



USAID
FROM THE AMERICAN PEOPLE

SKILLS AND KNOWLEDGE NEEDS ASSESSMENT FOR PHARMACEUTICAL INDUSTRY

**REPORT, VOLUME I
SKILLS AND KNOWLEDGE NEEDS ASSESSMENT**

December 8, 2008

This publication was produced for review by the United States Agency for International Development



SKILLS AND KNOWLEDGE NEEDS ASSESSMENT FOR PHARMACEUTICAL INDUSTRY

REPORT, VOLUME I SKILLS AND KNOWLEDGE NEEDS ASSESSMENT

DISCLAIMER: The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

CONTENT

1. EXECUTIVE SUMMARY	4
1.1.1. <i>Introduction: Base and Motivation for the Assessment</i>	4
1.1.2. <i>Main findings</i>	4
2. METHODOLOGICAL ASPECTS OF THE ASSESSMENT	7
2.1. STUDY LOGIC: TECHNICAL APPROACH TO RESEARCH.....	7
2.1.1. <i>Identification of the pharmaceutical industry key positions</i>	7
2.2.2. <i>Development of the Job Description Templates</i>	7
2.2.3. <i>Survey component</i>	9
2.2. OUTPUTS AND DELIVERABLES.....	9
3. BEST PRACTICE REVIEW.....	10
3.1. CLASSIFICATION OF KEY POSITIONS	10
3.1.1. <i>GMP Requirements</i>	10
3.1.2. <i>Local Achievements</i>	11
3.2. JOB DESCRIPTIONS.....	12
3.2.1. <i>Availability</i>	12
3.2.2. <i>Composition and templates</i>	12
4. ASSESSMENT OF PHARMACEUTICAL CLUSTER PARTICIPANTS	13
4.1. SKILLS AND KNOWLEDGE GAP BY MANAGERS OF PHARMACEUTICAL ENTERPRISES.....	13
4.1.1. <i>Need for additional employees</i>	13
4.1.2. <i>Delegation of responsibilities</i>	15
4.1.3. <i>Need for improving qualifications</i>	16
4.1.4. <i>Training peculiarities</i>	16
4.1.5. <i>Relationship with educational institutions</i>	18
4.1.6. <i>Demand for new employees</i>	19
4.2. KNOWLEDGE SUPPLY BY EDUCATIONAL INSTITUTION.....	21
4.2.1. <i>Profile of educational institutions and training offered</i>	21
4.2.2. <i>Number of places vs. applications</i>	22
4.2.3. <i>Curricula suggested at educational institutions</i>	25
4.2.4. <i>Relationships with the pharmaceutical industry</i>	26
4.2.5. <i>Awareness of the pharmaceutical industry</i>	27
APPENDIX.....	28
TABLE A-1. RESPONDENTS FROM PHARMACEUTICAL ENTERPRISES.....	28
TABLE A-2: RESPONDENTS FROM EDUCATIONAL INSTITUTIONS	28
REFERENCES.....	29

1. EXECUTIVE SUMMARY

1.1.1. Introduction: Base and Motivation for the Assessment

The USAID/CAPS Project in Armenia, under the workforce development component, is engaged in significant efforts to enhance workforce and skills development with the goal of matching qualified labor with potential employers in the pharmaceutical industry. The CAPS Project identified the need to undertake the skills and knowledge needs assessment among pharmaceutical firms and academic institutions to

- i) Identify gaps between existing skills and knowledge and those that are required;
- ii) Identify skills, knowledge, and competencies, as well as training needs of the pharmaceutical workforce;
- iii) Identify shortcomings of the educational system and actual demand in the long term,

The Skills and Knowledge Needs Assessment consisted of the following tasks:

1. Classify the main positions (jobs) offered by pharmaceutical enterprises in Armenia;
2. Conduct the skills and knowledge needs assessment, including the qualitative assessment of the managers of pharmaceutical enterprises and representatives of educational institutions, as well as polling (self-regulated survey) of employees of pharmaceutical enterprises in Armenia;
3. Analyze the data collected.

1.1.2. Main findings

The skills and knowledge needs assessment has resulted in findings that are described in detail below and in the other two report volumes. The main findings of the assessment with regard to the review of international best practices, as well as the qualitative survey of representatives of pharmaceutical industry and educational institutions, are summarized below:

1. Fifteen key employment positions have been identified through the review of international best practice. Although respondents from local enterprises recognize the importance of employing specialists for those positions, no local enterprise does so. Job roles such as Qualified Person, Pharmacovigilance Specialist, and R&D Specialist, are usually performed by other employees in addition to their normal responsibilities, or by the manager of the enterprise.
2. In order to generally meet structural requirements according to Good Manufacturing Standards (GMP) and international experience, local producers should have clearly defined organizational structures. Unfortunately, only a few local enterprises have such structure while other local producers really need to structure their business for meeting the minimum requirements.
3. The situation is similar with job descriptions. The majority of respondents stated that they have developed job descriptions but few could produce the documents. Some respondents even think that these documents are not so necessary, because the situation changes often, and job descriptions should be revised regularly or they lose their currency.
4. As of the November 2008 the pharmaceutical industry of Armenia accounts for more than 15 enterprises, including facilities producing various herbs, additives, and other products. The survey covered nine leaders. Only five of the enterprises produce and supply a relatively wide assortment of pharmaceuticals. Some enterprises not only produce pharmaceuticals locally, but also are engaged in the import, distribution, and retail trade of pharmaceuticals.
5. The surveyed enterprises employ about 570 people. Almost 60% of employees are concentrated in two relatively large enterprises—Yerevan CPFirm and Liqvor. Only a few employment positions are vacant in the enterprises surveyed, which the management of the enterprises stated they will fill in the near future.
6. Local producers do not usually employ qualified specialists from the outset and prefer to hire employees with a minimum of knowledge and skills (except for key positions), who are taught

the necessary skills on the job. In this way, on the one hand, producers get what they specifically need after they themselves train their employees; on the other hand, the remuneration demands of the employees notably increase after they have improved their experience and qualifications. In many cases producers cannot afford to pay significantly increased compensation to their employees and lose them. This circle is destructive; comparatively strong producers suggest higher remuneration and seek to recruit qualified specialists, while smaller competitors have to adopt alternative strategies.

7. All companies stated that they needed to improve the qualifications of their employees. Some managers would like to improve the qualifications of all employees; others prefer to train only some specific specialists. The availability of needs is explained by the following main reasons:
 - Specialists' knowledge is outdated and employees are not familiar with modern technologies. There are no training programs in Armenia for improving the skills of pharmaceutical industry employees.
 - When the producers do possess modern equipment, operators are not completely aware of the capability of that equipment and need training to operate the equipment more effectively;
 - There is a general lack of qualified specialists in Armenia. Producers usually attract general specialists and give them on-the-job training.
 - Professional education and training at educational institutions is not adequate to allow the graduates to meet producers' requirements.
8. Managers of pharmaceutical enterprises think that training is the main tool for improving employees' qualifications. This idea is not shared by the majority of employees, who either cannot understand the real importance of intensive training or don't want to spend time for that purpose.
9. Managers declared that their personnel need to receive training in GMP, GLP, and other professional subjects. Almost all producers are planning to apply GMP requirements, and some of them have already initiated specific activities. Furthermore, in the near future, legislative and regulatory changes aim to bring pharmaceutical production closer to GMP standards. Pharmaceutical enterprises understand this and try to react promptly and effectively. According to top managers of the pharmaceutical enterprises, training is needed urgently.
10. Cooperation between pharmaceutical producers and educational institutions is not close. Their relations are limited mainly to providing room for passing practical classes for students of medical and chemical educational institutions: no joint working groups, no research projects, no ventures, no planned labor-educating policy, no influence on educational disciplines and curricula, etc. In fact, the current situation is something like "relations" but not "cooperation."
11. Producers expect closer cooperation from educational institutions. Educational providers must try to meet the requirements of the industry. Producers have the following specific expectations of educational institutions:
 - Training of qualified GMP and related specialists. Skillful GMP specialists have become a necessity.
 - Students of medical educational institutions are not meeting pharmaceuticals producers' requirements. The theoretical knowledge is obsolete, and practical classes are lacking.
 - Revision of educational disciplines and curricula to meet industry requirements.
 - Research and synthesis of new pharmaceuticals. Some producers cannot develop new pharmaceuticals because that requires the availability of special infrastructure, analytical laboratory equipment, and R&D specialists. Normally, educational institutions possess these assets and can develop new pharmaceuticals.

