies, real estate, energy, construction, media, finance, open innovation |
| SmartClick | Advertising agencies, energy, construction, construction, finance, open innovation |

### (3) Results of Q&A sessions

Q&A sessions were held for about eight minutes after each company pitch. Questions were accepted through the webinar's Q&A function. The main questions from the audience were as follows. (Answers to these questions are omitted.)

Table-17 Main Q&As (Seminar on introducing advanced Armenian IT companies)

| Company | Questions |
|---|---|
| Instigate | • Do you have an overseas office (sales and development bases) outside of Armenia?<br>• If already have a deal with a competing vendor, is the information secure?<br>• Why did you establish your own university? What is the characteristic difference from other universities?<br>• Do you handle maintenance solutions for manufacturing, plants etc? If so, what kind of use cases are there? Are there any examples of solutions that leverage AI or image recognition? |
| Grovf | • Who are your global competitors?<br>• Why did a global company work with your company? |
| Arloopa | • There are many AR/VR companies in Japan as well, but what are your company's key differentiators?<br>• Why did Coca-Cola and WFP hire your company?<br>• What collaboration needs do you particularly have with Japanese partners? Why do you want to do this with Japanese companies? |
| Essential Solution | • Do you work with Japanese companies?<br>• Is there a price advantage?<br>• Your company's strengths and achievements are so diverse that we cannot see its actual strengths. What would you dare to point to as one of your greatest strengths? |
| Intelinair | • Japan's agricultural market is shrinking, but what kind of cooperation do you want with Japanese partners?<br>• What type of images could be used other than aerial image by plane? Indoor imaging by a fixed camera?<br>• Do you get all kinds of information such as soil information from images taken by a camera? Are other sensors also mounted on airplanes for sensing?<br>• What is your company's image detection technology that no other company has achieved? |
| SmartClick | • Regarding the detection of masks, transparent shields are sold, but have you been able to detect them?<br>• Please tell me a little more about the use cases in the financial industry. Is it like AI-OCR?<br>• Can you elaborate on the advantages of your company's computer vision technology? |

### (4) Business Matching Support after the Event

For Japanese companies who answered in the questionnaire that they are interested in participating companies, follow-ups were provided via e-mail regarding their needs for cooperation and interest

in trial projects. If they show their interest or specific technology needs to be solved, the Survey team supported discussions through online meetings, etc. In addition, since it has been confirmed that Japanese companies directly approached Armenian companies after the event, the number of companies approaching startups, needs for cooperation, and needs for support were confirmed to the Armenian companies. Also, a major Japanese energy company has expressed interest in SmartClick, Intelinair and Instigate, and held online interviews. However, it did not lead to actual business collaboration.

## 5.4 Seminar on Introducing Japanese Market to Local IT Companies

A seminar was held to introduce the characteristics of the Japanese market and its potential needs to the IT industry in the target countries. The seminar was originally planned to be held locally when the Survey Team visited the target countries, but since the field visit was cancelled, the seminar was held online with all the target countries invited. Invitations to seminar participants were sent by e-mail to all government agencies, companies, and industry organizations that were contacted in the course of the Survey, and the recipients were asked to freely share the information with their related parties.

### 5.4.1 Summary of the Event

Table-18 Outline of seminar on introducing Japanese market to local IT companies

| | |
|---|---|
| Seminar Title | Introduction to entering advanced ICT solution market in Japan |
| Date/Time | Wednesday, 21 October, 2020 13:00~14:30 Armenia Standard Time<br>(14:00~15:30 Pakistan, 14:30~16:00 Sri Lanka, 18:00~19:30 Japan) |
| Format | Online (Zoom Webinar) |
| Purpose | • Introduce situation of advanced ICT solution needs in Japan<br>• Introduce characteristics and differences of the Japanese market compared to the Western market<br>• Provide information on branding and marketing to appeal the Japanese market<br>• Encourage participation to pilot business matching activity planned by JICA |
| Target | • Advanced ICT solution companies in the target countries (Armenia, Pakistan, Sri Lanka)<br>• ICT industry associations and incubators in the target countries<br>• Relevant government agencies and international organizations in the target countries |
| Program (Armenia Time) | 13:00-13:05 Opening remarks and introduction of the project<br>13:05-13:10 Opening speech<br>Mr. SAITO Mikiya (Senior Deputy Director General, Senior Director, Office of Science, Technology and Innovation, and Digital Transformation, Governance and Peacebuilding Department, JICA)<br>13:10-13:30 “Situation and needs of advanced ICT solution market in Japan”<br>Prof. John Kojiro MORIWAKA (CEO of Silicon Valley Ventures, Executive Vice President of Moriwaka Medical)<br>13:30-13:50 “Practices and Uniqueness of the Japanese Business”<br>Mr. Toshihiro MOMATA (Marketing Consultant)<br>13:50-14:10 “How to brand your company to appeal the Japanese advanced ICT solution market”<br>Yoichi Kogure (Senior Consultant of Japan Development Service Co., Ltd.)<br>14:10-14:20 Information for entering Japanese market<br>14:20-14:25 Invitation to JICA Pilot Program for business matching<br>14:25-14:30 Closing remarks |

### 5.4.2 Results of the Event

#### (1) Participants

A total of 149 people registered to participate, and 97 people attended in the seminar. The breakdown of participants is as shown in the figure below. 16 participants from Armenia, 43 from Pakistan, 30 from Sri Lanka, etc. By organization, the overwhelming majority were from the private sector. It should be noted that many of the participants from Armenia were government officials (all from MHTI).

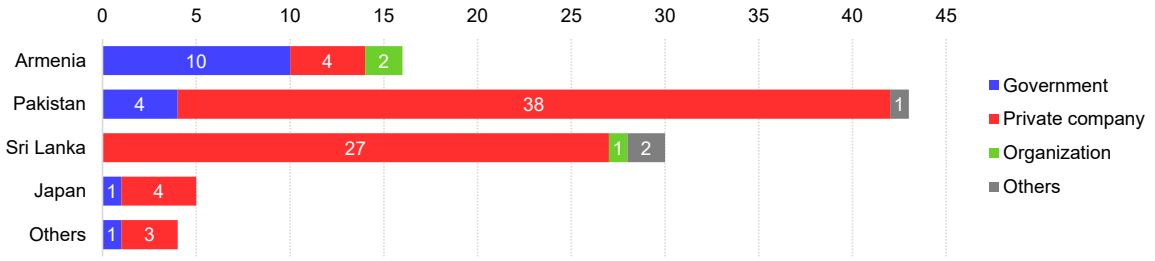



Figure-26 Breakdown of participants (Seminar on introducing Japanese market)

#### (2) Results of Q&A sessions

During the seminar, Q&A sessions were held using the Q&A function. In total, there were 75 active questions, all of which were answered on the spot by the presenters or the Survey Team members. Typical questions and answers are shown in the table below.

Table-19 Main Q&As (Seminar on introducing Japanese market)

| Question | Answer |
|---|---|
| Can you tell us how we can approach Japanese companies for offering them IT solutions? | I think you need to physically present in one of trade shows (such as Japan IT Week). Or you can find some Japanese friends to connect in the target industry |
| Are there any opportunities in offshoring IT services? | Yes, but with tough competition. |
| What is the level of Blockchain adoption in Japan? | For crypt currency market, many. For financial sectors, not so much. |
| How can we connect with SMEs? Are there any forums? | Try J-GoodTech |
| How long does it take to build trust and lock a deal in Japan on average? | It depends. Sometimes, it will be longer than you think. But, be patient. Show whoever you are trying to gain trust you are serious. |
| Is Japanese society hierarchical? | I would say, yes. Seniority is valued as well. President is stronger than vice president, and VP is stronger than manager, oftentimes. |
| In Trust building mechanisms how can we get the referral based company or person? | Start with nearby connections such as your bank, friends, anyone you see anywhere in Japan. Use every possible way of making connections. Even at restaurants, you may be able to get some connections. |
| What do Japan based companies think about companies based in Armenia, Pakistan and Sri Lanka? and their way of working? | Many Japanese companies unfortunately don't have a lot of knowledge about those three countries. |

| Question | Answer |
|---|---|
| Is it necessary to learn Japanese to “melt hearts” ? | Some Japanese words might help melting hearts. My suggestion for you is to learn culture behind the language. |
| How can we reach out to the local Japanese market? | There are a couple of government services for foreign companies when they open business in Japan. One example is JETRO. Please look at their web site. |

## 5.5 Pilot Program for Trial Business Collaboration with Japanese Companies

### 5.5.1 Overview of the Pilot Program

As a part of the Survey, a pilot program was conducted to solicit business matching in which ICT solution companies in the target countries were paired with Japanese companies to conduct some kind of collaboration or trial in the field of advanced ICT (PoC, development of prototypes, research for product development, etc.). From the applications received, a maximum of six projects were selected after a prescribed screening process, and JICA covered the costs (up to US$10,000 each) for the ICT companies in the target countries to implement the projects. As shown in the figure below, this pilot program was implemented in the form of subcontracting work from the Survey Team entrusted by JICA to the ICT companies in the target countries.

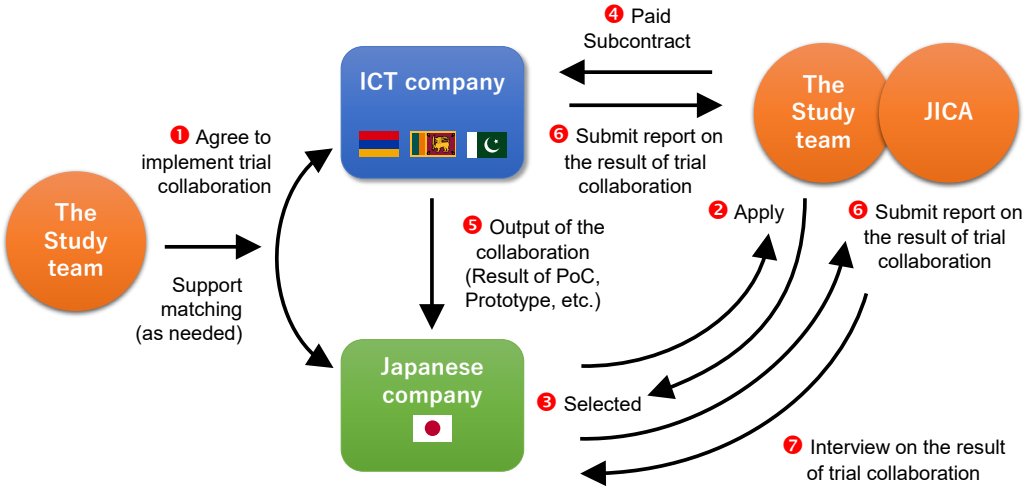



Figure-27 Overview of the Pilot Program for trial business collaboration with Japanese companies

Requirements for applying to the Pilot Program

- The content of the collaboration should be compatible with the purpose of the Survey. Specifically, the collaboration should be related to some advanced ICT field (AI, IoT, Blockchain, etc.). Specific examples are as follows.
  - ➢ Creation of AI models for evaluation by using data provided by Japanese companies
  - ➢ FPGA prototyping according to the specifications provided by the Japanese company (until the demonstration)
  - ➢ PoC supply chain experiment to track producers, etc. using Blockchain
  - ➢ Survey on the current needs for the development of smart medical systems

- The Japanese company should provide the technical specifications and data necessary for the development by the company of the target countries. In principle, technical communication during the development should be conducted directly between the companies.
- As a general rule, the copyright of specific software developed through this project will be held by the IT company (since existing code held by the IT company is often used for prototype development, for example), but detailed terms and conditions should be determined by agreement between the Japanese company and the partner IT company.
- Other conditions for participation and application shall be in accordance with the prescribed agreement, and submission of the agreement shall be a condition for application.

### 5.5.2 Call for Pilot Projects and Results of Selection

The call for the Pilot Program was done from November 16th to December 11th, 2020, and all Japanese companies and companies in the target countries that had been contacted in the Survey were invited to apply directly. The invitation was also made through our website of the Survey mentioned above, the e-mail newsletter of related industry associations, and the advertising function of Facebook, etc.

As a result of the recruitment, there were finally applications from 10 corporate pairs. The application documents were reviewed on December 15, 2020 in the form of an online conference. In addition to the Survey Team, JICA's person in charge of this case and international cooperation specialists participated in the review meeting. In examining the application documents, the evaluation criteria were prepared in advance as shown in the table below, and the total evaluation points were set to 100 points.

As a result of the call for applications, we finally received applications from 10 company pairs. The screening of the applications was conducted on December 15, 2020 in the form of an online conference by the Survey Team, the JICA staff in charge of the Survey, and JICA's international cooperation experts. In reviewing the applications, the evaluation criteria were prepared in advance as shown in the table below, and the full score of the evaluation was set at 100 points.

Table-20 Evaluation criteria for applications of trial business collaboration

| Evaluation items | Perspective of the evaluation | Score |
|---|---|---|
| Relevance to the Survey | Is the pair a combination of an ICT company of target country that provides solutions in the field of advanced ICT and a Japanese company that is a user of the solutions suitable for the purpose of the Survey?<br>Is it a case that "the solution has already been widely adopted in Japan, and there is no need to use a company from the target country in terms of cost" or not? | 20 |
| Advanced technology | Does the content apply technologies from advanced ICT fields (AI, IoT, Blockchain, robotics, etc.)? | 20 |
| Feasibility | Can the project be implemented within a limited period of three months?<br>Is it likely that clear and objective results will be obtained? | 20 |
| Implementation system | Are there any problems with the implementation system on the part of the Japanese company and on the part of the company of the target countries?<br>Has the commitment of the Japanese company been obtained? | 20 |
| Sustainability | Although it is up to the Japanese company to decide whether or not to continue the collaboration after the PoC is implemented, does the PoC have a certain level of sustainability from an objective standpoint?<br>Would it be a case study that can be expected to have a ripple effect on other Japanese companies? | 10 |
| Price point | Is the composition of the rough estimate reasonable and within the predefined limit price? | 10 |
| | Total | 100 |

After reviewing the 10 applications submitted in accordance with the above-mentioned criteria, the evaluation results were as shown in the table below, and the top six projects with the highest total score were selected. By country, there were three Sri Lankan companies, two Armenian companies, and one Pakistani company.

Table-21 Selection result of trial business collaboration applications

| | Selected pairs | | | | | | Pairs that were not selected | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Evaluation items | A | B | C | D | E | F | G | H | I | J |
| Relevance to the Survey | 20 | 20 | 20 | 20 | 20 | 20 | 10 | 5 | 10 | 10 |
| Advanced technology | 20 | 20 | 20 | 15 | 15 | 15 | 18 | 10 | 10 | 10 |
| Feasibility | 18 | 20 | 20 | 20 | 20 | 20 | 20 | 10 | 5 | 15 |
| Implementation system | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 5 | 5 | 15 |
| Sustainability | 10 | 8 | 8 | 10 | 10 | 8 | 4 | 0 | 5 | 8 |
| Price point | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| **Total score** | **98** | **98** | **98** | **95** | **95** | **93** | **82** | **40** | **45** | **68** |

### 5.5.3 Implementation Results of the Pilot Projects

The selected company pairs started business collaboration in the latter half of December 2020 immediately after the notification of the selection result. Of the six corporate pairs, one of them subsequently declined the Pilot Program in the process of discussing specific details of the collaboration, but the remaining five company pairs all completed the collaboration by May 2021. Appendix 3 shows the results of the trial collaboration for the six corporate pairs, including the pair that declined. The table below shows the summary of results that were judged to be useful from the work completion reports submitted by each corporate pair. Similar opinions are combined into one and its number of opinions is

appended. Opinions specific to each country (Armenia, Pakistan, and Sri Lanka) are marked with the country flag.