- Application and implementation labor projects. This involves the selection of the best students, training them in special programs and curricula, preparing qualified specialists, and ensuring their employment. In fact this means investment in education.
12. Managers of local pharmaceutical enterprises stated that about 170 potential new jobs will need to be filled in the next 12 months—to increase employment by 30%. Some producers have more preconditions for success than others. Thus, almost 65% of the planned increase in the number of employees is forecasted by only two enterprises.
 13. Local producers usually hire general specialists from employment agencies, who may not even be graduates of medical educational institutions. Employees attracted from general educational institutions are relatively cheap but lack skills and knowledge because of little or no working experience. However, producers like the idea of attracting specialists straight from graduation, directly from the educational institution, and this may become the first step toward the real co-operation between the educational institutions and producers.
 14. Total number of potential specialists in the pharmaceutical sector studying in educational institutions of Armenia is 1,563 people. This figure includes all students of tertiary, higher and post-graduate education. Secondary education may be enough for operators or midlevel managers, while for higher positions more educated and skillful specialists are should be hired.
 15. On average, the demand for an education in pharmaceuticals is almost matched by supply. This coefficient is different for the various educational institutions. Some institutions were not able to meet demand, while more famous institutions faced significant shortage of applicants. The main reason for this is the high cost of education—only a very small number of educational places are free of charge.
 16. The overwhelming majority of pharmacy students don't even think about working at pharmaceutical enterprises. They prefer to find employment at pharmacies, where their work is perceived to be easier, safer and better paid. At pharmacies these specialists do not have good career opportunities, but the majority of specialists prefer today's better conditions in pharmacies.
 17. The number of educational places in pharmacy schools bears no relation to industry dynamics. Educational institutions operate separately, under strict state regulation. Decisions about the number of educational places are made by license issued by the Ministry of the Education and Science. The Ministry makes licensing decisions based on the capacity of the particular institution, i.e. availability of classrooms and infrastructure, laboratories and equipment.
 18. In a five-year timeframe, about 2,500 students will graduate from pharmacy schools of various educational institutions in Armenia, while the total demand of pharmaceutical producers will reach 410 employees.
 19. Managers of enterprises are dissatisfied with the current educational system and suggest immediate changes. Some managers complain that educational programs and curricula have not changed for 30 years. By contrast, educational institutions claim that current curricula and disciplines match industry requirements.
 20. According to the majority of the representatives of educational institutions, visits to pharmaceutical enterprises are the most practiced type of cooperation between educational institutions and producers. Practical classes and on-site training are the next most common option. Some enterprises organize these events on commercial bases, others do it for free. In some cases producers select good students, organize special classes for them, and even pay them some remuneration. Implementation of joint projects and research is the rarest type of cooperation.
 21. Pharmaceutical enterprises have no real influence on education processes. Producers are allowed to apply for an educational place for a student that will not participate in entry competition. In some cases, managers of enterprises are invited to participate in examination committees; sometimes producers are invited to discuss *minor modifications* to educational programs.

2. METHODOLOGICAL ASPECTS OF THE ASSESSMENT

2.1. STUDY LOGIC: TECHNICAL APPROACH TO RESEARCH

2.1.1. Identification of the pharmaceutical industry key positions

Although one of the most important tasks of the assessment is the classification of existing jobs in Armenian pharmaceutical enterprises, the assessment was not limited to this task, and it also reviewed main employment positions in some modern international companies, as well as various reports and informative documents. This assessment asked the managers of nine Armenian pharmaceutical to provide the management structure of their enterprises. This was the only way to collect data on local enterprises, although some producers refused to provide such information because of privacy issues.

Nevertheless, we tried to base our analysis on information available from other enterprises and authoritative documentation, such as GMP and other relevant papers. This approach allows us to review the task from both theoretical and practical viewpoints and has resulted in the identification of 15 key positions necessary for operating a pharmaceutical enterprise. These positions are based on survey questionnaires, and job description templates have been developed for the positions. The 15 classified key positions are listed below:

- Qualified person,
- Head of quality control
- Head of production
- Head of technology
- Laboratory supervisor
- Registration specialist
- Production operator
- Packaging operator
- Quality control analyst, chemist
- Laboratory technician
- Microbiologist
- Storage / Warehouse person
- Marketing specialist
- Complaint and pharmacovigilance specialist
- R&D specialist / Scientist

2.2.2. Development of the Job Description Templates

Job description templates for key employment positions of pharmaceutical enterprises are the major deliverable of the current assignment. To develop useful, applicable and well-grounded templates two methodological tools have been applied: review of international best practices and assessment of local Armenian practices.

Best practice review

To conduct the review of international best practice the following methodological base was adopted:

1. The following three directions were selected to be the review objects:

- ⇒ Assessment and analysis of the experience of international pharmaceutical associations that were represented by EphMRA (European Pharmaceutical Market Research Association), PHMRA (Pharmaceutical Research and Manufacturing of America), IFPMA (International Federation of Pharmaceutical Manufacturers and Associations).
- ⇒ Assessment of the EU and WHO (World Health Organization) GMP documents
- ⇒ Assessment and analysis of the successful experience of modern international pharmaceutical enterprises. The parameters for selecting successful producers of pharmaceuticals were turnover and number of employees. The following companies were assessed:

Table 1 – Researched Enterprises

- Pfizer, USA
- Merck & Co., USA;
- Bayer, Germany
- Abbott Laboratories, USA
- GlaxoSmithKline, United Kingdom
- Wyeth, USA
- Novartis, Switzerland
- Bristol-Myers Squibb, USA
- Sanofi-Aventis, France
- Eli Lilly and Co., USA
- Hoffmann–La Roche, Switzerland
- Schering-Plough, USA
- AstraZeneca, UK/Sweden
- Elan Corporation, Ireland

2. The online internet search method was selected as the main tool for conducting the desk research and assessment of pharmaceutical companies. The websites of the abovementioned associations and companies were thoroughly reviewed; information was collected about the obligations and functions, as well as skills and knowledge requirements for those organizations' personnel. Concurrently, the experience and educational levels required were also assessed.
3. The collected information was summarized, analyzed and attributed to classified key positions of specialists of pharmaceutical enterprises.

Local practices

Although the assessment has thoroughly analyzed the best practices of successful international companies (pharmaceutical producers), not all of these practices are applicable to Armenian realities. Some requirements of international producers are too tough for Armenian producers and may not be faced for many years.

On the other hand, local peculiarities may cause specific requirements for employees applying for specific positions at pharmaceutical enterprises in Armenia. Holding several positions simultaneously, working without narrow specialization, and a 6-day work week, are examples of specific requirements that are requested of employees at local pharmaceutical enterprises, but cannot be considered as widely adopted practices abroad.

2.2.3. Survey component

Sample frame

The survey component of the assessment consists of three main blocks: a qualitative survey of the managers of pharmaceutical enterprises, the same assessment for representatives of educational institutions, and self-regulated survey/polling of employees of those enterprises. The sample frame of the pharmaceutical enterprises contained nine local producers illustrated at Appendix 1.

Specially trained surveyors visited the abovementioned enterprises and conducted face-to-face interviews with their top management. The answers will be justified and crosschecked with the data collected from other sources. The survey of educational institutions also covered nine academic entities providing various types of education (see Appendix 2).

Methodological aspect of the self-administered survey of employees of pharmaceutical enterprises is presented in Volume II of this report.

Survey tools and topics

Separate survey tools were developed for conducting each part of the survey. The questionnaire for interviewing the managers of pharmaceutical enterprises consisted of the following main sections:

- a) Respondent's profile
- b) Number of employees and vacancies
- c) Job descriptions and delegation of responsibilities
- d) Importance of main responsibilities
- e) Skills and knowledge improvement needs and methods
- f) Training required and its format
- g) Relations with educational institutions
- h) Number of employees to be attracted in a five-year perspective.

The questionnaire for interviewing the representatives of educational institutions consisted of the following main sections:

- a) Profile of the educational institutions
- b) Relationship/Gap between the number of students and applicants in the past three years
- c) Prospective of changes of the number of students
- d) Suggested disciplines and curricula
- e) Availability of capacities
- f) Cooperation with the pharmaceutical enterprises.

2.2. OUTPUTS AND DELIVERABLES

The assessment has resulted in the following outputs:

- a) Qualitative assessment of the managers of local pharmaceutical enterprises
- b) Qualitative assessment of the representatives of educational institutions
- c) Polling of the employees of local pharmaceutical enterprises
- d) Assessment of international best practice.

The following deliverables were submitted to CAPS for the current assessment:

- a) Report on qualitative assessment of managers of pharmaceutical enterprises and representatives of educational institutions on the theme of Skills and knowledge needs

- b) Report on the assessment of employees of pharmaceutical enterprises on the theme of Skills and knowledge needs
- c) Classification of 15 key employment positions at pharmaceutical enterprises
- d) Job description templates for 15 key employment positions at pharmaceutical enterprises.

3. BEST PRACTICE REVIEW

3.1. CLASSIFICATION OF KEY POSITIONS

3.1.1. GMP Requirements

Premises

Premises must be located, designed, constructed, adapted, and maintained to suit the operations to be carried out. The layout and design of premises must aim to minimize the risk of errors and permit effective cleaning and maintenance to avoid cross-contamination, build-up of dust or dirt, and, in general, any adverse effect on the quality of products.

1. Production—to minimize the risk of a serious medical hazard due to cross-contamination, dedicated and self-contained facilities must be available for the production of particular pharmaceutical products.
 - Different operational areas—the production should take place in areas connected in a logical order corresponding to the sequence of the operations and to the requisite cleanliness levels;
 - Packaging area—Premises for the packaging of pharmaceutical products should be specifically designed and laid out so as to avoid mix-ups and cross-contamination.
2. Quality Control Laboratories—QCLs should be separated from production areas. Areas where biological, microbiological or radioisotope test methods are employed should be separated from each other.
3. Storage—Storage areas should be of sufficient capacity to allow orderly storage of the various categories of materials and products with proper separation and segregation:
 - Storage of starting and packaging materials
 - Storage of products in quarantine
 - Storage of finished products
 - Storage of rejected, returned, or recalled products

Key Personnel

Key personnel include the Head of Production, the Head of Quality Control and the Authorized/Qualified Person. The Heads of Production and Quality Control should be independent of each other. Duties and responsibilities of the key personnel are described in a range of international documents.¹

¹ 1. EU Directive 2001/83/EC

2. EU DIRECTIVE 2003/94/EC "The principles and guidelines of GMP in respect of medicinal products and investigational medicinal products for human use"

3. EudraLex Volume 4: The Rules Governing Medicinal Products in the European Union, EU Guidelines to Good Manufacturing Practice Medicinal Products for Human and Veterinary Use

4. WHO, Quality Assurance of Pharmaceuticals (WHO Good Manufacturing Practice: main principles for pharmaceutical products) volume 2

5. PICs Good Manufacturing Practice

It is impossible to provide ideal solutions for the structure of the pharmaceutical enterprise covering all possible varieties and nuances, but below we present a sample of a structure that illustrates minimum requirements and may serve as guidance.

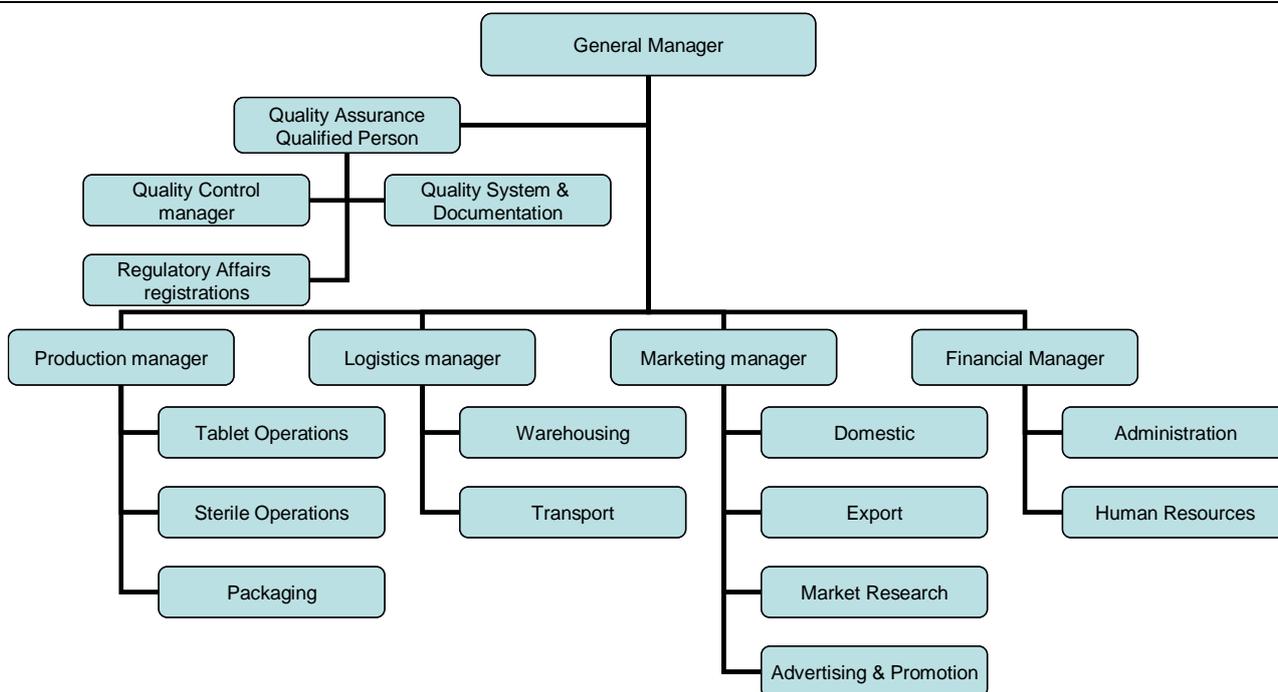


Chart 1 - Exemplary structure for the pharmaceutical enterprise (based on the best practice analysis)

3.1.2. Local Achievements

During the assessment we reviewed organizational structures of some local producers and note that leading enterprises have sophisticated and impressive structures—those enterprises need no modification. In fact, these are companies with ISO certification, which requires an enterprise to have an organizational chart. This is legitimate, because those advanced enterprises have spent significant resources on the organizational aspect of their businesses. Meantime, some organizational structures and Job Descriptions may be applicable from an ISO point of view, but may not be GMP compliant.