Table-22 Summary of implementation results of pilot collaboration projects

| Question | | Answers from Japanese company | Answers from IT company of the partner country |
|---|---|---|---|
| Issues and problems encountered during trial business collaboration | Communication, business practices, culture, etc. | • Language barrier: 3 companies<br>• Time difference | • Language barrier: 2 companies<br>• End users do not understand English<br>• Understanding Japanese industry knowledge and terms |
| | Technical problems | • Low expertise in fields other than IT (customer industry) | |
| How the above problems were solved (or not solved) | | • Regular meetings<br>• Flexible response to scope changes, etc.<br>• Support from person with high English proficiency<br>• Support from the Survey Team members who are strong in IT | • Regular meetings<br>• Support from the Survey Team members who are strong in English |
| Possibility to collaborate with companies in the partner country | Future possibilities | • Yes (positive): 5 companies | • Yes (positive): 5 companies |
| | Attractiveness of partner country companies | • High cost performance: 4 companies<br>• High level of advanced technology: 2 companies<br>• Fast development speed: 2 companies<br>• Global standard development approach | • Japanese are professionals: 2 companies<br>• Japanese labor culture, polite business etiquette, time and resource accuracy<br>• 🇱🇰 Japan's agricultural market is very attractive |
| | Challenges of the partner country industry | • Support and troubleshooting that require on-site work cannot be expected | • Japanese language is a barrier: 3 companies<br>• Lack of information about the Japanese market |
| What to do to promote business collaboration | By companies and industry associations of your country | • Make efforts to include target country in the options of the contractor as industry association<br>• Collect more information on IT companies in the target countries, discover good companies, and actively interact with them. | • Providing Japanese language education for developers and incentives for Japanese language ability: 2 companies<br>• Trade and exchange program implementation: 2 companies<br>• 🇱🇰 Promotion of understanding of Japanese culture, work ethics, etc.<br>• Cooperation with companies in specific industries: 2 companies |
| | By JICA, Government of Japan | • Continuous implementation of trial business collaboration: 2 companies<br>• Collect and share information regarding IT industry of target countries: 3 companies | • Promotion of entry of IT companies in target countries in the projects of JICA and Japanese companies: 3 companies<br>• Network building between the industry of two countries (Web portal, annual conferences, use case accumulation, etc.): 3 companies |

| Question | | Answers from Japanese company | Answers from IT company of the partner country |
|---|---|---|---|
| | By Government of target country | • Collect and share information on local IT companies<br>• Support for Japanese language (brochure, etc.) | • Network building between the industry of two countries (Web portal, public relations with Japanese market): 5 companies<br>• Add Japanese to elective courses at IT universities<br>• IT -related joint research with Japanese universities and the support for start-ups starting from there |
| Other comments and suggestions to promote collaboration between the two countries | | | • Expansion of international students to Japanese universities<br>• Cooperation program by universities in both countries (joint research, start-up support by both countries, etc.) |

### 5.5.4 Analysis of the Results of the Pilot Projects

In the implementation results shown above, all pairs that collaborated were mostly satisfied with the content of the collaboration and responded positively to the idea of further collaboration with the target country companies. For the IT companies in the target countries, the attitude of the Japanese companies and the Japanese business culture seemed to be favorable, and the Japanese companies were satisfied with the cost performance and technology level of the target companies.

In almost all of the trial projects, the language barrier was cited as an issue. Even if the Japanese side has a person in charge who is fluent in English, if the final beneficiaries (end users) do not have good English skills, there were many issues such as the inability to have direct discussions between users and developers. Another issue is that even if the Japanese company is a specialist in a particular industry, if they are not familiar with the IT field, there were several cases where the members of the Survey Team had to participate in every meeting because the Japanese side could not understand the IT-related content explained by the target company. In order to deal with these issues in future collaborations, English coordinators with knowledge of the target industry will be needed for the former, and (English) coordinators with knowledge of the ICT field will be needed for the latter.

Another area on the Japanese side that deserves special mention is smart agriculture. The Japanese agricultural market is highly premium and crops are sold at a high price point compared to other countries. Farmers are also highly literate in IT and technology, which makes it easy for them to adopt IT and command a price premium to cover the cost.

## 5.6 Production of a Promotional Video for the Armenian ICT Industry in the Japanese Market

### 5.6.1 Production Overview

In line with the content of the branding and marketing strategy, 10-15 minute ICT industry promotional video for the Japanese market was produced for each target country. This activity was conducted as an alternative measure to help Japanese companies deepen their understanding of the characteristics and strengths of the ICT ecosystem in each country, since the program for Japanese companies to visit the target countries was cancelled due to COVID-19.

### 5.6.2 Structure and Content of the Video

In order to introduce the Armenian government's efforts to promote the ICT industry, the characteristics of ICT education, the history of the development of the ICT industry, and the strengths of local ICT companies, we conducted interviews with the following stakeholders in Armenia.

Table-23 Target of interview recording in Armenia

| Classification | Organization | Position | Name |
|---|---|---|---|
| Government Initiatives for ICT Industry Promotion | Ministry of High-Tech Industry | Innovation Lead | Ms. Arpi Abramian |
| Characteristics of ICT education | TUMO Center | CEO | Ms. Marie Lou Papazian |
| History of ICT industry development and collaboration with Japanese companies | Intelinair | CEO & Co-Founder | Mr. Al Eisaian |
| ICT companies (startup) | Grovf | CEO & Co-Founder | Ms. Astghik Nalchajyan |
| ICT companies | Instigate Design | Co-founder & CTO | Mr. Vahagn Poghosyan |

The following is a synopsis of the promotional video that was produced.

Table-24 Synopsis of the promotional video produced

| Part | Contents |
|---|---|
| 1. Armenia Overview | • Located in southeastern Europe<br>• In addition to the domestic population of 2.9 million, 7 million diaspora live in Russia, the U.S., and other countries.<br>• Increasing its presence as a leading ICT nation with high R&D capabilities in the ICT field |
| 2. History of Innovation | • Armenia was a major center for software development, semiconductor manufacturing, and electronics development during the former Soviet era, and was known as the "Silicon Valley of the Soviet Union.<br>• Innovations such as ATMs, CT scanners and color TVs originated in Armenia.<br>• Currently, Armenia's ICT sector is growing to 7-10% of GDP |
| 3. IT Human Resource Development System | • Chess is now a required subject in elementary schools, and robotics curricula are being introduced in high schools, fostering a group of brains with "math brains" from a young age.<br>• TUMO Center, one of the world's most advanced STEM education providers, offers unique after-school program for youth<br>• As a result, there is an abundance of talented engineers with high R&D capabilities in Armenia. |

| Part | Contents |
|---|---|
| 4. Development of the ICT industry | • Since the 2000s, global IT companies have acquired many of Armenia's best startups, and a number of global IT companies have established R&D centers in Armenia.<br>• The establishment of the R&D Center has contributed to the production of excellent engineers and has been a catalyst for the further development of the Armenian ICT industry.<br>• In recent years, the country has spawned a number of start-up companies that are attracting attention around the world and is attracting global attention as an advanced IT nation with strong R&D engineers. |
| 5. Core Values | • Among these, "R&D-oriented software development" and "semiconductor design" are Armenia's competitive advantages. |
| 6. Local ICT companies | • Founded in 2017, Grovf provides network acceleration solutions based on FPGA cards that enable high-speed data processing as communication load increases with the spread of IoT and other technologies. In just three years since its establishment, the company has set up an office in Silicon Valley and is doing business with clients around the world, including the US, Canada, Russia, Japan, India, and China.<br>• Headquartered in Yerevan, the capital of Armenia, Instigate is a leading company with four branches in the country, and has advantages in both semiconductor design and R&D-based software development. Instigate nurtures engineers who can handle a wide variety of industries and technologies and is constantly creating innovative solutions using cutting-edge technologies. |
| 7. Collaboration with Japanese companies | • Due in part to the global network of the diaspora, there are countless examples of collaboration between Armenian ICT companies and Western companies, but collaboration with Japanese companies is still limited. Expectations are high that Armenian companies will become more recognized as business partners of Japanese companies in the future, and that collaboration between companies in the two countries will become more active. |

This video will be uploaded to JICA's YouTube channel and will also be shared with Japanese companies, industry associations, Japanese embassies, JETRO, etc.

# 6 Proposed Branding/Marketing Strategy for IT Companies to Japan

In the Survey, we developed a draft strategy for branding and marketing of the Armenian ICT industry to the Japanese market, as well as proposed activities based on the draft strategy. These documents are prepared in PowerPoint format with a lot of infographics in accordance with marketing methodology and will be submitted to the Armenian government as a separate document from this report. Here, we will only discuss the outline of the draft strategy and its activities and attach thumbnail images of the draft in Appendix 4.

## 6.1 Overview of the Proposed Branding/Marketing Strategy

Armenia's branding/marketing strategy was developed according to the following steps, as shown in Process 4-1 of Work 4 in Chapter 1.6

### (1) Set priority target industry in Japan

As shown in Table-10, the following industries have been identified as priority target industries.

Semiconductor design, cyber security, robotics, AI and ML, Blockchain

### (2) Value image to be evoked

First, the target persona for marketing was assumed to be an engineering professional in a Japanese business company, where innovation is a management issue, but ideas and solutions are unclear. The value image of Armenia that we wanted to evoke in this persona is “When it comes to R&D based software development, it is Armenia”.

### (3) Customer contact points

The story that appeals to customers starts with Armenia’s national background, followed by its excellent human resource development, world-class advanced ICT companies, additional business values such as geographic conditions and economic advantages, and the current status of its entry into the Japanese market, before concluding that it would be beneficial for Japanese companies to cooperate with Armenian companies. The promotional video in the previous Chapter was produced in line with this story.

### (4) KGI/KPI

As for KGI/KPI to quantitatively measure the results of branding/marketing implementation, it is desirable to use the followings from the perspective of measuring how well the target audience was reached.

- KGI: Market share of Armenian advanced ICT technology companies in the Japanese market
- KPI: Recall rate of Armenia as an image of an advanced ICT country: 10%;
  Matching/ business meeting support rate: 50%.

## 6.2 Outline of the Proposed Action Plan

In addition to the above proposed branding/marketing strategy, we have also prepared a separate document on the proposed activities to be undertaken by the Armenian side in the future. The following is a summary of this document. (See Appendix 3 for details.)

- In order to enter the Japanese market, a specialized organization (tentative name: Armenian advanced ICT Export Organization) would be established to support the export of Armenia’s ICT industry to Japan (and to the rest of the world).
- Its Japanese branch, cooperating with the Armenian Embassy, will partner/collaborate with Japanese organizations (JICA/JETRO, local governments, companies, academic institutions, etc.).
- The branch will implement the above marketing/branding strategy and support the advancement of Armenian companies. Specifically, it will disseminate information over a wide area, provide individual information, networking, promotion, and business meeting opportunities.

- Assume one year for research and planning, and about 1.5 years for the launch of the Japan branch.

## 7 Recommendations on Japan's Support for Promotion of the ICT Industry

In this Chapter, based on the results of the Survey described so far and the results of the various events described in Chapter 6, we will clarify what Japan should support in order to promote business matching between the Armenian ICT industry and Japanese user companies. First, a SWOT analysis was conducted on the advantages of Armenia's ICT industry compared to the ICT industries of other emerging countries (China, India, Vietnam, Bangladesh, etc.) that are already doing business in Japan. The results are shown in the figure below.

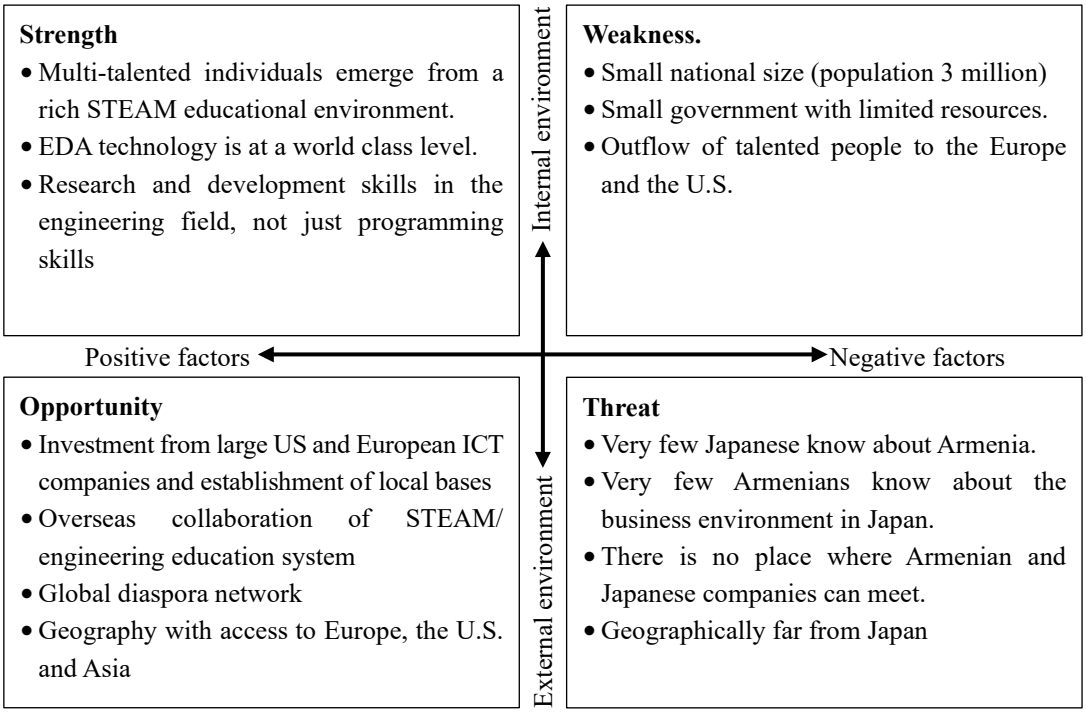



Figure-28 SWOT Analysis of Armenian ICT industry compared to existing countries with business in Japan

Based on the results of the SWOT analysis, the table below categorizes the contents that Japan should support in terms of the target group and the SWOT approach. In the table, those indicated by notation like [PRG1] are the numbers of support measures and actions, and those with high priority is indicated by ★ mark. Details of each program are described in the next section.

Table-25 Japan's support measures and actions for promoting ICT industry in Armenia

| Strategy / Target group | Enhance the Strength | Overcome the Weaknesses | Take advantage of Opportunities | Ward off Threats |
|---|---|---|---|---|
| Government body (Agency) | | **[PRG1]** ★ Dispatch of ICT industry business collaboration advisor from Japan | | |
| Educational Institutions | **[PRG2]** Invitations to participate in robot contests and other technical competitions in both countries | | **[PRG3]** Dispatch of lecturers to STEAM educational institutions in Armenia | **[PRG4]** Exchange student program with Japan **[PRG5]** Internship program at Japanese companies |
| IT industry | **[PRG6]** Business matching event with Japanese companies focusing on specific technological fields in which Armenian companies have strengths | | **[PRG7]** Promotion of business matching with Armenian companies headquartered in the U.S. and Europe | **[PRG8]** Accumulate and publicize cases of business collaboration with Japanese companies **[PRG9]** Building a technology-oriented business matching system/platform |

## 7.1 Project Possibilities

Possible projects that could be implemented targeting governmental and educational institutions in Armenia would be as follows.