The assessment also identified enterprises that have relatively weak structures, although this can be explained by lesser needs. Relevant operational units are created and specialists are hired as the need arises. Except for some 4-5 leaders local pharmaceutical enterprises are quite weak and are still looking for best solutions for their business. Below we present the structure of one of the intermediary enterprises.

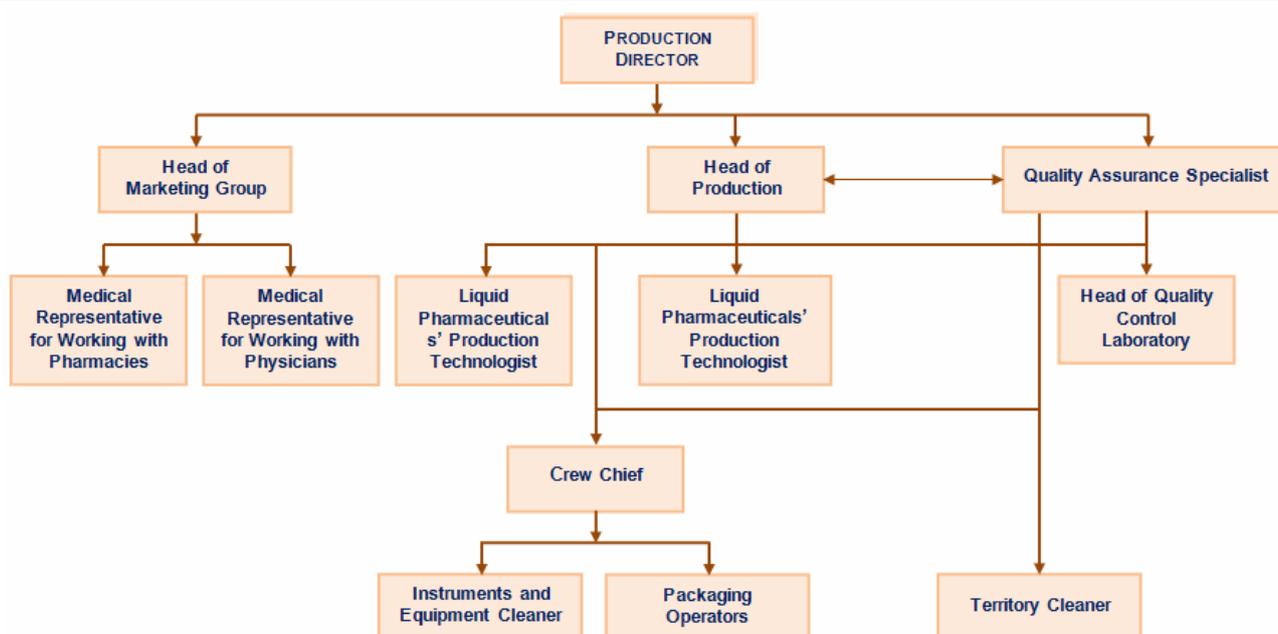


Chart 2 - Organizational chart for one of intermediary enterprises

This chart is not very sophisticated, but it is a real achievement in comparison with others. Some enterprises do not even pay attention to this issue.

3.2. JOB DESCRIPTIONS

3.2.1. Availability

All enterprises that were involved in the assessment were asked about the availability of responsibility delegation procedures and tools, i.e. job descriptions. Again the same modern enterprises declared that they practice the system of job descriptions; others are either in process of preparation or do not want to apply them at all. Nevertheless, we asked the management of all enterprises to supply their job descriptions for comparing with international best practice.

Unfortunately, only one enterprise supplied us with its job descriptions. Others either refused, explaining their position on the basis of privacy issues and commercial factors (for some enterprises those job descriptions have been developed by professionals and cost substantial financial resources), or have nothing to provide. As a result, it was impossible to compare local practices with internationally adopted ones, and we have to limit ourselves only to provision of expertise of advanced international producers of pharmaceuticals. Sources of information used during the desk research are presented in *References*, at the end of document.

3.2.2. Composition and templates

The standard composition of job descriptions is the following:

- a) Name of the position
- b) Short summary or description of the position
- c) Primary duties and responsibilities to be undertaken by the employee
- d) Relevant additional requirements, mainly regarding to education and experience
- e) Skills and knowledge necessary for the implementation of professional responsibilities and duties.

Listed positions comprise the main body of job descriptions. In different enterprises this document is modified in different ways: it may also contain terms and conditions of employment, length of suggested contract, required social status (age, gender), and more.

We have identified 15 key positions for a sample enterprise and developed model job descriptions for them (i.e., templates). The prepared templates are not necessarily the last truth and the best way for organizing the work of specialists, but they can serve as guidance for local pharmaceutical producers in developing their own job descriptions.

Templates of the job descriptions for 15 key positions are presented in *Volume III: Job Description Templates*.

4. ASSESSMENT OF PHARMACEUTICAL CLUSTER PARTICIPANTS

4.1. SKILLS AND KNOWLEDGE GAP BY MANAGERS OF PHARMACEUTICAL ENTERPRISES

4.1.1. Need for additional employees

Rate of employment

As of November 2008 the pharmaceutical industry in Armenia included 15 enterprises, including facilities producing herbs, additives, and other byproducts. The survey covered nine leading firms. Only five produce and supply a wide assortment of pharmaceuticals; others specialize in the production of a few types of pharmaceuticals or have just started operations. Some enterprises do not produce pharmaceuticals locally but are engaged in import, distribution, and retail trade of pharmaceuticals.

The nine pharmaceutical enterprises surveyed together employ about 570 people. Almost 60% of those employees are concentrated in two large enterprises—Yerevan Chemical Pharmaceutical Firm and Liqvor. An important deliverable of the current assessment is the identification of the “employment rate” or the number of vacancies at pharmaceutical enterprises. At the time of the assessment only four of nine enterprises surveyed stated that they had vacancies; others had no vacancies. The total number of pharmaceutical enterprises’ demand for new specialists was 16 employees for existing vacancies and 12 employees for new openings, for opening new production facilities).

Positions to be filled and urgency

The assessment of the pharmaceutical enterprises’ vacancies has resulted in a very interesting finding – their employees are not necessarily narrow specialists of pharmaceutical science. In a practice, so called “non-specialists” comprise quite a notable proportion of the personnel. For some positions, such as operators, medical representatives, and marketing staff, pharmaceutical enterprises employ personnel for specialist positions with quite general knowledge and skills. Narrow specialization is not always obligatory.

Table 2 summarizes the positions that managers of pharmaceutical enterprises said were not filled at the time of the survey.

Table 2 – Vacancies at assessed enterprises

Title	No. of employees
Marketing specialist	2 employees
Designer	1 employee
Medical representative	1 employee
Technologist	3 employees
Head of quality control unit	1 employee
Laboratory analyst	1 employee
Confidential info	7 employees
Lyophilization ² specialist	10-12 employees (new openings)

As to the urgency of hiring new specialists, for both vacant positions and new openings, the situation is not critical: only 5 of 28 were said to be needed urgently. These positions are for marketing specialists, technologists and visiting specialists. More generally, producers are willing to find and hire specialists at a more leisurely pace. At least 15 of 28 new employees may be hired within 3-12 months, or even more. This means that local pharmaceutical producers are not suffering from a lack of qualified specialists and can operate without filling vacancies for

a long period. Problems may appear only if the company grows. The companies with the fastest growth will have the biggest problems; staff will work over-time for longer periods.

Causes of not filling the vacancies

Reasons for not recruiting the required specialists are varied. Some pharmaceutical enterprises are expanding production and adding new facilities (e.g., laboratories, production units) or moving to new premises. For attracting new employees pharmaceutical enterprises often advertise positions. They place their advertisement in media and/or with job agencies and wait for response.

Armenian pharmaceutical enterprises give specialists for specific positions on-the-job training. Usually, they have to attract employees with a minimum level of knowledge and skills (except for key positions, such as managers of production process and quality control). These employees are trained on the job at the enterprises to gain the necessary skills.

This situation is twofold: on the one hand producers get what they specifically need after that training; on the other hand, the remuneration demands of those employees notably increase after the employees improve their experience and qualifications. Often producers cannot afford to pay significantly increased compensation to their employees and lose them. This circle is destructive; comparatively strong producers suggest higher remuneration and seek to recruit qualified specialists, while smaller competitors adopt alternative strategies.

² Drying and evaporation specialist

Conformity of existing employment structure to current needs

Managers of local pharmaceutical enterprises have responded to this question in various ways: some are more or less happy with the employment structure of their enterprises; others can see significant room for improvement. Nevertheless, the majority of top managers interviewed are satisfied with the employment structure of their enterprises. In some cases managers want to attract new specialists to delegate some of their own responsibilities, or the structure was designed to meet much more requirements than it actually has.

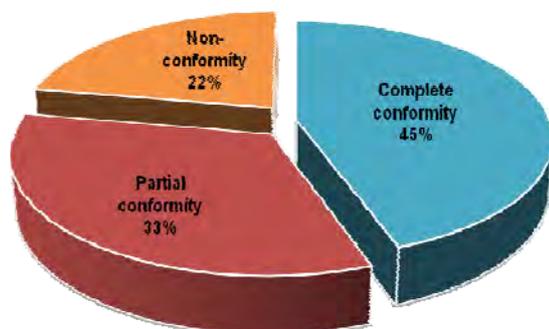


Chart 3 - Conformity of employment structure

Some local producers are growing quickly; in the near future they plan to make modifications to meet changing market needs, such as adding production facilities, market conjuncture variations, and changes in marketing policy. That is why they state that they conform only partially.

Finally, more than one-fifth of respondents commented on their enterprises' failure to meet staffing needs. They believed their employees are overloaded, and urgent and notable changes are needed. This may be initial signals of dissatisfaction with the structure, delegation of responsibilities, and recruitment of their enterprises.

4.1.2. Delegation of responsibilities

Availability of job descriptions

Six of the nine pharmaceutical enterprise managers interviewed stated that their companies use job descriptions. Nevertheless, only one enterprise surveyed agreed to share this information. Managers that did not provide job descriptions explained their decision mainly on the basis of confidentiality. Some went further: "28,000 Euros have been paid for developing those job descriptions and we can't share it with anybody."³ On the one hand, having no job description for analysis and comparison with international practice affects assessment results negatively; on the other, it is promising that producers are willing to spend such significant means on solving staffing problems that may not be of first priority.

Pharmaceutical producers that have not adopted job descriptions give the following two reasons:

- a) They are newly opened and are still developing their job descriptions.
- b) Technologies and functions change rapidly; developing final documents that meet the requirements of the changing environment is difficult.

Ways of delegating responsibilities to employees

In the analysis made above we saw that the overwhelming majority of pharmaceutical producers have adopted the system of job descriptions. In those cases, when producers have not completely developed the system of job descriptions, the method of oral instructions is employed. Although this practice is not effective and may even be dangerous in certain circumstances, this is the only alternative for some local companies. Nevertheless, with increased production volume and product range, producers will have to evaluate their operating procedures.

At least three local producers have declared that they do not have job descriptions, but we cannot say for sure that other six have these documents, we haven't seen them.

³ The amount mentioned was spent not only for developing job descriptions but for a whole set of consulting and certification services.

4.1.3. Need for improving qualifications

Employees' needs

All managers of pharmaceutical enterprises identified some training needs. Some respondents think that all their personnel should be trained, others mention only a couple of positions that they think are more important.

The assessment showed that the top managers of pharmaceutical enterprises completely understand the need for improving the skills and knowledge of their personnel. They mentioned that continuous improvement of the qualifications of specialists is the decisive factor for their success. As to reasons for those needs, respondents had the following explanations:

- a) Specialists' knowledge is outdated and employees are not familiar with modern technologies. There are no training programs in Armenia for improving the skills of pharmaceutical industry employees.
- b) When the producers possess modern equipment, operators are not completely aware of the capability of that equipment and need to improve their training to operate the equipment more effectively.
- c) There is a general lack of qualified specialists in Armenia. Producers usually attract general specialists and conduct on-the-job training for them.
- d) Professional education and training at educational institutions is not adequate for graduates to meet producers' requirements. Technologies develop continuously, and producers have to train specialists to keep them informed and skillful.
- e) Employees trained on the job notably improve their qualifications, after which they usually request better remuneration. Producers cannot always afford to meet these demands and often lose their specialists to other companies without having other alternatives. Availability of training opportunities will increase the supply of the qualified workforce, *ceteris paribus*.

It can be concluded that improving the knowledge and skills of all staff will reduce the pressure, as there will be more qualified people available.

Ways of fulfilling needs

Because the improvement of employees' skills and knowledge is one of the most important challenges for Armenian producers of pharmaceuticals, various types of activities are applied for that purpose. Producers usually train specialists in the production process. This method is efficient and does not require many resources. Nevertheless, some producers spend a lot of money on training specialists outside of the production process. All respondents stated that they would welcome a consolidated industry training program.

Respondents think that the availability of centralized training opportunities would facilitate the training of specialists for employment in pharmaceutical enterprises and set minimum requirements for all potential employees.

4.1.4. Training peculiarities

The assessment covered the following aspects of training requested: need, urgency, theme, place of implementation, and trainers. The *combination of these factors* will allow us to make objective judgments about real training needs of pharmaceutical enterprises in Armenia. All factors are combined and illustrated in one general table (see below).

Table 3 - Combination of answers of top managers of the 9 pharmaceutical enterprises (number of responses)

Types of most required training	N of respondents	Urgency		Place of trainings			Trainers			
		Urgently	In coming months	At the workplace	In Armenia, out of the workplace	In abroad	Local specialist, theoretician	Local specialist, practitioner	Foreign specialist, theoretician	Foreign specialist, practitioner
GMP	9	6	3	3	6	4	1	3	3	8
GLP	9	6	3	3	6	4	1	3	3	8
Professional pharmaceutical themes	8	3	5	5	1	4	2	5	0	3
Marketing	4	1	3	2	2	1	2	2	0	2
Computer techniques	4	1	3	1	4	0	4	2	0	0
Accounting themes	1	0	1	0	1	0	1	1	0	0
Juridical themes	1	0	1	0	1	0	1	1	0	0

Themes

Almost all respondents stated that their personnel required training in GMP, GLP, and other professional pharmaceutical issues. Almost all producers are planning to apply GMP requirements, and some have already initiated specific activities in this direction. Furthermore, legislative and regulatory changes are also imminent, with the aim to bring pharmaceutical production closer to international GMP standards. Pharmaceutical enterprises understand this well and try to react promptly and effectively.

Other themes for training are more organizational and promotional. Improvement of marketing skills and computer literacy has a somewhat indirect connection with pharmaceutical production, although it is important, too.