**[PRG1]** Dispatch of ICT industry business collaboration advisor from Japan

| | |
|---|---|
| Type of cooperation | Dispatch of experts (long-term) |
| Necessity of cooperation | The Armenian Ministry of High-Tech Industry has already implemented various measures to promote the ICT industry but has not yet implemented any measures specifically aimed at promoting business with Japan. Since there are very few local human resources with knowledge of the Japanese business environment, there is a lack of support personnel on the local side. |
| Purpose of cooperation | Establish a short- and long-term, multi-faceted mechanism to facilitate business matching between Armenia's ICT industry and potential Japanese clients |
| Target institution | Ministry of High-Tech Industry |
| Cooperating organization in Japan | Industry associations of technology areas that are promising as customers of the Armenian ICT industry (custom semiconductor design (ASIC, FPGA, etc.), embedded systems, consumer robotics, network infrastructure products, etc.) |
| Contents of cooperation | Advisors from Japan will be dispatched as long-term expert with the following TORs.<br>• Stationed at the Ministry of High-Tech Industry<br>• Advise the Armenian government on actions needed in both countries to promote collaboration and business matching between Armenia's advanced technology industry, particularly the ICT industry, and Japanese industry.<br>• Regular opinion exchanges should be held with several industry associations on the Japanese side, and specific measures to promote business collaboration will be planned and implemented. Implementation on the Japanese side will be led by the industry associations, while the advisors on the Armenian side will work with government agencies and industry associations in Armenia. |

| | |
|---|---|
| | • Specifically, it is expected and efficient to promote the possibility of all other cooperation activities ([PRG2] to [PRG9]) as sub-projects and provide advice on their overall coordination, etc.<br>• In addition to advising on direct business collaboration, should also advise on activities and events to get to know each other's countries better in order to promote friendship between the two countries from a long-term perspective. Specifically, this includes the promotion of human exchange such as exchange students (see [PRG4]) and the implementation of events to introduce Japan's advanced culture (anime and game, etc.) that is also relevant to the ICT industry. |
| Time frame | Immediate |

**[PRG2]** Invitations to participate in robot contests and other technical competitions in both countries

| | |
|---|---|
| Type of cooperation | Invitation to participate in international technical competition events held in both countries |
| Necessity of cooperation | Armenia is participating in Robotex, an international robotics competition led by Estonia, which has been held in Armenia in 2019. On the other hand, Robocon is also a widely known technology competition in Japan. However, in both cases, participation tends to be limited to neighboring countries, so there is no opportunities for exchange between students from the two countries who have high technological skills. |
| Purpose of cooperation | • Promotion of exchange among engineering students through mutual competition participation<br>• Securing technical personnel who know the culture, education, and business environment of both countries<br>• Expand future business matching opportunities between the two countries in the ICT field using the above human resources. |
| Target institution | Technical high schools, Armath Laboratories (see 2.2) |
| Cooperating organization in Japan | Robocon (https://official-robocon.com/), JICA, Robotex Japan, etc. |
| Contents of cooperation | Invite student teams from Armenian technological educational institutions to participate in engineering and technology competitions such as Robocon held in Japan. Also, Japanese student teams will be sent to engineering and technology competitions held in Armenia.<br>• It does not need to be limited to Robocon, but can be any international competition event related to ICT.<br>• For example, AI Go/Shogi/Chess, Automated Driving AI Challenge (Society of Automotive Engineers of Japan), etc. |
| Time frame | The time when these technical competitions will be held |

**[PRG3]** Dispatch of lecturers to STEAM educational institutions in Armenia

| | |
|---|---|
| Type of cooperation | Dispatch of experts (short-term)/country-specific training |
| Necessity of cooperation | Armenia has an advanced STEAM education system, and similar efforts are widely being made in Japan. One of the areas in which Japan holds a unique position in the world in this field is digital art and content-based technology (including animation, games, etc.), but its educational system is still not well known to the world. |
| Purpose of cooperation | • Introduction of Japanese digital art technologies and its transfer<br>• Fostering technical personnel who are familiar with Japan's digital art culture and its educational environment<br>• Expansion of future business matching opportunities between the two countries in the field of ICT by the above-mentioned personnel (with a view to promoting ICT offshore development related to digital art from Japan) |
| Target institution | TUMO Center and others |

| | |
|---|---|
| Cooperating organization in Japan | Digital art schools in Japan, Japan Foundation, JICA |
| Contents of cooperation | • A short course to introduce Japanese digital art technologies will be held as an selective topic at STEAM educational institutions in Armenia.<br>• Conducting country-specific training in Japan for digital art instructors from Armenia to learn Japanese digital art technologies.<br>• Training content may also include consumer-oriented robotics technology in Japan. |
| Time frame | Within a few years |

**[PRG4]** Exchange student program with Japan

| | |
|---|---|
| Type of cooperation | Exchange student program |
| Necessity of cooperation | Compared to other emerging countries that have already made inroads into Japan and to the other two countries in the Survey (Sri Lanka and Pakistan), Armenia and Japan are overwhelmingly lacking in human resources with knowledge of both countries. When considering the promotion of business matching between companies in the two countries, the Survey results show that the presence or absence of human resources with knowledge of the situation in the other country has a significant impact on the success or failure of the matching, and therefore the long-term development of such human resources is necessary. |
| Purpose of cooperation | • Fostering human resources with knowledge and experiences of both countries<br>• Expanding business matching opportunities between the two countries in the future with the above human resources |
| Target institution | Universities, higher education institutions, Ministry of Education of Armenia |
| Cooperating organization in Japan | Universities, higher education institutions, Japan Student Services Organization (JASSO), etc. |
| Contents of cooperation | • Planning and implementation of international student programs that invite Armenian students to Japanese universities and higher education institutions<br>• Planning and implementation of foreign student programs that send Japanese students to Armenian universities and higher education institutions<br>• Planning and implementation of exchange student programs between Armenian and Japanese universities and higher education institutions<br>• In addition to the government-sponsored international student program, also consider collaborating with private international student programs to accept international students to Japan. |
| Time frame | Immediate |

**[PRG5]** Internship program at Japanese companies

| | |
|---|---|
| Type of cooperation | Collaboration between universities and the private sector |
| Necessity of cooperation | In order to expand business matching opportunities between Armenian ICT companies and Japanese user companies, human resources on the Armenian side who are familiar with the Japanese business environment and needs for ICT solutions are needed. While diaspora networks are playing a major role in Western countries, there are still few such networks in Japan. |
| Purpose of cooperation | Secure Armenian human resources who are familiar with Japan's business environment and ICT needs |
| Target institution | Universities and higher education institutions |
| Cooperating organization in Japan | Japanese system integrators engaged in offshore development, Japanese technology companies (preferably in industries where ICT human resources are in short supply, such as manufacturing), companies in industries where the Japanese side has strengths (games, animation, etc.), the Center for International Cooperation in Computerization (CICC), JICA, METI "Japan Internship Program"[73], etc. |

[73] https://internshipprogram.go.jp/english/

| | |
|---|---|
| Contents of cooperation | • Through the Japanese partner organization, recruit companies that can accept ICT students from Armenia as interns.<br>• On the Armenian side, recruit students who wish to participate in internship program at Japanese companies.<br>• Students who wish to participate will be matched with companies through online interviews.<br>• Training on Japanese culture and simple Japanese language will be provided prior to the trip to Japan.<br>• Conduct an internship at a Japanese company. The duration of the program would be about 3 to 6 months.<br>• The host company will bear the cost of travel to and stay in Japan.<br>• CICC has successfully implemented a similar project in Myanmar[74] so it is advisable to refer to that project. |
| Time frame | As soon as the Japanese side is ready to cooperate. |

## 7.2 Possibility of Private Sector Collaboration

Potential private sector partnerships with Armenia's ICT industry include the following.

**[PRG6]** Business matching event with Japanese companies focusing on specific technological fields in which Armenian companies have strengths

| | |
|---|---|
| Type of cooperation | Event implementation |
| Necessity of cooperation | From the results of the Survey, it is clear that there is a need in the Japanese market for specific fields in which Armenian companies have strengths, but since there are almost no matching opportunities in specific fields with companies that have needs, implement such events with a clearly defined objective. As the result of the Survey suggests, it is important to focus on specific fields that Armenia has clear edge, as it is difficult to differentiate from other emerging countries if the event is focused too loosely such as "advanced ICT fields". |
| Purpose of cooperation | Business matching between the two countries in specific fields |
| Target institution | Armenian companies with solutions in specific technological areas. The specific areas are expected to include some of the following areas.<br>• EDA<br>• Control systems for network infrastructure such as server farms and web hosting<br>• Embedded devices, robots<br>• Custom product development for drones, IoT, etc. (ASIC, FPGA, etc.)<br>• Edge AI |
| Cooperating organization in Japan | Industry associations in specific fields, METI, JETRO, etc. |
| Contents of cooperation | An online matching event will be held in collaboration with the corresponding industry organization on the Japanese side.<br>• The event will be planned jointly with Japanese industry associations. The industry association should not be user companies, but rather the same industry as Armenia's strong technological field. In other words, it is assumed that Japanese companies will collaborate and co-develop with Armenian companies in the same field.<br>• Recruit companies to participate on the Armenian side.<br>• Participating companies in both countries will create their own business and technical information on the Web in advance and make it available to participating companies.<br>• There will be a period of time prior to the event when the above introductory information can be freely viewed. This does not preclude companies from entering into business negotiations without waiting for the event. |

[74] http://www.cicc.or.jp/japanese/news/pdf_ppt/201106MyanmarInternship2020.pdf

| | |
|---|---|
| | • The event will include online opportunities for one-on-one discussions with multiple counterpart companies, as well as breakout sessions where companies in more focused technology areas can come together for discussions. |
| Time frame | Implement one session, and if there are sufficient concrete results, continue to hold the session on a regular basis. |

**[PRG7]** Promotion of business matching with Armenian companies headquartered in the U.S. and Europe

| | |
|---|---|
| Type of cooperation | Diverting the business matching scheme with European and American companies |
| Necessity of cooperation | Based on the results of the trial business matching events conducted in the Survey, Japanese companies that don't know Armenia well tend to have insufficient confidence in Armenia. However, in fact, many Armenian companies are headquartered in Europe or the U.S. and are recognized as European or U.S. companies in terms of registration, so we will take this fact and use Japanese companies' sense of security in "European or U.S. companies" and the existing matching scheme for European or U.S. companies to conduct matching. |
| Purpose of cooperation | Business matching between international Armenian companies based in the U.S. and Europe and Japanese companies |
| Target institution | International Armenian companies with offices in Europe and the United States |
| Cooperating organization in Japan | Organizations and companies that support matching with Western companies, such as Japanese companies that have a need for the solutions offered by Armenian companies mentioned above, or Japanese companies that wish to form a JV with such companies. |
| Contents of cooperation | • List the ICT companies (or advanced technology companies in general) in Armenia that are based in Europe or the United States. In addition to Armenia, similar companies in Sri Lanka and Pakistan can also be listed.<br>• Identify Japanese industries that may have a need for the solutions provided by the listed companies and solicit interested Japanese companies through industry associations. In doing so, it is not necessary to specify that the listed companies are originally from Armenia, Sri Lanka or Pakistan (as they are registered as European/US companies).<br>• The business matching between these companies and Japanese companies will be conducted using the existing business matching scheme and platform with European/US companies. In other words, formally, it is no different from matching with European/US companies.<br>• The fact that the nationality of the company to be matched is Armenian (or Sri Lankan or Pakistani) will naturally become apparent during the matching process. However, if the matching is done from the perspective of technology and business, these facts will not be a problem. |
| Time frame | At any time |

**[PRG8]** Accumulate and publicize cases of business collaboration with Japanese companies

| | |
|---|---|
| Type of cooperation | Information sharing |
| Necessity of cooperation | One of the characteristics of the business mindset in Japanese industry is the tendency to place emphasis on word of mouth and real cases. No matter how good the ICT companies are in Armenia, Japanese companies often fail to take concrete actions if there are no real cases of collaboration between those companies and Japanese companies. |
| Purpose of cooperation | Provide Japanese companies with an opportunity to generate interest in matching with Armenian companies and to take concrete actions. |
| Target institution | Armenian advanced technology companies that have experience working with Japanese companies (not limited to ICT field) |
| Cooperating organization in Japan | Japanese companies with experience in collaborating with Armenian advanced technology companies, the Armenian Embassy in Tokyo, JETRO, etc. |

| | |
|---|---|
| Contents of cooperation | • Collect case studies of collaboration between advanced Armenian and Japanese companies in both countries.<br>• Interviews will be conducted with companies in both countries that have collaborated with each other to gather information on the challenges of collaboration and the strengths of the other country's companies.<br>• The collected information will be accumulated and (with the consent of the interviewee company) posted on websites that support collaboration with overseas companies.<br>• Ideally, it would be desirable to collect similar cases not only from Armenia but also from Sri Lanka, Pakistan, and all other countries where promoting cooperation with Japan in the future would be beneficial to both countries, and publish them on the business matching system described below. |
| Time frame | As soon as we find an existing matching site that can help us accumulate and publish examples of collaboration |

**[PRG9]** Building a technology-oriented business matching system/platform

| | |
|---|---|
| Type of cooperation | Building an online platform |
| Necessity of cooperation | As mentioned in Section 4.2.2 of the main text, existing business matching sites only provide information on companies, and users can only find companies by searching through a vast amount of information. However, companies that are actually looking for collaboration partners need a function that can automatically present matching candidates based on specific technical keywords. |
| Purpose of cooperation | Create a new international business matching system/platform that is easy to use and highly efficient for both Japanese and foreign companies looking for business partners. |
| Target institution | Overseas companies wishing to collaborate with Japanese companies (not limited to countries covered by the Survey) |
| Cooperating organization in Japan | Japanese companies wishing to collaborate with overseas companies, JETRO, JICA, etc. |
| Contents of cooperation | • Establish an online system that allows overseas and domestic companies to register their information for the purpose of finding collaborators.<br>• Be sure to conduct screening (manual or automatic) to eliminate false information when registering company information.<br>• In addition to automatic matching based on technical keywords entered by the company, AI will pick up companies with a high expected success rate for matching based on machine learning from the overall information entered by the company, without placing a large burden on the system operator.<br>• In order to alleviate the language barrier, which is the biggest obstacle for Japanese companies to collaborate with overseas, the information entered by overseas companies can be searched and viewed in Japanese by linking with an external automatic translation function, etc. The system will also have a registration function for interpreters. This will allow the same site to be used for securing and booking interpreters in the other party's language when conducting specific business negotiations online. Interpreter personnel can also register on this site to ensure stable and continuous work.<br>• It is desirable that the system be operated by a public organization such as JETRO, as it will ultimately benefit Japanese companies by enabling them to find high-quality, low-cost solutions. |
| Time frame | As soon as the governing body of the system is determined and the budget is available |

(End)

# Appendix 1: List of Organizations/IT Companies Surveyed in Armenia

Government organizations

| Name | URL | Overview |
|---|---|---|
| Ministry of High-Tech Industry | http://www.hti.am/ | Ministry in charge of all high-tech industries including ICT |

IT industry associations, organizations, incubation centers, and venture capitals

| Name | URL | Overview |
|---|---|---|
| Armenia Startup Academy | https://www.startupacademy.am/ | Provides entrepreneurship and startup education program, which aims to prepare startups to raise their pre-seed rounds and expand to global markets through its Pre-acceleration and Traction programs. |
| CATALYST Hi-Tech and Entrepreneurship Development Foundation | https://www.catalyst.am/ | Startup support organization established by the founder of SmartGate VC. Execute acceleration program called Armenia Startup Academy. |
| Engineering City | http://engineeringcity.am/ | Supporting facility for engineering companies. Provide tenants with advanced engineering equipment. |
| Enterprise Incubator Foundation (EIF) | http://www.eif.am/eng/ | World Bank technology incubator. Involved in the establishment of various SU support facilities |
| Granatus Ventures | https://www.granatusventures.com/ | The first VC in Armenia established in 2013. Already invested in 14 companies. Established $ 40M fund in 2019. |
| Gyumri Information Technologies Center | http://www.gitc.am/ | An incubation facility established with the support of the World Bank, EIF, and the government. |
| HIVE Ventures | https://hiveventures.co/ | VC specializing in seed startups in Armenia. Have already invested in about 20 companies. |
| Microsoft Innovation Center | https://mic.am/ | An IT-based SU incubation and acceleration facility established with the support of Microsoft, EIF, and USAID |
| The International Science and Technology Center (ISTC) | https://istc.am/ | Startup/research incubation facility for ICT, AI, etc. established by IBM, USAID, government, etc. |
| Tumo Center for Creative Technologies | https://tumo.org/ | A free education center specializing in technology and design, mainly for ages 12-18. |
| Union of Advanced Technology Enterprises (UATE) | https://www.uate.org/ | It is an industry organization to which high-tech companies join, and is conducting marketing using ICT and attempting collaboration between companies. |

Note: There are several more organizations who responded to our online questionnaire, but they are not considered as the target of the Survey.