Urgency

The assessment of the urgency of training needed has the aim of understanding the importance that pharmaceutical enterprises give to specific training programs. Some training programs should be conducted in the very short term; others can wait. Again, professional pharmaceutical training programs are requested as a priority. According to top managers of the pharmaceutical enterprises, these training programs need to be conducted urgently.

Place of implementation

The place of implementation of training sessions is another important factor that may affect the effectiveness and efficiency of training. For some trainees it is preferable to get training closer to their home and work: they try to keep in touch with their everyday agenda and complete other tasks besides training. Other trainees prefer to participate in training programs at specially designed training centers, far from their everyday life. It helps them to concentrate on the training topic and get maximum information in a short time.

Local training vs. overseas programs is another topic to discuss. On the one hand, training programs organized abroad are more useful by default, because many people from other countries participate and bring their successful experience. On the other hand, these training programs are usually expensive, and many producers cannot afford them.

Preferred trainers

Many factors characterize different kinds of training, but the most important is the trainer and his/her qualifications. For deepening academic education, theoretician trainers are to be recruited, while practitioners are preferable for improving everyday working skills. For pharmaceutical enterprises there is tendency toward practical training. Participants apply the skills and knowledge gained at these types of training in their own production process.

As we can see from the table, GMP/GLP and narrow professional themes are the most requested. These training programs are needed urgently for the majority of respondents. Training programs on different professional themes and parallel topics such as marketing and computer skills are also required, but not as urgently.

Respondents gave different answers to the question regarding the role of training. The majority prefers to get training in Armenia, but out of their workplace. As for trainers, respondents mainly require practical classes carried out by foreign specialists.

4.1.5. Relationship with educational institutions

Cooperation

From the beginning of the assessment we were thinking that there should be close cooperation between pharmaceutical enterprises and educational institutions. Concluding the results of the assessment we can see that we were only partly right. Of course, there are relations between producers and educational institutions, but they are limited to providing rooms for practical classes for some students of medical and chemical educational institutions.

Cooperation is limited to various types of practical classes. To our understanding, it is not enough or effective. No joint working groups, no research projects, no ventures, no planned labor-educating policy, no influence on educational disciplines and curricula. In fact, the current situation is something like “relations” but not “cooperation”.

Industry expectations from educational institutions

In general, producers' major expectation from educational institutions is closer cooperation. Different producers see that cooperation in different ways, but all have their requirements. On the one hand, they are right: the educational system must try to meet requirements of the industry. On the other hand, the producers are not proactive either. Here is the snapshot of Armenian pharmaceutical enterprises' specific expectations of educational institutions:

- a) Training of qualified GMP and related specialists. GMP continuously increases its value in Armenia and around the world, and skillful GMP specialists have become just a necessity.
- b) Improvement of teaching and training quality. Students of medical educational institutions (especially small ones) do not meet the requirements of pharmaceutical producers. The theoretical knowledge that students get in their classes is outdated, and they lack practical classes.
- c) Revision of educational disciplines and curricula. There is a need for modifications in curricula, because technologies are changing. Corresponding changes should be made at the educational level, otherwise we shall face a deep gap between pharmaceutical producers and educational institutions in the near future.
- d) Research and synthesis of new pharmaceuticals. Some producers cannot develop new pharmaceuticals because that requires the special infrastructure, analytical laboratory equipment, and R&D specialists. Normally, educational institutions possess these assets and can develop new pharmaceuticals, but they have no means for organizing serial production. The mutual

benefit of real cooperation between educational institutions and pharmaceutical enterprises needs no more proof.

- Application and implementation of labor projects. This involves the selection of the best students, training them in special programs and curricula, preparing qualified specialists and ensuring their employment. In fact this means investment in education.

e) In Armenia we have such examples in IT sector, and those examples turned to be success stories both for educational institutions and pharmaceutical enterprises.

Effectiveness of cooperation

Although we tend to define the relations between pharmaceutical producers and educational institutions as non-effective, producers think that practical classes at their enterprises are useful for students. They are sure that visiting practicum students receive real pharmaceutical knowledge. "Even just one look at the production processes gives them more knowledge than many lectures."

Producers state that they often offer employment opportunities to students during practicums. Meantime, in Armenia students usually prefer employment in pharmacies than in pharmaceutical enterprises. Nevertheless, Arpimed, Esculap, and other producers have already attracted dozens of students. Their requirements are that the students complete their education and make a long-term commitment.

4.1.6. Demand for new employees

Number of newly requested employees in the short-term and in a five-year perspective

Although development preconditions in Armenia are not promising, almost all managers of the pharmaceutical enterprises assessed plan to develop extensively.

Managers of pharmaceutical enterprises mentioned about 170 total potential openings or new jobs in the next 12 months. The same nine enterprises currently employ 570 employees. In other words, the pharmaceutical industry in Armenia plans to increase employment by 30% in the next 12 months.

At the same time, the general development of the industry does not necessarily mean development for all enterprises. Some have much more preconditions for success than others. Only five of nine enterprises have planned employment increases of more than 25%.

The figure of 170 new employees in coming 12 months stated by the managers of the pharmaceutical enterprises is impressive. At first sight it may seem inflated, but managers know their businesses, and they hopefully can make accurate estimates. Five-year estimates are a little conservative. four enterprises refused to estimate the potential number of new employees. The other five estimated about 240 employees over five years. In further analysis we compare these figures with the number of graduates of educational institutions in the same period and trace the dynamics of the potential supply and demand of specialists in pharmaceutical industry.

Table 4 - Demand for new employees at local pharmaceutical enterprises

>1 year	Demand for new employees	1-5 years	Demand for new employees
Technologist	34	Technologist	40
Maintenance Staff	27	Worker	32
Production Operator	18	Pharmacist (for heading positions)	15
Packaging Operator	16	Lyophilization Specialists	12
Engineer-technician	15	Fireman	10
Marketing Specialist	6	Medical Representative	8

>1 year	Demand for new employees	1-5 years	Demand for new employees
Laboratory technician	3	Marketing Specialist	5
Export specialist	1	Head of Workshop	5
Medical Representative	1	Production Operator	5
Quality Control Specialist	1	Laboratory technician	4
Essential oil specialist	1	Registration Specialist	2
Not specialized	47	Quality Control Specialist	1
		Export specialist	1
		HR Specialist	1
		Head of Storage	1
		Engineer	1
		General Specialist	1
		Responsible person	1
		Safety Engineer	1
		Not specialized	94
Total	170	Total	240

Respondents were not able to completely justify the specialization of all potential employees. The most requested positions mentioned by managers of pharmaceutical enterprises are technologists, maintenance staff, and packaging and production operators. For some employees, pharmaceutical education is desirable but not required.

Possible ways of recruiting employees

The assessment showed that Armenian producers of pharmaceuticals do not usually practice sophisticated ways of attracting new employees. Producers usually attract general specialists from employment agencies that are not always graduates of medical educational institutions.

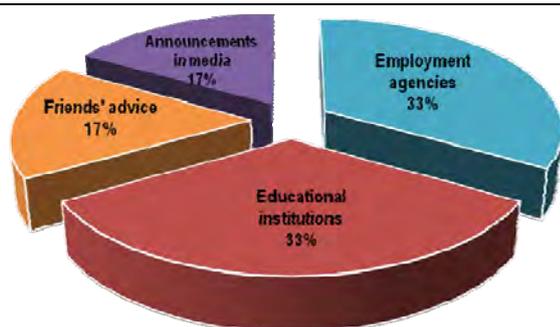


Chart 4 - Ways of attracting employees

Employees attracted from general educational institutions are comparatively cheap but lack many skills and knowledge because of a lack of work experience. Anyhow, producers like the idea of attracting specialists exactly from the pharmacy schools of educational institutions, and this may become the first step toward real cooperation between educational institutions and producers.