IT companies

| Company name | URL | Overview |
|---|---|---|
| AOByte | http://aobyte.com/ | Large scale enterprise web applications |
| arloopa | https://arloopa.com/ | An augmented reality and virtual reality app and game development company |
| Britive | https://www.britive.com/ | Provider of cloud security solutions intended to solve issues associated with privileged access. |
| Codesignal | https://codesignal.com/ | Automated skills-based assessment platform |
| Develandoo | https://www.develandoo.com/ | Biggest consortium of AI and Data companies in Armenia |
| Disqo | https://www.disqo.com/ | Collects, analyses, and provides high quality consumer data to the world's largest market research agencies, analytics companies, and brands. |
| Embry Tech | https://embry.tech/ | Biometric data tracking and wellness monitoring device |

| Company name | URL | Overview |
|---|---|---|
| Essential Solutions | http://www.essentialsln.com/ | Strong in cutting-edge solutions using AI, Blockchain, and quantum computers (research only) |
| Fimetech | http://www.fimetech.com/ | Provide solutions such as AI, Robotics, EDA, IoT, Embedded Systems |
| Grovf | https://grovf.com/about-us | Application performance acceleration company through FPGA-CPU pairs |
| Improvis | https://www.improvis.am/ | Development of games, AI, robots, etc. Former Gyumri Technologies Center Incubetee. |
| Instigate Design | https://ggg.instigatedesign.com/ | Circuit design, FPGA, large-scale distributed computing |
| Instigate Mobile | http://ggg.instigatemobile.com/ | System development using mobile, IoT, VR, etc. |
| Instigate Robotics | http://www.instigaterobotics.com/ | R&D of drones, unmanned aerial vehicles, 3D printers, agricultural systems, etc. |
| IntelinAir | https://www.intelinair.com/ | Aerial imagery analytics company focused on agriculture |
| IUnetworks | https://www.iunetworks.am/ | Provide e-government, enterprise solutions, and networking equipment working both with private and state organizations |
| Joomag | https://www.joomag.com/ | Digital publishing platform offering a suite of integrated solutions for every content marketing need |
| Netris | https://www.netris.ai/ | vendor-agnostic networking software suite |
| Quality Testing Lab | https://www.qt-lab.com/ | Provide a full range of software testing services at any level of software development |
| RAFA Solutions | https://rafasolutions.com/ | Systems integrator company specializing in Smart Machines and data acquisition and control systems |
| SmartClick AI | https://smartclick.ai/ | Full-service software provider delivering Artificial Intelligence (AI) and Machine Learning (ML) solutions for Enterprises. |
| snark AI | https://snark.ai/ | A Deep Learning platform designed to enable up to faster Deep Learning training |
| SoloLearn | https://www.sololearn.com/ | Mobile social platform to learn coding |
| SuperAnnotate AI | https://www.superannotate.ai/ | One of the fastest image annotation platform utilizing AI for the one-click pixel accurate object selection |
| Triple-E | https://www.triplee.info/ | AR platform where everyone can create their own AR samples on a mobile device |
| Volo | http://www.volo.am/ | Software development using advanced technologies such as Fintech. |
| YEA engineering | https://yeae.am/ | Engineering services in the converging technologies of advanced industrial applications |

Note: There are many more companies who responded to our online questionnaire, but they are not considered as the target of the Survey.

International donors/foreign companies that are engaged in IT sector development

| Name | URL | Overview |
|---|---|---|
| Armenian-Indian Center for Excellence in ICT (AITC) | http://www.armindia.am/eng/ | provides a specialized infrastructure and high-performance facility for the delivery of IT-related trainings and R&D programs |
| GIZ Armenia | https://www.giz.de/en/worldwide/374.html | Armenian office of GIZ |
| USAID Armenia | https://www.usaid.gov/armenia | Armenian office of USAID |
| World Bank Armenia | https://www.worldbank.org/en/country/armenia/ | Armenian office of World Bank |

## Appendix 2: List of Contacted Japanese Industry Associations with Potential Needs for Advanced ICT Solutions

| Industry Sector | Potential Technology to Apply | Industry Association and Major Company | URL |
|---|---|---|---|
| Finance/Securities | AI, Blockchain, Big Data processing, Privileged Access Management Service, Smartphone app, Startup service, etc. | Japanese Bankers Association | https://www.zenginkyo.or.jp/en/ |
| | | Japan Securities Dealers Association (JSDA) | https://www.jsda.or.jp/en/ |
| | | Japan Consumer Credit Association (JCA) | https://www.j-credit.or.jp/en/ |
| | | Fintech Association of Japan | https://www.fintechjapan.org/ |
| | | Institute for Monetary and Economic Studies, Bank of Japan (IMES) | https://www.imes.boj.or.jp/en/ |
| | | Center for Financial Industry Information Systems (FISC) | https://www.fisc.or.jp/english/ |
| | | Chigin Network Service Co., Ltd. (CNS) | https://www.chigin-cns.co.jp/ |
| | | Blockchain Collaborative Consortium | https://bccc.global/ |
| | | Japan Blockchain Association (JBA) | https://jba-web.jp/ |
| Insurance | AI, Blockchain, Big Data processing, Smartphone app, Image processing recognition and data analysis, Privileged access management service, etc. | General Insurance Association of Japan (GiAJ) | https://www.sonpo.or.jp/en/ |
| | | All Japan Independent Adjusters Association (JAA) | http://zengikyo.gr.jp |
| | | National Agricultural Insurance Association | http://nosai.or.jp/ |
| Medical system/ Health care | AI, Big Data processing, Computer vision, Image processing recognition and data analysis, Deep learning, Privileged Access Management Service, Image annotation technology for AI, Smartphone app, etc. | Japan Federation of Medical Devices Associations (JFMDA) | http://www.jfmda.gr.jp/e/ |
| | | Japan Association of Medical Devices Industries (JAMDI) | http://www.jamdi.org/about/index_en.html |
| | | Medical Technology Association of Japan (MTJAPAN) | http://www.mtjapan.or.jp/jp/mtj/en/ |
| | | Japan Analytical Instruments Manufacturers' Association (JAIMA) | https://www.jaima.or.jp/en/ |
| | | Tokyo Metropolitan Institute of Medicine and Engineering HUB Organization | https://ikou-hub.tokyo/ |
| | | IoMT (Internet of Medical Things) Society | https://iomt.or.jp/ |
| | | Association of Medical Databases in Japan (AMDJ) | http://www.amdj.org/ |
| | | Health Data Scientist Association | http://japan-hds.org/ |
| | | Japan Medical Venture Association (JMVA) | https://jmva.or.jp/ |
| | | Japan Bioindustry Association (JBA) | https://www.jba.or.jp/en/ |
| Machine Tools | AI, FPGA, SoC design, Image processing recognition and data analysis, Computer vision, Deep learning, etc. | Japan Electrical Manufacturers' Association (JEMA) | https://www.jema-net.or.jp/English/ |
| | | Japan Auto-Body Industries Association inc. (JABIA) | https://www.jabia.or.jp/en/ |
| | | Japan Die & Mold Industry Association (JaDMA) | https://www.jdmia.or.jp/english/ |
| | | Japan Machine Tool Builders' Association (JMTBA) | https://www.jmtba.or.jp/english/ |
| | | Japan Machine Tool Distributors Association (JMTDA) | http://www.nikkohan.or.jp/english/ |
| Automobile (autonomous driving, etc.) | Autonomous driving, sensing, electrification, etc. | Japan Automobile Manufacturers Association (JAMA) | http://www.jama-english.jp/ |
| | | Japan Auto Parts Industries Association (JAPIA) | https://www.japia.or.jp/en/ |
| | | Japan Electronics and Information Technology Industries Association (JEITA) | https://www.jeita.or.jp/english/ |
| | | Japan Automotive Service Equipment Association (JASEA) | https://www.jasea.org/en.html |
| | | Internet ITS Consortium (IIC) | http://www.internetits.org/ |

| Industry Sector | Potential Technology to Apply | Industry Association and Major Company | URL |
|---|---|---|---|
| Distribution | AI, Blockchain, FPGA, SoC design, Big Data processing, Deep learning, Image annotation technology for AI, Smartphone app, etc. | Japan Retailers Association | https://japan-retail.or.jp/english/ |
| | | Japan Institute of Logistic Systems (JILS) | https://www1.logistics.or.jp/ |
| | | Japan Information Technology Service Industry Association (JISA) | https://www.jisa.or.jp/e/ |
| | | Japan Institute of Material Handling (JIMH) | https://www.jimh.or.jp/en/ |
| Aerospace | AI, Big Data processing, FPGA, SoC design, Image processing recognition and data analysis, Computer vision, Deep learning, etc. | Society of Japanese Aerospace Companies (SJAC) | https://www.sjac.or.jp/en_index.html |
| | | Nationwide Network of Aircraft Manufacturing Clusters (NAMAC) | https://namac.jp/en/ |
| Materials science | AI, Big Data processing, Computer vision, FPGA, SoC design, Image processing recognition and data analysis, etc. | Japan Petrochemical Industry Association (JPCA) | https://www.jpca.or.jp/english/ |
| | | Sokeizai Center | https://www.sokeizai.or.jp/english/ |
| | | Japan Association for Chemical Innovation (JACI) | http://www.jaci.or.jp/english/ |
| | | Japan Chemical Industry Association (JCIA) | https://www.nikkakyo.org/ |
| | | West Japan Plastic Products Industrial Association | https://www.nishipla.or.jp/ |
| | | Smart IoT Acceleration Forum | https://smartiot-forum.jp/ |
| Manufacturing | AI, Big Data processing, FPGA, SoC design, Image processing recognition and data analysis, Computer vision, Deep learning, etc. | Factory Scientist Association | https://www.factoryscientist.com/ |
| | | Japan Management Association (JMA) | https://www.jma.or.jp/en/index.html |
| | | Robot Revolution & Industrial IoT Initiative | https://www.jmfrri.gr.jp/ |
| | | Japan Embedded Systems Technology Association | https://www.jasa.or.jp/ |
| Biochemical analysis | AI, Computer vision, Image processing recognition and data analysis, etc. | Japanese Association of Clinical Laboratory Systems (JACLaS) | https://jaclas.or.jp/en/ |
| Drug discovery/ pharmaceutical | AI, Big Data processing, FPGA, SoC design, Image processing recognition and data analysis, Computer vision, etc. | Japan Pharmaceutical Manufacturers Association (JPMA) | http://www.jpma.or.jp/english/ |
| | | Japan Generic Medicines Association (JGA) | https://backup.jga.gr.jp/english.html |
| Resource exploration | AI, Big Data processing, FPGA, SoC Design, Image processing recognition and data analysis, Deep learning, etc. | Japan Marine Surveys Association (JAMSA) | https://www.jamsa.or.jp/ |
| | | Japan Oil, Gas and Metals National Corporation (JOGMEC) | http://www.jogmec.go.jp/english/ |
| | | Remote Sensing Technology Center of Japan (RESTEC) | https://www.restec.or.jp/en/ |
| Plant control | AI, Big Data processing, FPGA, SoC design, Image processing recognition and data analysis, Deep learning, etc. | Japan Institute of Plant Maintenance (JIPM) | https://jipmglobal.com/ |
| | | Instrumentation & Process Control Engineers' Association (IPC) | https://www.ipc.gr.jp/ |
| Information security/ Physical security | AI Big Data processing, FPGA, SoC design, Image processing recognition and data analysis, Background noise reduction, Deep learning, Privileged access management service, etc. | Japan Information Security Audit Association (JASA) | https://www.jasa.jp/en/ |
| | | Information-technology Promotion Agency, Japan (IPA) | https://www.ipa.go.jp/index-e.html |
| | | Local IoT Acceleration Lab | https://local-iot-lab.ipa.go.jp/ |
| | | National Institute of Information and Communications Technology (NICT) | https://www.nict.go.jp/en/index.html |
| | | Japan Institute for Promotion of Digital Economy and Community (JIPDEC) | https://english.jipdec.or.jp/ |
| | | Japan Network Security Association (JNSA) | https://www.jnsa.org/en/aboutus/ |

| Industry Sector | Potential Technology to Apply | Industry Association and Major Company | URL |
|---|---|---|---|
| Agriculture | AI, IoT, Agricultural support technology using aerial imaging system, Image processing recognition and data analysis, FPGA, SoC design, Deep learning, etc. | Japan Agricultural Mechanization Association (JAMA) | https://nitinoki.or.jp/ |
| | | Forestry and Fisheries Aviation Association | http://www.j3a.or.jp/ |
| | | Japan Agricultural Drone Association | https://www.nougyoudrone.com/ |
| | | Japan Association for Techno-innovation in Agriculture, Forestry and Fisheries (Jataff) | https://www.jataff.jp/index.html |
| | | Agricultural and Livestock Industries Corporation (alic) | https://www.alic.go.jp/english/index.html |
| | | Japan Fisheries Information Service Center (JAFIC) | https://www.jafic.or.jp/ |
| | | Japan Drone Association (JDA) | https://alldrones.org/ |
| | | Japan Agricultural Drone Association | https://www.alpsdrone.co.jp/ |
| | | International Drone Association (IDA) | https://ida-drone.com/ |
| | | Hokkaido Agricultural Machinery Manufactures Association | http://hokunoko.jp/ |
| | | ZEN-NOH(JA) | https://www.zennoh.or.jp/english/index.html |
| | | Central Union of Agricultural Co-operatives (JA-ZENCHU) | https://www.zenchu-ja.or.jp/eng/ |
| | | AgVenture Lab | https://agventurelab.or.jp/ |
| | | National Agricultural Insurance Association (NOSAI) | http://nosai.or.jp/index.php |
| | | Hokuren | https://www.hokuren.or.jp/ |
| Tourism | Guide AR, Online VR, Smartphone app, etc. | Virtual Reality Innovation Organization (VRIO) | https://vrio.or.jp/ |
| | | Japan Travel and Tourism Association | https://www.nihon-kankou.or.jp/home/ |
| Education/Training | Programming self-study service, Smartphone app, etc. | LOT | https://lot.or.jp/ |
| | | Virtual Reality Innovation Organization (VRIO) | https://vrio.or.jp/ |
| Research | Consumer trend survey system, etc. | Japan Marketing Research Association (JMRA) | https://www.jmra-net.or.jp/Portals/0/aboutus/en/index.html |
| | | Japan Marketing Association (JMA) | https://www.jma2-jp.org/index.php |
| | | Computer Software Association of Japan (CSAJ) | https://www.csaj.jp/english/index.html |
| Clothing/Fashion | Trend analysis, customer behavior analysis, SNS social listening, Deep learning, etc. | Japan Direct Marketing Association (JDMA) | https://www.jadma.or.jp/ |
| | | Japan Apparel Fashion Industry Council (JAFIC) | http://www.jafic.org/ |
| | | Japan Fashion Industry Council (JFIC) | http://www.jfic.jp/ |
| Environment | Environment | National Institute for Environmental Studies (NIES) | https://www.nies.go.jp/index-e.html |
| | | Japan Agency for Marine-Earth Science and Technology (JAMSTEC) | https://www.jamstec.go.jp/e/ |
| | | New Energy and Industrial Technology Development Organization (NEDO) | https://www.nedo.go.jp/english/index.html |
| | | National Institute of Advanced Industrial Science and Technology (AIST) | https://www.aist.go.jp/index_en.html |
| Startup | Startup support | Japan Startup Support Association (JSSA) | https://www.yumeplanning.jp/ |
| Others | | Smart Japan Alliance | https://smt-jpn.org/ |

# Appendix 3: Results of the Pilot Program for Trial Business Collaboration with Japanese Companies

Table-26 Summary of trial business collaboration results of company pair A

| Japanese company | Investment information provider | |
|---|---|---|
| ICT company | Mid-sized ICT solution provider in Armenia | |
| Content of collaboration | Construction of algorithm for collection and automatic evaluation of corporate governance information by machine learning | |
| Category of collaboration | PoC | |
| Result status | Completed | |
| Questions | Answers from Japanese company | Answers from Pakistani company |
| Issues and problems caused by communication with the other party, business practices, culture, etc. | N/A | N/A |
| Technical problems | N/A | (Omitted for technical details) |
| Other issues and problems | N/A | (Omitted for technical details) |
| How the above problems were solved (or not solved) | During the regular weekly meetings, the issues faced by the outsourced engineers were shared and discussed. We also shared the output data for each development process and provided feedback on whether there were any major omissions, issues to be resolved, or exceptions to be dealt with. | Frequent meetings were held with customers to discuss and understand the problems they were facing. |
| Possibility to collaborate with companies in the partner country (not limited to this company) in the future | Positive consideration. Would like to consider assessing corporate governance information with various advanced technologies, as it seems that the company has many elemental technologies, not limited to machine learning in this case. | We can provide services and this project showed us that remote work is possible and there were no significant issues. However, marketing and identifying businesses in need of these services would be a challenge. |
| Attractiveness of companies of partner country felt through this trial business collaboration | • Response to requests and corrections were quick, and weekly reports were easy to understand, making communication easy.<br>• Rarely felt the time difference, and information exchange was smooth.<br>• The quality of performance is high in relation to the cost, and they have a deep knowledge of advanced technology. | • Very professional business encounter<br>• Hours of operations suitable for remote work |
| Obstacles of the partner country industry felt through this trial business collaboration | No particular issues | • All of our engineers understand English, but data and documents written in Japanese need to be translated and sometimes the context is not understood.<br>• Language can be a barrier as analysts need to interact with customers.<br>• Social media marketing is very important for off-site companies like ours, but currently, access to social media in Japan is limited. |
| What companies and industry of your country should do to promote collaboration | To include the target countries in the choice of outsourcing partners/To make these efforts by Japanese industry organizations. | Provide trainings on Japanese language and business culture of Japanese industry. |
| What JICA and the Government of Japan should do to promote collaboration | Continue trial business collaboration projects like this. The lack of familiarity with the target country may be the first barrier, so it is necessary to expand awareness as the number of PoC cases increases, and to have enough information and deep understanding to be able to introduce IT companies in the target country. | Facilitate additional Japanese subsidiary companies in Pakistan and require IT and software services for them be provided by local Pakistan companies. |

| | | |
|---|---|---|
| What the government of Pakistan should do to promote collaboration | N/A | Allow simpler and fast establishment of Japanese companies in Pakistan and provide tax and other incentives if these companies use Pakistan IT and software services. |
| Other comments and suggestions to promote collaboration between the two countries | N/A | Scholarships to Pakistani computer science and engineering students for studies in Japanese colleges. This will allow them to learn the language and culture as well as evaluate software needs. These students can then return to Pakistan and become key segment of providing such services to Japanese industry. |

Table-27 Summary of trial business collaboration results of company pair B

| | |
|---|---|
| Japanese company | Semiconductor design solution development company |
| ICT company | Semiconductor design solution development company in Armenia |
| Content of collaboration | Performance Improvement of Display Device Electrical Characteristics Analysis Tool |
| Category of collaboration | Technical study |
| Result status | The Japanese companies declined the collaboration. The reasons for declining are as follows.<br>• Could not get the specifics of the software implementation in the final proposal submitted by the Armenian company.<br>• The software production capacity seemed to be high, and there were suggestions for means and strategies for long-term implementation methods, but the time, cost, and feasibility of reaching the goal were unclear.<br>Note by the Survey Team: It seems that the Japanese company was expecting not only a trial collaboration but also a full-scale collaboration afterwards, but they were unable to reach an agreement on the part of the collaboration that went beyond the trial. |

Table-28 Summary of trial business collaboration results of company pair C

| | | |
|---|---|---|
| Japanese company | Steel pipe manufacturing company | |
| ICT company | AI solution provider in Armenia | |
| Content of collaboration | Project to automate the quality check process using image recognition of produced steel pipes | |
| Category of collaboration | PoC, Prototype development | |
| Result status | Completed | |
| Questions | Answers from Japanese company | Answers from Armenian company |
| Issues and problems caused by communication with the other party, business practices, culture, etc. | • Language barrier<br>• 5 hour time difference between Japan and Armenia | N/A |
| Technical problems | • Little expertise in camera selection, photography methods, etc. | • The placement of the camera and lighting to create a good quality AI model was more difficult than expected, and was not completed in time. |
| Other issues and problems | N/A | • Insufficient high quality data with label to achieve high accuracy of detection was the biggest challenge. |
| How the above problems were solved (or not solved) | • Members with good English conversation skills participated.<br>• Use of meeting tool such as Zoom | • Changed the implementation method of the AI model. |
| Possibility to collaborate with companies in the partner country (not limited to this company) in the future | Plans to consider future collaboration in a positive manner. | Ready to provide consulting services to any Japanese company in any industry on how they can benefit from the use of AI in their daily operations. |
| Attractiveness of companies of partner country felt through this trial business collaboration | • High level of expertise in image analysis<br>• Low cost compared to companies in Japan | • Japan's production monitoring and quality assurance market is attractive<br>• Possible to collaborate on quality control solutions with large Japanese manufacturing companies |

| | | |
|---|---|---|
| | | • Japanese work culture, respectful business etiquette, and precision for time & resource estimations are important |
| Obstacles of the partner country industry felt through this trial business collaboration | • Support and troubleshooting that requires on-site work cannot be expected.<br>• Performance evaluation of analysis speed, etc. is not possible because there is no comparison. | • The language barrier can certainly be an issue. Luckily, we have not had such issues . |
| What companies and industry of your country should do to promote collaboration | • Communication tools should be adapted to the company in the other country.<br>• Do not ask for excessive (too detailed) specifications, quality, or verification as domestic companies do. | • Have more various collaborations with companies of different industries |
| What JICA and the Government of Japan should do to promote collaboration | • Compliance with corporate security policies | • Promoting data collection and education on data quality. |
| What the government of Armenia should do to promote collaboration | N/A | • Creating more opportunities for partnership between Japanese and Armenian companies. |
| Other comments and suggestions to promote collaboration between the two countries | N/A | N/A |

Table-29 Summary of trial business collaboration results of company pair D

| Japanese company | Medical device startup company | |
|---|---|---|
| ICT company | IoT solution development company in Sri Lanka | |
| Content of collaboration | Application development for IoT medical device prototype using new medical sensors | |
| Category of collaboration | PoC, Prototype development, Research | |
| Result status | Completed | |
| Questions | Answers from Japanese company | Answers from Sri Lankan company |
| Issues and problems caused by communication with the other party, business practices, culture, etc. | • Japanese companies should learn to recognize technical terms in English common to the ICT industry. | • During initial discussions, we got the help of Sri Lankan friend located in Japan for translation. |
| Technical problems | • The software used to share the deliverables and progress was not very common in Japan. It would be good to have an opportunity to discuss in advance what software will be used. | (Omitted for technical details.) |
| Other issues and problems | None | (Omitted for technical details.) |
| How the above problems were solved (or not solved) | • Supported by the Survey Team members. (for technical discussions, etc.) | To verify how the actual system works, we had a real device sent to us by courier. |
| Possibility to collaborate with companies in the partner country (not limited to this company) in the future | • Opportunities for online collaboration should continue to increase. For Japanese companies looking to expand their business globally, collaboration with overseas companies is inevitable.<br>• We are very satisfied and would like to continue to collaborate with them. | • We see a great potential in business collaborations in the IoT domain. We are confident of gaining a foothold in the Japanese market using technology in this field. |
| Attractiveness of companies of partner country felt through this trial business collaboration | • A global standard development approach<br>• Fast development speed<br>• Might also be cost effective | • Common Asian Culture that binds the two countries<br>• Increased use of IoT applications in day-to-day life<br>• High growth potential for foreign software firms |

| | | |
|---|---|---|
| Obstacles of the partner country industry felt through this trial business collaboration | • Need for frequent and smooth communication since the common language is English<br>• Need to agree on the software to be used<br>• Adjusting the time zone (inevitable for foreign country) | • Lack of information about use of advanced ICT technologies used in the Japanese market<br>• Unavailability of any guideline/tax structure/ employee restrictions for foreign companies who wish to operate in Japan.<br>• Lack of information about salary structure/remuneration schemes for software developers in Japan |
| What companies and industry of your country should do to promote collaboration | • We need to develop our own services and products, always with the perspective of developing global services.<br>• Make necessary contacts to ensure that specifications and communication in English are available. | • Train developers in the Japanese language and provide incentives for competency in Japanese<br>• Establish professional developer exchange programs with Japanese counterparts<br>• Work with the Sri Lankan embassy in Japan to organize referral programs showcasing Sri Lankan ICT companies |
| What JICA and the Government of Japan should do to promote collaboration | To create business and collaboration opportunities for both the partner country and the Japanese side, and to provide financial support and subsidies. | • Establish a web-based portal highlighting opportunities available in the Japanese market.<br>• Register ICT companies in Sri Lanka for possible matching with startups/ businesses in Japan<br>• Initiate a referral program where JICA will act as a referrer of ICT companies in Sri Lanka for Japanese businesses<br>• Enable and open opportunities for Sri Lankan ICT companies to develop software for JICA funded projects in other countries. |
| What the government of Sri Lanka should do to promote collaboration | Maintaining development environment when local development is required. Provide measures for people from Japanese companies to travel and stay in the country safely, including convenience in obtaining visas. In addition, should actively disseminate information on the development environment, business customs and culture of the country and maintain close communication with each other. | • Include Japanese language as an optional course unit in Universities for ICT degree programs<br>• Promote the online portal [75] through social media and the Japanese consulate.<br>• Establish a Japanese business linkage cell to coordinate ICT business collaborations between Japan and Sri Lanka<br>• Provide incentives to university academics to carry out research collaborations with Japanese universities relevant to the ICT industry and setup startup companies based on research outputs |
| Other comments and suggestions to promote collaboration between the two countries | Would like to see more announcements of this kind of collaborative trial projects in the future. | • Organize annual conference where startups from both countries can showcase their products<br>• JICA to support establishment of joint ventures/partnerships between ICT companies in the two countries<br>• JICA to offer support to obtain ISO certification for ICT startups<br>• Initiate a global referral program where Japanese and Sri Lankan companies jointly develop software for major Japanese companies who serve other continents (e.g. automakers, heavy machinery, electronics, etc.) |

[75] https://www.srilankabusiness.com/

| | | |
|---|---|---|
| | | • Establish a program where University academics from both countries can start a business serving a common goal (e.g. University academic in Japan establishes a startup company to manufacture an IoT device and partner faculty from Sri Lankan university setup a startup company to develop required application software for the IoT device). |

Table-30 Summary of trial business collaboration results of company pair E

| Japanese company | Smart agriculture system development company | |
|---|---|---|
| ICT company | Smart agriculture solution provider in Sri Lanka | |
| Content of collaboration | Smart agriculture solutions for monitoring crops, conserving resources, preventing risks, and maximizing production using AI and IoT | |
| Category of collaboration | PoC, Prototype development, Research | |
| Result status | Completed | |
| Questions | Answers from Japanese company | Answers from Sri Lankan company |
| Issues and problems caused by communication with the other party, business practices, culture, etc. | Got support from the Survey Team members, but it was a little difficult to get the Sri Lankan engineers to understand the meaning of Kanji characters in technical terms. | • Language was a barrier to communicate with Japanese farmers.<br>• The end client is a farmer, so we need to communicate through our business partner |
| Technical problems | Technically, there is no problem. | The solution was designed for 2G networks, but since there is no 2G in Japan, it had to be changed to support 3G and Wi-Fi. |
| Other issues and problems | (Omitted for technical details.) | Due to sudden climate changes this year crop rotation is delayed by one month, so the completion of the project was extended to the end of May 2021. |
| How the above problems were solved (or not solved) | (Omitted for technical details.) | • Had a mediator to translate between English and Japanese. And we got support from Survey Team.<br>• Got assistance from Japanese local Wi-Fi providers as well.<br>• Instructed the deployment guidelines, shared instruction manuals/videos, and provided virtual training as well. |
| Possibility to collaborate with companies in the partner country (not limited to this company) in the future | In the future, we can further standardize data, provide data to new farmers, and collaborate in consultations. | Japanese agricultural market is highly premium, and crops are sold at high price points. Also, the technological literacy of farmers is one of the highest in the world. Therefore, agri-tech companies have the potential to expand in the Japanese market. |
| Attractiveness of companies of partner country felt through this trial business collaboration | • It is possible to build a cloud system for cultivation at a relatively low cost.<br>• We felt that there is a lot of potential for the use of AI and big data in the future.<br>• Companies that can also develop IoT units | • The demand for IoT intelligence in the agricultural sector is growing across the globe.<br>• The IT literacy of Japanese farmers is surprisingly attractive.<br>• Even small improvements through technology can bring high value and return on investment in Japan's premium agricultural market. |
| Obstacles of the partner country industry felt through this trial business collaboration | N/A | • There is a lot of customization required to localize a technology platform into Japanese.<br>• Japan is very competitive in the technology sector compared to other consumer markets in the world. |