The advice and recommendation of friends or other close people are still an effective and decisive factor for selecting employees. Although in many cases such recommendations do not mean anything in a professional arena, Armenian employers still prefer to believe in their friends instead of judging people by their qualifications.

4.2. KNOWLEDGE SUPPLY BY EDUCATIONAL INSTITUTION

4.2.1. Profile of educational institutions and training offered

The assessment covered almost all academic institutions that offer educational services in the field of pharmaceutical science and related fields. The list of educational institutions includes state and private entities, secondary vocational and higher education. Table 5 lists the educational institutions assessed and the training and education provided by them.

Table 5 - Educational institutions and proposed trainings

Educational Institution	Type of Education	Specialization
S.Kh. Avdalbekyan SCJSC National Institute of Health	<ul style="list-style-type: none"> ☞ Refresher courses for pharmacists ☞ Refresher courses for pharmacists with higher education ☞ Pharmaceutical specializations 	Continuing education—professional enrichment and training for pharmacists and pharmaceutical scientists
Mkhitar Heratsi Yerevan State Medical University (YSMU)	<ul style="list-style-type: none"> ☞ Higher education ☞ Internship ☞ Post-graduate education ☞ Specialization 	Pharmacist
Yerevan State University (YSU)	<ul style="list-style-type: none"> ☞ Bachelor’s degree ☞ Master’s degree ☞ Postgraduate education 	Pharmacist, chemist
Yerevan State Engineering University (YSEU)	<ul style="list-style-type: none"> ☞ Specialized secondary education ☞ Bachelor degree ☞ Master degree ☞ Post-graduate education 	Pharmaceutical scientist, chemist
“Haybusak” Yerevan University	Higher education	Pharmaceutical scientist
Yerevan Mehrabyan Medical Institute	<ul style="list-style-type: none"> ☞ Higher education ☞ Specialized secondary education⁴ 	Pharmaceutical scientist at the college, pharmacist at the institute
Saint Teresa Medical University	Higher education	Pharmaceutical scientist
Yerevan State Basic Medical College SNPO	Specialized secondary education	Pharmaceutical scientist
Grigoris Medical-Humanities College	Specialized secondary education	Pharmaceutical scientist
Yerevan State Medical College Erebouni	Specialized secondary education	Pharmaceutical scientist

The major player among educational institutions is *YSMU*, which is the main supplier of specialists in pharmaceutical production.

⁴ 2-year education

4.2.2. Number of places vs. applications

Current number of students

The purpose of the analysis of the current number of students at educational institutions is the understanding of the ratio of labor supply and demand in Armenia in a five-year perspective. The task is complicated because it is impossible to combine all students in one final figure. The reason for that are the different types of education: graduates of colleges are potential applicants for higher education. Graduates of universities are potential applicants for internship and postgraduate education. Nevertheless, Table 6 presents the combined picture of the number of students.

Table 6 – Distribution of pharmaceutical students by year (2008-2009)

Educational institution	1 st year	2 nd year	3 rd year	4 th year	5 th year	Intern	Total
S.Kh. Avdalbekyan National Institute of Health ⁵	0	0	0	0	0	0	0
YSMU	156	51	57	61	61	25	411
YSU	48	68	57	60	57	0	290
YSEU	0	0	18	16	0	16	50
Haybusak Yerevan University	19	24	30	42	25	0	140
Mehrabyan Yerevan Medical Institute after	16	25	46	7	0	0	94
Medical University named after Saint Teresa	3	0	0	3	2	0	8
Yerevan State Basic Medical College SNPO	200	200	0	0	0	0	400
“Grigoris” Medical-Humanities College	18	18	0	0	0	0	36
Yerevan State Medical College “Erebouni” SNPO of the MOH of RA	67	67	0	0	0	0	134
TOTAL	527	453	208	189	145	41	1563

As can be seen in the table, the total number of potential/future specialists of the pharmaceutical sector studying in educational institutions in Armenia is 1,563 students. There is one important caveat: the same courses of vocational institutions and universities are presented in a combined figure, although in reality these are qualitatively different people.⁶ Nevertheless, the total figure of students illustrates the approximate potential supply of pharmaceutical specialists.

Meantime, the type of education is also important. Secondary education may be enough for operators or middle management, but for higher positions, more educated and skillful specialists should be recruited.

⁵ The education at the National Institute is organized in a cyclic manner. Cycles last 5-7 weeks

⁶ Mehrabyan Yerevan Medical Institute - 1st course: 9 students at higher school and 7 students at college, 2nd course: 5 vs. 20, 3rd course: 6 vs.40. Yerevan State Engineering University - 4 students at the 1st course of the master course and 12 students at the 2nd master course.

Coefficient of applications and places available

Educational opportunities in the field of pharmaceutical science are another important issue to be discussed. Development of the pharmaceutical industry is going to create demand for qualified and skillful personnel. This demand can be met only by providing educational opportunities in pharmaceutical science.

Table 7 - Availability of educational places in pharmaceutical science institutions

Educational institutions	Coefficient of applications and places available		
	2006	2007	2008
Mkhitar Heratsi YSMU	0.6	0.6	1.4
YSU	1.2	1.2	0.8
YSEU	6.7	5.3	5.7
“Haybusak” Yerevan University	0.3	0.4	0.5
Mehrabyan Yerevan Medical Institute	2.2	1.0	1.3
Saint Teresa Medical University	1.0	1.0	0.2
Yerevan State Basic Medical College ⁷	1.0	1.0	1.0
“Grigoris” Medical-Humanities College	1.5	1.5	1.5
Erebouni Yerevan State Medical College	1.0	1.2	1.0
Average	1.08	1.04	1.15

The average coefficients⁸ of the availability of educational places at educational institutions are unexpectedly low. Bold coefficients mean that on average the demand for a pharmaceutical education is almost adequate to supply. Obviously, the coefficient is different for different educational institutions. Some institutions, such as YSEU, Mehrabyan Yerevan Medical Institute, Grigoris Medical-Humanities College cannot satisfy demand. For other institutions that are more well-known, we see a significant shortage of applicants. Authoritative institutions such as YSMU, YSU, and Haybusak are not able to fill classes. The only reasonable explanation for the situation is the high cost of the education—only a very small number of educational places are free.

Another conclusion can also be drawn from the figures in the table. Pharmaceutical education is not required in Armenia as primary education. Applicants prefer to apply for other specialties and mark pharmaceutical science as a secondary alternative.

At the same time, there is another important point regarding pharmaceutical education. The overwhelming majority of students of pharmacy schools do not even consider working at pharmaceutical enterprises. They prefer work in pharmacies, where the work is easier, safer, and better paid. Specialists do not have good career opportunities at pharmacies, but the majority prefer the better conditions at pharmacies.

⁷ Figures are estimates.

⁸ Number of applicants was divided by the number of places at educational institutions

Decision of the number of educational places

Results of the assessment show that the number of educational places in pharmacy schools in Armenian institutions has no relation to industry requirements. Educational institutions operate separately, under the strict control of state regulatory authorities. Decision making about the number of educational places is made by license issued by the Ministry of the Education and Science of Armenia. The ministry makes licensing decisions based on the capacity of the institution—i.e., availability of classrooms and infrastructure, laboratories and equipment. The only decision maker is the ministry, and the industry has no chance to influence decisions. Fortunately, there is no notable gap between the number of places at educational institutions and the number of applications.