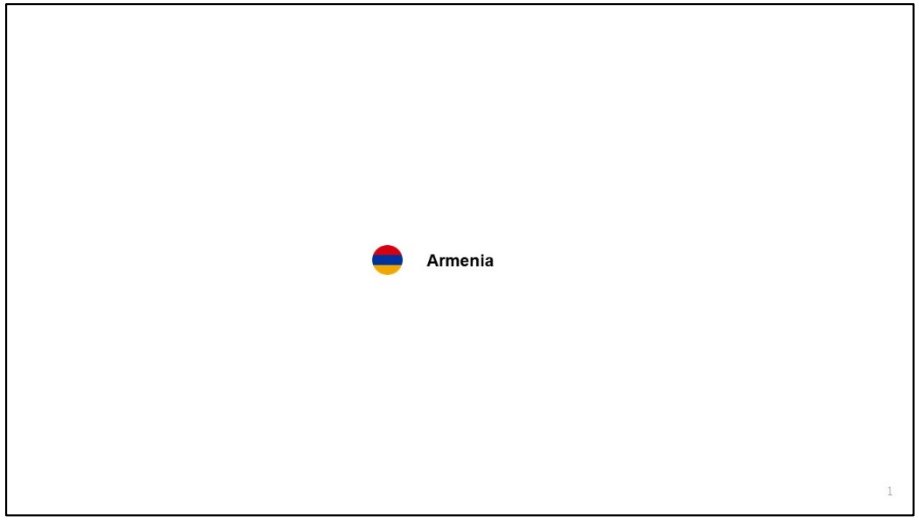
| | | |
|---|---|---|
| What companies and industry of your country should do to promote collaboration | Gather more information on IT companies in the target countries, discover unknown good companies, and actively interact with them. | • Further strengthen cooperative relationships with public institutions such as JICA.<br>• Frequent trade programs and conferences.<br>• Selection of technology companies in specific fields to participate in projects in Japan. |
| What JICA and the Government of Japan should do to promote collaboration | Would also like to receive support for the phase after the PoC where the results are put into products. | • Give these opportunities to young start-ups to experiment with new market development.<br>• JICA can share more use cases in an open forum through Sri Lankan ICT agencies to bid for them. |
| What the government of Sri Lanka should do to promote collaboration | It would be good to have a system to collect detailed information on local companies and introduce some of the most suitable companies in response to inquiries from Japan. It would also be helpful if they can coordinate a visit to the country. | To support local start-up companies to enter the Japanese market by conducting technological exchanges within the government. |
| Other comments and suggestions to promote collaboration between the two countries | Sri Lanka, as a subcontractor of the world's IT companies, has a concentration of world standard technologies. If we can match them well, I think we can build a better relationship for both countries. | The two governments should sign a long-term agreement to share technical expertise and exchange technology. |

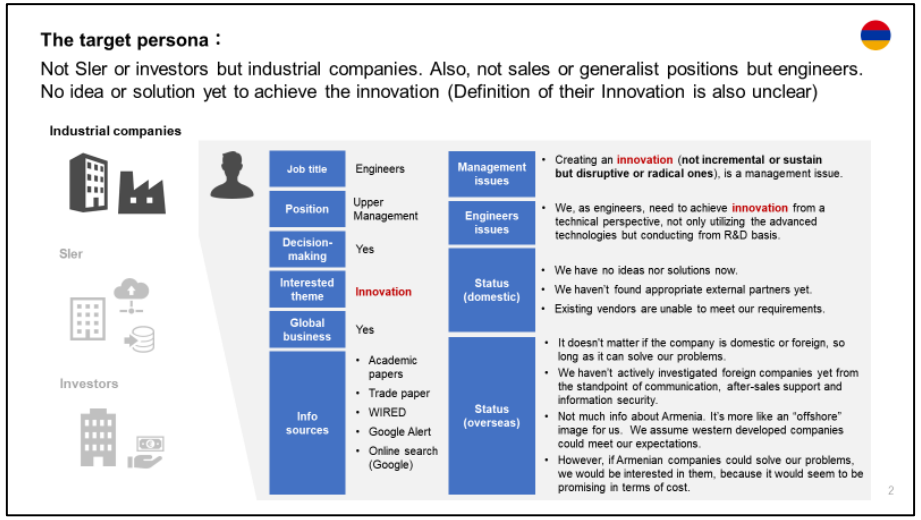
Table-31 Summary of trial business collaboration results of company pair F

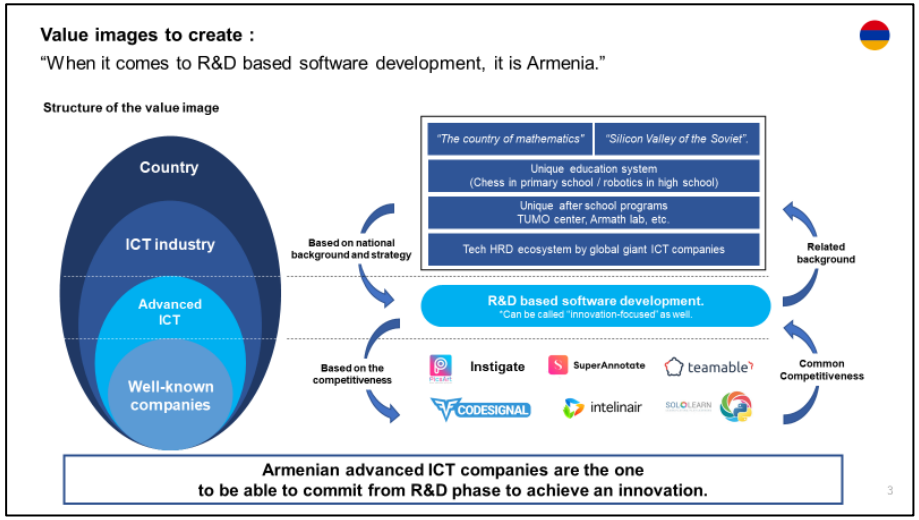
| | | |
|---|---|---|
| Japanese company | Agricultural IoT solutions company | |
| ICT company | AI Solution Provider in Sri Lanka | |
| Content of collaboration | Video analysis of agricultural workers and Japanese voice command recognition | |
| Category of collaboration | PoC, Prototype development | |
| Result status | Completed | |
| Questions | Answers from Japanese company | Answers from Sri Lankan company |
| Issues and problems caused by communication with the other party, business practices, culture, etc. | • It was difficult for the Sri Lankan engineers to judge whether the recognized Japanese from the voice was correct. Knowledge of Japanese language, Japanese customs, and the agricultural field are necessary, and it is difficult to learn in a short period of time, so an advisor to support them is essential.<br>• It was difficult to respond due to lack of English conversation skills. There were many points that we did not understand about Sri Lankan culture. | • Language barrier since our team does not speak or read Japanese language.<br>• The timeline and the budget were somewhat limited for the initial scope of the project. |
| Technical problems | Since their technical capabilities and development environment are unknown, it would be difficult to improve the accuracy rate of the important Japanese conversion of voice commands. | • Relatively low maturity of AI speech to text technology for Japanese language compared to English.<br>• Developer testing voice input flows of the solution was somewhat challenging |
| Other issues and problems | As for the development, we have been holding development progress meetings every two weeks, but due to the limited development time, the program verification time becomes short. | N/A |

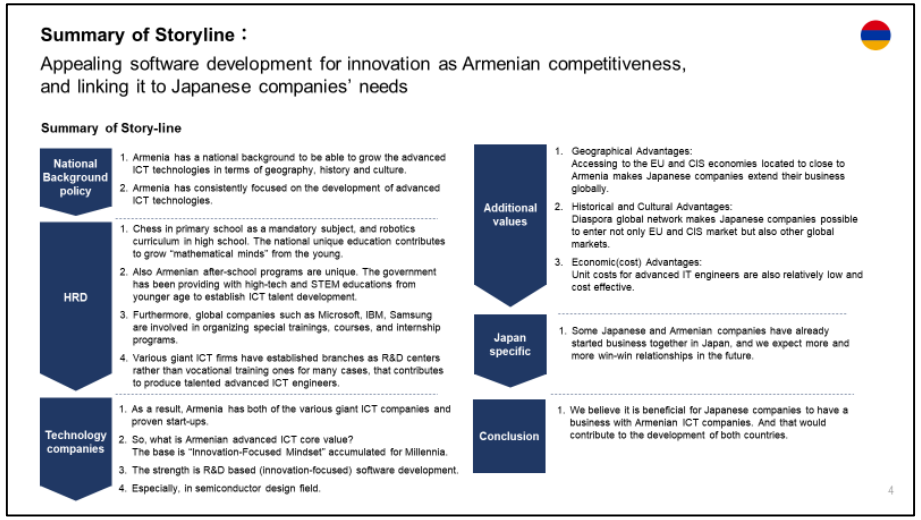
| | | |
|---|---|---|
| How the above problems were solved (or not solved) | In order to support development in a short period of time, we provided specific voice examples in advance with their Japanese text for voice commands, and provided data to verify whether the developed application can convert the voice correctly when playing the voice in-house. | • With the support of a Survey Team member, we could overcome the language barrier. The product owner of Japanese company also speaks English, so communication was not a problem.<br>• Timeline and budgetary limitations were overcome by discussing with the client and agreeing to a manageable yet usable scope. The client understood the limitations and was flexible to reduce the scope. |
| Possibility to collaborate with companies in the partner country (not limited to this company) in the future | Companies in each country have established Japanese subsidiaries to collaborate with Japanese companies. There is a possibility of collaboration for new projects in the future, if necessary. | We believe that there is great potential in the Japanese market because we can provide services in specialized fields without compromising on quality or competence. We find Japanese people and the culture to be welcoming and professional which makes it quite easier to work with. |
| Attractiveness of companies of partner country felt through this trial business collaboration | • Speeding up development by working with companies that have excellent human resources in the target countries<br>• Reduction of development costs | • Developed, stable economy<br>• Mature tech industry<br>• High demand for tech talent<br>• Professionalism and the work-oriented culture |
| Obstacles of the partner country industry felt through this trial business collaboration | • Lack of understanding of Japanese<br>• Lack of English skills on the Japanese side | • language barrier<br>• Potential competition with existing suppliers<br>• Physical distance and time difference |
| What companies and industry of your country should do to promote collaboration | • Company: English Skill Up<br>• Industry associations: Research strengths and weaknesses of overseas IT companies. Create a map of recommended skills. | • Actively pursue opportunities and deliver the best quality outcomes<br>• Overcome the language barrier by acquiring or developing staff who can communicate and work in Japanese<br>• Understand the Japanese culture, work ethics etc. and adapt to those<br>• Organize as a community and promote the services/talent as a country |
| What JICA and the Government of Japan should do to promote collaboration | • Organize past achievements and recommendations.<br>• Organize the history, characteristics, and contributions of the target company.<br>• Disclose the characteristics of the target country's IT companies, the target country's policies and promotion subsidies, etc. | • Promote Sri Lankan companies to the Japanese market and encourage collaboration<br>• Open channels and facilitate networking between the industries from two countries<br>• Become early facilitators of any limitations such as language and market access |
| What the government of Sri Lanka should do to promote collaboration | • Brochures in Japanese language<br>• Strengthening of Japanese language support system | • Encourage local industry to pursue opportunities in Japan<br>• Facilitate collaboration between the industries form two countries and eliminate any barrier<br>• Actively promote the local talent and the capabilities in the Japanese market |
| Other comments and suggestions to promote collaboration between the two countries | • It should have been a great challenge for the Sri Lankan company to participate without knowing Japanese.<br>• It was very important that we got support from a Survey Team member who understand both Japanese and Sri Lankan culture so that we could select company and follow-up development in a short time period. | Short-term, PoC projects like this give a very good opportunity for service providers to prove their capabilities to prospective clients. And for prospective clients, it is a good opportunity to evaluate new suppliers without taking too much business risk. |

# Appendix 4: Branding/Marketing Strategy and Action Plan for Armenia to Enter Japanese Market (Thumbnail only)



## Storyline

5

1. Historical, geographical and cultural background

### Armenia has a national background that makes it able to grow advanced ICT technologies in terms of geography, history and culture.

National Background regarding the ICT Industry

**Geographical aspects**


- Small landlocked country with limited natural resources.
- Political relations with Turkey and Azerbaijan, the borders has been long closed.
- Difficult to connect to the rest of the world for product exports.

**Naturally finding a way out in the ICT sector and focusing on it.**

**Historical aspects**

- Soviet's main hub for software development, semiconductor production electronics, etc.
- Over **30%** of military electronics designed and produced in Armenia.
- Thousands of specialists worked on developing and manufacturing computer technology.

***"Silicon Valley of the Soviet".***

**Cultural aspects**

- The Armenian diaspora living abroad is about **7 million**, more than double the current 3 million population living in the country.
- Making a global network and forming a potential pool of investors looking for opportunities to invest in their home country.

**The Armenian diaspora's global network in ICT industry.**

6

2. Government policy

### Armenia has consistently focused on the development of advanced ICT technologies.

**Important Developments and Achievements**

| | |
|---|---|
| 1994 | • Adopted the Law on Foreign Investment to promote foreign investment to ICT industry |
| 2000 | • Declared the IT sector a priority in the development of the Armenian Economy |
| 2001 | • The Viasphere Technopark, the first technopark in Armenia, was launched |
| 2002 | • The government established the Enterprise Incubator Foundations (EIF) in collaboration with the World Bank |
| 2004 | • Synopsys established a presence in Armenia |
| 2006 | • Adopted the Law on State Support for Innovation Activity to promote innovation and R&D activities in the industry |
| 2008 | • The government adopted a new ten-year industry strategy - "Sustainable Development Program 2008" - focused on building infrastructure, improving the quality of IT graduates, and creating venture and other financing mechanism for start-up companies |
| 2011 | • The Microsoft Innovation Center (MIC) was established through the joint efforts of the Government, USAID, Microsoft Inc., the National Engineering University of Armenia, and EIF |
| 2012 | • The first Armenian Free Economic Zone (FEZ) was established |
| 2013 | • Armenia's first venture capital firm, Granatus Ventures, was established |
| 2014 | • Promulgated RA Government Decree # 442 Armenia Development Strategy 2014-2025 (Amendment to Sustainable Development Program 2008)<br>• The government enacted the Law on State Support for the IT Sector, which provides tax privileges for startups<br>• The Armath engineering laboratories were launched in the Armenian educational system |
| 2016 | • The government adopted the 2016 tax legislation to provide VAT exemption to those who are actively involved in R&D operations |
| 2017 | • More VC firms and angel networks came into play |
| 2018 | • The Armenian Revolution 2018 |
| 2018 | • Signed "Agreement for Promotion and Protection of Investments between Armenia and Japan" |
| 2019 | • The Ministry of High Tech was established |

7

2. ICT HRD 1/3

School | After school | Business

### Chess in primary school as a mandatory subject, and robotics curriculum in high school. The national unique education contributes to grow "mathematical minds" from the young.

Primary school | High school

***"Raising the Next Generation of Chess Grand Masters"***

*In Armenia, chess is not merely a game, but an approach to life. Given that chess lessons are mandatory from primary school onwards, Armenians have found a great recipe for building strong character and breeding future champions. Indeed, Armenia is regarded as being at the very epicentre of the modern chess-playing world."*

***"The Land of 50,000 Young Robotics Engineers"***

*Armenia has just launched what we aim to be the world's leading high-school level robotics curriculum. While it is still only in pilot phase in 60 schools, by 2020 it will be in every school in the country and over 50,000 budding engineers will be trained robotics developers."*

Source: Surprising engineering website

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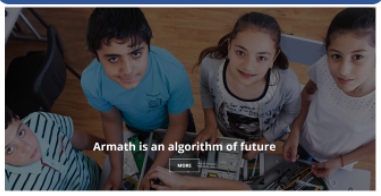
## 2. ICT HRD 2/3

School | After school | Business

**Also, Armenian after-school programs are unique. The government has been providing with high-tech and STEM educations from younger age to establish ICT talent development.**

### Armath LAB




- Armath LAB is a **STEM** education programme organized by UATE (Union of Advanced Technology Enterprises).
- It provides an after-school program of modern engineering education across the nation.
- By the beginning of 2020, the number of Armath engineering laboratories has reached **575**, providing **15,000** children the opportunity of free engineering education.

### TUMO center


- TUMO is a non-profit venture founded institution offering extracurricular, innovative education programs in design and technology, providing teenagers with the space and equipment to advance their education while developing technical skills.
- One unique aspect of TUMO's education model concerns the TUMO Path, a software program developed in-house that places beginning students on a learning plan based on the students' expressed areas of interest, showing the students' rate of progress and letting them know which tasks they need to complete to move on to the next level.
- There are currently four TUMO centers in Armenia (Yerevan, Dilijan, Gyumri, and Stepanakert). Two additional centers recently opened in Paris and Beirut.

Source: Armath LAB website, TUMO website



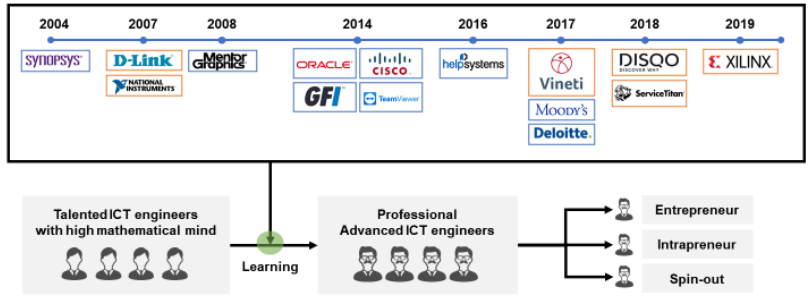
## 2. ICT HRD 3/3

School | After school | Business

**Various giant ICT firms have established branches as R&D centers rather than vocational training ones in many cases, thereby contributing to produce talented advanced ICT engineers.**

Development offices opened by global ICT companies in Armenia

R&D offices established by acquisition of local startups
R&D or branch offices established by themselves




Talented ICT engineers with high mathematical mind → Learning → Professional Advanced ICT engineers → Entrepreneur / Intrapreneur / Spin-out



## 3. ICT companies in Armenia

**As a result, Armenia has both various giant ICT companies and proven start-ups.**

### Major multinationals

SYNOPSYS
Microsoft
NATIONAL INSTRUMENTS
D-Link
Mentor Graphics
(involved)
IBM
SAMSUNG

### Local Startups

- The top 5 VC backed Armenian startups as of the end of 2018
  - PicsArt: Photo editor app with 100M monthly active users (USD 45M)
  - CODESIGNAL: Tech talent assessment and recruitment tool (USD 12.5M)
  - teamable: AI enabled employee referral SaaS, recently acquired Greylock/Vertex (USD 10M+)
  - intelinair: Agriculture focused aerial imagery analytics company (USD 10M)
  - SOLOLEARN: A 28M+ user community learning platform for programming content with peers (USD 7M+).
- Notable Local Startups map (Existing and Originated in Armenia)


**Furthermore, the number of ICT companies has been growing at CAGR 22.1% during the period of 2015 thru 2018 and is expected to reach 1,000 in 2019.**



## 4. The Armenian core ICT value 1/3

**So, what is Armenian advanced ICT core value?**
**The base is "Innovation-Focused Mindset" accumulated for millennia.**

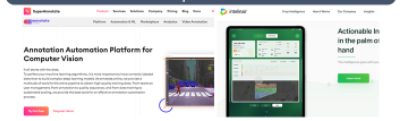
### Armenian Innovations

## 4. The Armenian core ICT value 2/3

### The strength is R&D based (innovation-focused) software development.

**Examples of innovative ICT companies**

**Computer Vision**




**SuperAnnotate AI**
- One of the fastest image annotation platform utilizing AI for the one-click pixel accurate object selection

**IntelinAir**
- Aerial imagery analytics company focused on agriculture

**AR/VR**


**arloopa**
- An augmented reality and virtual reality app and game development company

**Triple-E**
- AR platform where everyone can create their own AR samples on a mobile device

**AI**


**Fimetech**
- Provide solutions such as AI, Robotics, EDA, IoT, Embedded Systems

**Improvis**
- Development of games, AI, robots, etc. Former Gyumri Technologies Center Incubetee.

**Blockchain**


**Volo**
- Software development using advanced technologies such as Fintech.

**Essential Solutions**
- Strong in cutting-edge solutions using AI, blockchain, and quantum computers.



## 4. The Armenian core ICT value 3/3

### Especially, in semiconductor design field.

**Software development for semiconductor design**


- Armenia's largest IT solution provider with cutting-edge technologies. Armenia's gateway to the IT industry.


- Grovf Inc. is an application performance acceleration company through FPGA-CPU pairs, focusing on the development of basic programming algorithms on FPGA and creating the universal offloading platform in the application layer.

**The above companies are examples. We have more ICT companies in the field in Armenia.**



## Additional Values

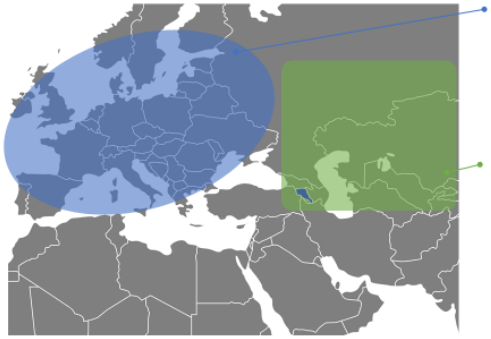
**of business with Armenian companies**



## 5. Additional values of business with Armenian companies

### 1. Geographical Advantages:

Accessing to the EU and CIS economies located to close to Armenia makes Japanese companies extend their business globally.



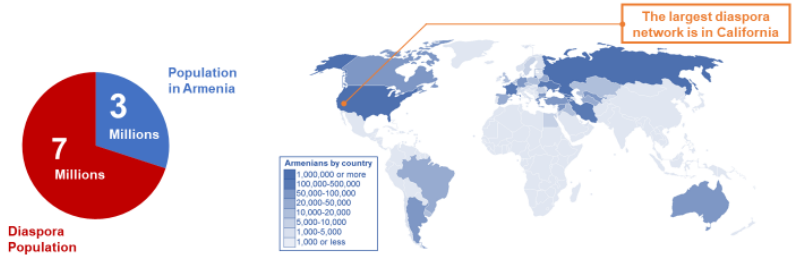
**EU economy**
- Not only is Armenia close to the EU economic zone, but it also conducts joint research on an equal basis with Western companies. Also, there are mergers and acquisitions by Western companies, making it possible for Japanese companies to enter the market from Armenia to the EU economic zone.

**CIS economy**
- Since Armenia is a member of the CIS, it is also possible for Japanese companies to enter the CIS market by partnering with Armenian companies.

5. Additional values of business with Armenian companies

## 2. Historical and Cultural Advantages:

Diaspora global network makes Japanese companies possible to enter not only EU and CIS market but also other global markets as well.




**Even Silicon Valley is one of the choices because the largest diaspora network is in CA.**

Source: Wikipedia (en: User: Yerevanci - en: Armenian population by country)



5. Additional values of business with Armenian companies

## 3. Economic (cost) Advantages:

Unit costs for advanced IT engineers are also relatively low and cost effective.

**The average monthly salary in local companies**

| Role | Years Experience | Daily Rate | Monthly Rate |
|---|---|---|---|
| Software & AI Team Lead/Architect | 7 or more | $490 | $10,780 |
| Senior Software & AI Developer | 5-7 | $380 | $8,360 |
| Experienced Software & AI Developer | 3-5 | $290 | $6,380 |
| Junior Software & AI Developer | 0-3 | $150 | $3,300 |
| Data Team Lead/Architect | 7 or more | $490 | $10,780 |
| Senior Data Scientist | 5-7 | $380 | $8,360 |
| Experienced Data Scientist | 3-5 | $290 | $6,380 |
| Junior Data Scientist | 0-3 | $150 | $3,300 |
| Senior QA Automation Engineer | 5 or more | $375 | $8,250 |
| Experienced QA Automation Engineer | 3-5 | $285 | $6,270 |
| Junior QA Automation Engineer | 0-3 | $145 | $3,190 |
| Senior QA Specialist | 5 or more | $330 | $7,260 |
| Experienced QA Specialist | 3-5 | $250 | $5,500 |
| Junior QA Specialist | 0-3 | $130 | $2,860 |
| Senior Project Manager | 5 or more | $330 | $7,260 |
| Experienced Project Manager | 3-5 | $250 | $5,500 |
| Junior Project Manager | 0-3 | $130 | $2,860 |
| Senior Business Analyst | 5 or more | $375 | $8,250 |
| Experienced Business Analyst | 3-5 | $285 | $6,270 |
| Junior Business Analyst | 0-3 | $145 | $3,190 |

NOTES: These rates are as of June 2020 and valid for 1 year. / The monthly rate assumes 22 working days/calendar month.

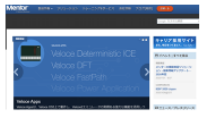
Source: Essentials,



6. Japan specific

## Some Japanese and Armenian companies have already started business together in Japan, and we expect more and more win-win relationships in the future.

**Mentor Graphics Development Services**



- EDA, FPGA, electronic board design / manufacturing, automobile electronics, IoT, etc.
- They have their branches in Japan.

**AARKI**


- Ad-creating platform transforming mobile app marketing using big data, machine learning, and large customer reach.

**EventGeek(Circa)**


- Project management and ROI toolkit.
- Rakuten is their business partner.

Rakuten

**360stories**


- VR/AR based virtual tour system
- JTB is their business partner.

JTB



7. Conclusion

## We believe it is beneficial for Japanese companies to conduct business with Armenian ICT companies. And that would contribute to the development of both countries.

8. Contact

**Please feel free to contact us If you are interested in Armenian ICT companies.**

Information

| Armenian ICT Export Organization | Embassy of the Republic of Armenia in Japan | Ministry of High-Tech Industry of the Republic of Armenia |
|---|---|---|
| New | Residence Viscountess #230<br>1-11-36, Akasaka, Minato-ku, Tokyo<br>107-0052, Japan<br>Phone: +81-3-6277-7453<br>His Excellency Mr. Grant POGOSYAN | Location:<br>Yerevan 0010, Vazgen Sargsyan 3/3<br>Phone: (+374 10) 59-01-40<br>URL: http://www.hti.am<br>E-mail: info@hti.am |

Services

Briefing | Business matching | Advisory

**We will provide you with related information and support for business matching.**

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**Action Plan**

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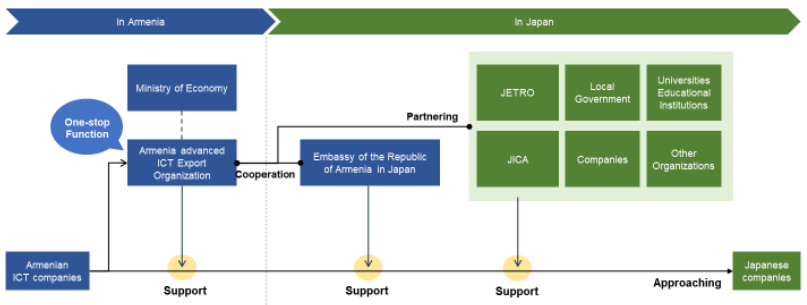
**Scheme of Japanese market entry:**

Establishing a one-stop system in cooperation with the Armenian Embassy in Japan, the Japanese government, private companies and academic institutions.

Overview

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**Role of Armenia advanced ICT Export Organization:**

A new function to support Armenian advanced ICT companies to enter the Japanese market.

Overview

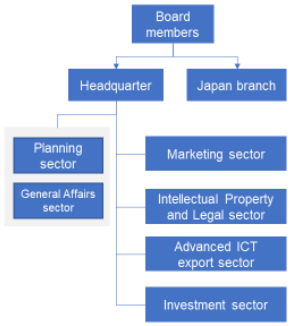
**Goal**

Through the comprehensive and efficient implementation of projects related to the promotion of Armenian advanced ICT in the Japanese market, we aim to achieve to contribute to the expansion of our country's advanced ICT trade and the promotion of economic cooperation.

**Job Description**

- To conduct research on trade regarding Armenian advanced ICT in the Japanese market and to distribute the results of that research widely.
- To introduce and advertise Armenian advanced ICT in Japan.
- To provide publicity on trade regarding Armenian advanced ICT between Japan and Armenia.
- To hold or participate in or arrange for exhibitions or other similar events regarding advanced ICT in both of Japan and Armenia.
- To conduct advanced ICT trade transactions between Japan and Armenia.

**Organization Chart**

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## Programs for Armenian advanced ICT companies:

For Armenian ICT companies

Allocating more resources is desirable to make the programs more beneficial to achieve the goal.

**Overview of suggested programs**

In Armenia | In Japan

**General Info**

■ **Providing info for mass**
- Online through website
- Offline such as seminars

Information to distribute:
- Basic info / statistics / quick survey results regarding the advanced ICT industry or specific industry in Japan
- Issues / Cases/ Success stories of Armenian ICT companies to have entered the Japanese market, etc.

**Specific Info**

■ **Providing info for Individuals**
- Briefing Service
- Consulting Service

**Networking**

■ **Dispatching a delegation**

**Promotion / Business creation**

■ **EXPO related services**
- Participating well-known EXPO in Japan as Armenian pavilion
- Subsidizing the participation cost
- Business meeting support

■ **Business-matching**
- Business-Business
- Business-academia
- Startup pitching

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## Appealing-approach to Japanese companies:

To Japanese companies

Conducting based on a behavioral process of the Japanese companies' vendor selection.

**Customer journey map for the target customer in this project**

| | Information gathering | Business meeting | Vendor selection | Contract |
|---|---|---|---|---|
| Action | • Google searching<br>• Reading newspapers, books and magazines.<br>• Visiting websites of potential SIer and industry associations.<br>• Downloading relevant materials (white papers, etc.).<br>• Attending seminars/webinars.<br>• Attending an industry trade show.<br>• Attending a pitch event<br>• Asking people you know<br>• Getting to know through social networking timelines, ads around town, etc. | • Attending relevant EXPO and business matching events.<br>• Contacting several prospective vendors that you have narrowed down through information gathering.<br>• Having a specific business meeting per company. | • The vendor with the highest expectations is selected after a comparative study in terms of quality, delivery time, cost, possibility of collaboration, and after-sales support.<br>• Obtaining final approval of the business internally and make a contract.<br>• If not approved, going back to planning or collecting information. | |
| Touch-points | Organic search; Newspaper, books, magazines; White Paper; SIer website; Seminar; Webinar; EXPO; Pitching event; Friends colleagues; SNS; Ads | Appointment; Offline Meeting; Online Meeting; EXPO, Business matching; Brochures, Proposals Quotation | Brochures, Proposals, etc.; Quotation; A; B; C | |

*Blue font: field Armenian Gov. can support

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## Appealing-approach to Japanese companies – Information gathering phase:

To Japanese companies

Quick actions to optimize or create online contents fitted to Japanese companies are suggested.

**Recommended countermeasures per customer touchpoints**

| Touchpoint | Countermeasures | Touchpoint | Countermeasures |
|---|---|---|---|
| Organic search | • Creating a new website of an organization for Armenia's ICT exports and distribute content in Japanese. (the content includes local IT events) *Cooperating with UATE (Why Armenia)<br>• Creating a promotion video for the Japanese market. | EXPO | • Participating in EXPOs related to ICT in Japan as the Armenia Pavilion.<br>• Participating in conferences for specific industry themes. **See next page for details |
| Newspaper, books, magazines | • Issuing press releases to get media coverage when participating in EXPOs in Japan. | Pitching event | • Partnering with the organizers of an ICT-related start-up pitch event in Japan. *See next page for details |
| SIer, other related organization website | • Encouraging Armenian companies interested in entering the Japanese market and the related organizations to make their own websites available in Japanese. (Providing subsidies is an option) | Friends Colleagues | • (Uncontrollable) |
| White Paper | • Providing more specific info such as ICT industry reports on Armenia, etc. on a new website.<br>• Encouraging Armenian companies interested in the Japanese market to make their report available in Japanese. | SNS; Friends UGC | • Posting info on SNS as well (Facebook and Twitter) when posting the same info on website *UGC: Uncontrollable |
| Seminar; Webinar | • Co-organizing seminars with governmental organizations such as JICA and JETRO, as well as Japanese companies about the Armenian ICT industry and the related companies and investments. | Ads | • Considering various types of online advertising at the time of events (listing ads and SNS ads) |

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## Appealing-approach to Japanese companies – Business meeting phase:

To Japanese companies

The 1st priority is to participate in well-known ICT EXPOs as Armenian pavilion in aspect of branding.

**Overview of Initiatives for Each Event**

| | EXPO (1st) | Business Matching | Pitching Event |
|---|---|---|---|
| Goal | • Increasing the recognition of Armenian ICT companies in Japan and realizing business with Japanese companies. | • Realizing business between Armenian ICT companies and Japanese companies on specific themes. | • Increasing the recognition of Armenian ICT startups in Japan and realizing business with Japanese companies.. |
| Approach | • Applying to participate in a prominent Japanese exhibition as Armenian pavilion<br>• Embassy of Armenia speaks at the seminar held at the exhibition.<br>• Participating in conferences for specific industry themes as a supporting member. | • Applying to co-operate the organizers of business matching, such as JICA, JETRO, local government, and companies, that hold business-matching events on a regular basis. | • Applying to co-operate the organizers of business matching, such as JICA, JETRO, local government, and companies, that hold startups pitching events on a regular basis. |
| Events / Partners (candidates) | **EXPOs:**<br>• Japan IT week<br>• CEATECH, Japan<br>• Wireless Japan<br>• Maker Faire Tokyo<br>**Technology conferences:**<br>• Japan Deep Learning Association.<br>• Robot Revolution & Industrial IoT Initiative.<br>• Japan Embedded Systems Technology Association<br>• Fintech Association of Japan, etc. | • JICA<br>• JETRO<br>• Local government<br>• Innovation Leaders Summit (PROJECT NIPPON)<br>• Tokyo Challenge 100 | • Deloitte<br>• Plug and Play |
| Note | • The widest reach. Effectively reachable and can be branded as a country by exhibiting as a pavilion.<br>• Recommended as the most prioritized activity. | • The event can be combined with seminars and dispatching-a-delegation event together for efficient promotion.<br>• Business matching is especially useful when the priority is to realize business with Japanese companies, as it allows to set a theme by industry axis. | |

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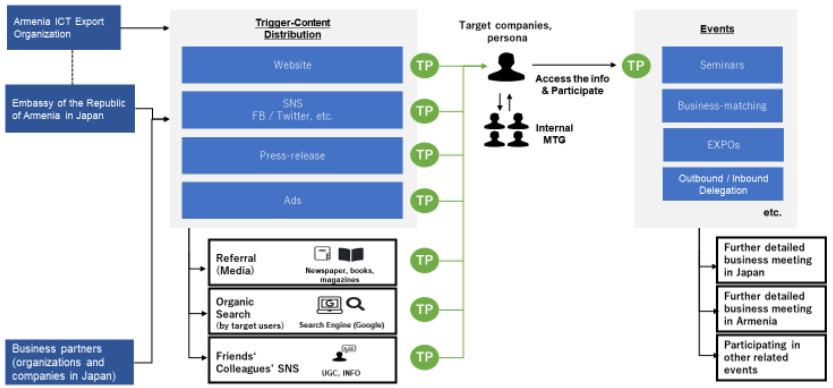
## Appealing-approach to Japanese companies – Expected flow and process

To Japanese companies

Distributing triggered content to create the first customer touchpoints,
and connecting to secondary customer touchpoints, such as events that can be deeply engaged.






## Key Actions 1/2

Focusing on one KPI in each phase of information gathering and business meeting.

| | |
|---|---|
| Objective | Armenian advanced ICT companies' Japanese market entry |
| KGI | Armenian advanced ICT companies' market shares in Japan<br>*Ratio of Armenian advanced ICT companies dealing with Japanese companies (compared to other foreign-affiliated companies) considering the project characteristics<br>*Fixed-point monitoring evaluation by questionnaire at exhibitions, technology conferences, etc. |
| CSF based on customer behavior | Target customer behavior<br>Information gathering / Business meeting<br>1 How efficiently is content reaching the target segment?<br>2 How deeply can the target segment understand value before biz meeting?<br>3 How much can support-service make business meeting smooth? |
| KPI | Ratio of Japanese companies that recognize Armenia as an advanced ICT country: 10%<br>*Number of Japanese companies answering "Trustworthy" is 7% in the seminar held during this project so that setting 10% s a goal to be able to achieve one out of 10 companies.<br>*Conducting fixed-point monitoring to be able to evaluate under same condition.<br>Business matching/support ratio: 50%<br>(among companies participated in programs)<br>* 45% of Japanese companies answered that they have anxiety about communication.<br>*Armenian companies with experience in dealing with Japanese companies also point out communication matters, the aim is to support one in two companies |

* Since it is a KPI item and value for the first year as an initial hypothesis, it is assumed that it will be refined in actual operation.
*Setting KGI in the first year as a qualitative goal and quantifying it by survey results when conducting KPI fixed point monitoring evaluation at the end of the first year.



## Key Actions 2/2

The key actions are measures to be able to reach wider, appeal value deeper, and to solve communication issues.

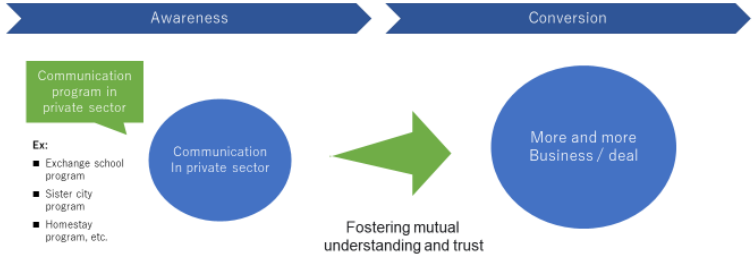
| | | | | |
|---|---|---|---|---|
| CSF based on customer behavior | Target customers' customer behavior | | | |
| | Information gathering | | | Business meeting |
| | 1 How efficiently is content reaching to the target segment? | 2 How deeply can the target segment can understand value before biz meeting? | | 3 How much can support-service make business meeting smooth |
| KPI | Ratio of Japanese companies recognizing Armenia as an advanced ICT country: 10%<br>*Since 7% of Japanese companies answered "Trustworthy" in the seminar held during this project, setting 10% as a goal can be achieved by having 1 out of 10 companies.<br>*Conducting fixed-point monitoring to enable evaluation under same conditions. | | | Business matching/support ratio: 50%<br>(among companies participated in programs)<br>* 45% of Japanese companies answered anxiety about communication<br>*Armenian companies with experience in dealing with Japanese companies also point out the communication matters so that aim to support one in two companies |
| Key ACTION sub-KPI | Appealing commitment | Dispatching delegations (along with EXPOs) | Once a year | Developing business matching service |
| | Widely reaching by an online approach | Distributing press-releases | 8 times a year | |
| | | Creating Japanese pages for UATE and new organization websites | All existing pages | |
| | Participation in events to be able to understand values deeply | Exhibiting at the Armenian Pavilion at well-known EXPOs | Twice a year | Developing business support service for Business meeting preparation |
| | | Participation in startup pitch events | Twice a year | |
| | | Participation in technical councils | Twice a year | Developing business support service for business meeting |
| | | Holding seminars / webinars including pitches | Twice a year | |

* Since it is a KPI item and value for the first year as an initial hypothesis, it is assumed that it will be refined in actual operation.
*Setting KGI in the first year as a qualitative goal and quantifying it by survey results when conducting KPI fixed point monitoring evaluation at the end of the first year.



## 【Reference】 Key Action – Cross - Cultural Communication Aspect

Recommending to launch cross-cultural communication programs due to less relations with Japan compared to other countries.

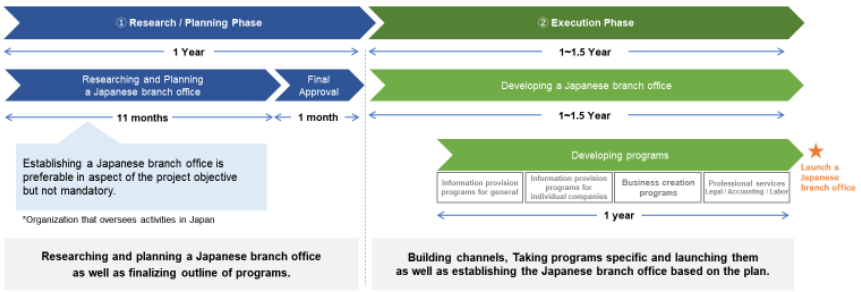



**It does not directly lead to business, but it is an opportunity to get to know Armenia.
It will work positively in your business in the long run.**

## Project Schedule

A research / planning phase for a year, and an execution phase for one and a half years.

Timeline




* The above is a model case because they are affected by the Armenia's ongoing national strategy, budget, and measures.

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## Schedule for establishing a Japanese branch office

Planning sector / Marketing sector

| Phase | Category | Tasks | Sector in charge | Phase1 1Q | 2Q | 3Q | 4Q | Phase2 1Q | 2Q | 3Q | 4Q | + α 1Q | 2Q | ~ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Research Planning | Researching and Planning a Japanese branch office | Goal setting of the base (ex: role and responsibility among stakeholders) | Planning | ■ | | | | | | | | | | |
| | | Designing function of the base | Planning | | ■ | | | | | | | | | |
| | | Designing structure / organization of the base | Planning | | ■ | | | | | | | | | |
| | | Feasibility study for Japanese market to design programs | Marketing | | | ■ | | | | | | | | |
| | | Selecting programs (lineups) | Marketing | | | ■ | | | | | | | | |
| | | Identifying related events required by the provided program | Marketing | | | ■ | | | | | | | | |
| | | Extracting collaborative partner candidates (public and private) required for the provision program | Marketing | | | ■ | | | | | | | | |
| | | HR planning for the base | Planning | | | ■ | | | | | | | | |
| | | Finalizing a budget for the base | Planning | | | ■ | | | | | | | | |
| | Finalizing and approval | Final approval of the plan and budget | Planning | | | ★ | | | | | | | | |
| Execution | Personal arrangement | Procedures such as visa, business traveling, etc. | Planning | | | | ■ | | | | | | | |
| | Office search/Contract | Search and contract for the base in Japan | Planning | | | | | ■ | | | | | | |
| | Office arrangement | Contracting & purchasing an office equipment, interiors, etc. | Planning | | | | | ■ | ■ | | | | | |
| | PR tools arrangement | Selecting and registering PR tools and services | Marketing | | | | | | ■ | | | | | |
| | PR the launch | Send press release (consider an opening ceremony if necessary) | Marketing | | | | | | ★ | | | Buffer time | | |

* The above is a model case because they are affected by the Armenia's ongoing national strategy, budget, and measures.

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## Schedule for developing programs

Planning sector / Marketing sector

| Programs | Category | Tasks | Sector in charge | Phase2 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | + α 1Q | 2Q | ~ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Programs for Providing info for mass | Creating and distributing content | Planning content to distribute for mass *Planning for both of companies in the countries | Marketing | ■ | | | | | | | | | | | | | | |
| | | Distinguish and align content for both of online and offline | | ■ | | | | | | | | | | | | | | |
| | | KPI setting and finalize the program including its timeline | | ■ | | | | | | | | | | | | | | |
| | Seminar | Planning themes for seminars/webinars | Marketing | | ■ | | | | | | | | | | | | | |
| | | Selecting person in charge, locations, approaches per theme | | | ■ | | | | | | | | | | | | | |
| | | Planning and finalize business partners and the scheme | | | ■ | | | | | | | | | | | | | |
| | Website | Planning the website for the branch in Japan | Marketing | | | ■ | | | | | | | | | | | | |
| | | Planning content on the website to distribute online specifically | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | |
| | | Creating and publish the website | | | | | | | | | | ■ | ■ | | | | | |
| | Partners' website | Planning themes, a scheme and business partners | Marketing | | | | ■ | | | | | | | | | | | |
| | Related organizations' website | Requesting the organizations to make their website content available to read in Japanese | Marketing | | | | ■ | | | | | | | | | | | |
| | Press-release | Planning target media, a person in charge and operation for press-release | Marketing | | | | ■ | | | | | | | | | | | |
| | Advertising | Planning target media, a person in charge and operation for ads (in the case of promote) | Marketing | | | | ■ | | | | | | | | | | | |
| Programs for specific companies | Briefing | Planning the program specifically - Theme, a briefing menu, a person in charge, the way to provide, location, term, charge or not, KPI, etc. | Marketing | | | | | ■ | | | | | | | | | | |
| | Consulting | Planning the program specifically - Theme, a consulting menu, a person in charge, the way to provide, location, term, charge or not, KPI, etc. | Marketing | | | | | | ■ | | | | | | | | | |
| | Business matching and support | Planning the program specifically - Theme, a support menu, a person in charge, the way to provide, location, term, charge or not, KPI, etc. | Marketing | | | | | | | ■ | | | | | | | | |
| Professional service | Law/Accounting/HR, etc. | Selecting business professionals in the field of law, Law/Accounting/HR | Marketing | | | | | | | | ■ | | | | | | | |
| | | Planning a scheme to provide services | | | | | | | | | ■ | | | | | | | |
| Business creation | Delegation | Planning a delegation programs such as setting goals, structure, organizing, announcing, etc. | Marketing | | | | | | | | | ■ | | | | | | |
| | EXPO | Selecting EXPOs to participate | Marketing | | | | | | | | | | ■ | | | | | |
| | | Planning a national pavilion such as exhibition area, booth designing, companies to participate, selection of translators, subsidies, etc. | | | | | | | | | | | ■ | | | | | |
| | | Planning a scheme of business-matching during the EXPOs | | | | | | | | | | | ■ | | | | | |
| | | Planning and selecting speakers for promotion at events of the EXPOs | | | | | | | | | | | ■ | | | | | |
| | Technology conferences | Listing up technology conferences in Japan | Marketing | | | | | | | | | | | ■ | | | | |
| | | Selecting the suitable conference to be able to be a member and meet the goal | | | | | | | | | | | | ■ | | | | |
| | | Developing an annual schedule | | | | | | | | | | | | ■ | | | | |
| | Pitching event | List up startup pitching event organizers in Japan | Marketing | | | | | | | | | | | | ■ | | | |
| | | Selecting the suitable organizers to be able to join or work together | | | | | | | | | | | | | ■ | Buffer time | | |
| | | Developing an annual schedule | | | | | | | | | | | | | ■ | | | |

* The above is a model case because they are affected by the Armenia's ongoing national strategy, budget, and measures.

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