In ideal format, the licensing procedure could consider also the market conjuncture while opening educational places for certain institutions. The industry may not need so many professionals of a specific specialty, and preparation of those specialists may turn to be a waste of time and resources. Meantime, evaluating the real demand for pharmacists in Armenia would be difficult for the following reasons:

- a) Estimation of the market conjuncture is a subjective process. Educational institutions may have their own understanding of the market.⁹
- b) There are hundreds of pharmacies in Armenia and they express a demand for pharmacists.

Number of students graduating from educational institutions in a five-year perspective

Information on the number of students that will graduate their educational institutions in the next 12 months and over the next five years is important for comparing demand of pharmaceutical enterprises and supply of qualified labor from educational institutions. As mentioned above, pharmaceutical enterprises stated their demand for new employees in 2009 to be 170 specialists; over five years, total demand will be at least 410 employees.¹⁰ The supply of qualified labor is presented in Table 8.

Table 8 - Projection of the number of students graduating pharmaceutical faculties in coming 5 years

Educational institutions	2009	2010	2011	2012	2013	Total
Mkhitar Heratsi Yerevan State Medical University	61	61	55	50	150	377
YSU	57	60	57	68	48	290
YSEU	17	17	20	20	20	94
“Haybusak” Yerevan University	25	42	30	24	19	140
Mehrabyan Yerevan Medical Institute	10	15	20	25	25	95
Saint Teresa Medical University	2	3	10	10	10	35
Yerevan State Basic Medical College	200	200	200	200	200	1000
Grigoris Medical-Humanities College	18	18	20	20	20	96
Erebouni Yerevan State Medical College	62	77	85	90	100	414
TOTAL	452	493	497	507	592	2541

⁹ In this situation educational institutions have financial interest. They offer their services for pay regardless of the labor market's demand for certain specialists.

¹⁰ Five pharmaceutical enterprises will need 240 employees in the period of 2–4 years. 170 + 240 = 410 employees

Making unambiguous judgments about the adequacy of the labor supply for pharmaceutical enterprises is difficult. At first sight, supply meets demand, the demand that will be expressed by pharmacies is unknown. Second, pharmaceutical enterprises require not only pharmacologists, pharmaceutical scientists, chemists, and technologists, but also marketing specialists, engineers, and managers. The latter staff should not necessarily have medical educations.

4.2.3. Curricula suggested at educational institutions

Adequacy of current curricula for the current context

During interviews with the managers of pharmaceutical enterprises they were asked about the sufficiency and adequacy of educational programs and curricula. The majority of respondents were strongly dissatisfied with the current educational system and suggested immediate changes to it. We also sought the opinions of representatives of educational institutions on the topic.

As could be easily predicted, educational institutions are confident that the current curricula and disciplines meet the requirements of industry. Nine of 10 respondents replied that the education provided to students was adequate to meet the current needs of the pharmaceutical community. Only the YSEU representative expressed a different opinion, for the following reasons: lack of theoretical and practical classes,¹¹ insufficiency of technical conditions and laboratory facilities, and a lack of modern literature and knowledge exchange.

Some managers of pharmaceutical enterprises complained that educational programs and curricula have not changed for 30 years. Representatives of almost all educational institutions stated that their curricula were adopted in 2005 and have changed slightly, i.e. were broadened a little in the past two to three years. According to regulations, educational institutions are allowed to make up to 15% changes in curricula while staying within the framework of allowed characteristics defined by state authorities.

Only one respondent noted that the YSEU curriculum was inadequate, and the perceived negative changes arose from the transformation to the Bologna system of education. Some disciplines were amended to master's programs, which, according to the respondent, lowered the quality of education at the bachelor's level.

Need for curricula modifications

Although the majority of educational institutions are happy with the disciplines and curricula they teach, all the institutions understand that from time to time change is necessary. In some institutions, curricula are reviewed for modification every five years; in others modifications are made only every nine years. At the same time, slight changes may be made almost every year. This means that educational institutions are in fact flexible.

Curricula modification in almost all cases means amending some disciplines and introducing new ones. Respondents named about 10 disciplines (in chemistry, biology, pharmaceutical science) that they plan to introduce to improve curricula and the quality of education. The National Institute of Health is going to introduce GMP education for postgraduate students and interns.

Availability of qualified lecturers

Training of specialists depends on the availability of resources. The most important resource in this process is the lecturer. All representatives of educational institutions replied that they have a sufficient number of qualified lecturers for organizing the educational process.

As with curricula, there were discrepancies between the answers of the representatives of educational institutions and those of the managers of pharmaceutical enterprises. The managers of pharmaceutical enterprises think that lecturers at educational institutions are more theoreticians and students need more practical classes, as well as problem- and project-based learning—hence the need for cooperation between academic institutions and industry. Universities do not have production facilities and students can get experience only in industry.

¹¹ Time factor

4.2.4. Relationships with the pharmaceutical industry

Cooperation

Cooperation between Armenian pharmaceutical enterprises and educational institutions is one of the most important topics of the current assessment. From the analysis of the pharmaceutical enterprise managers' answers we found that cooperation is weak and restricted to providing practicum and internships to students. The answers of representatives of educational institutions are more encouraging.

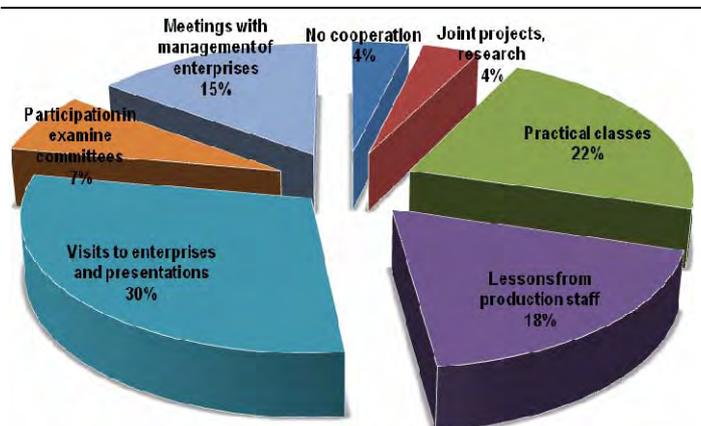


Chart 5 – Cooperation between pharmaceutical enterprises and educational institutions

Only 1 of 10 respondents admitted that they have no cooperation with pharmaceutical enterprises. They train pharmacists to work in pharmacies. Others seemingly often have a kind of cooperation.

As can be seen from the chart, *Visits to pharmaceutical enterprises* are the most practiced type of cooperation. Meantime, the regularity of visits is more important. Visits can be organized and paid much more often and not to the same company.

Practical classes and on-site training (lessons from production staff) are the next most common answers. Some enterprises charge for these events, others provide

them for free. In some cases producers select the best students, organize special classes for them, and even pay them a stipend. Table 11 lists the cooperation between Armenian pharmaceutical producers and educational institutions.

Implementation of joint projects and research is the rarest type of cooperation. Educational institutions do not seek such cooperation intensively, and pharmaceutical enterprises are not ready to spend substantial financial resources and time¹² for that purpose. This inactivity is problematic, because in developed countries the close cooperation between producers and scientific/educational institutions in research projects is a prerequisite for the development of both counterparts.

Effectiveness of cooperation

Representatives of educational institutions think that cooperation with pharmaceutical producers is very effective and useful for their students. All respondents expressed their satisfaction with results of actual cooperation—practical classes, visits to enterprises, etc. They note that cooperation significantly contributes to developing experience and skills for students, justifying their theoretical knowledge with practical experience.

Although the representatives of educational institutions consider the current level of cooperation as very effective, we tend to hold another opinion. Cooperation is almost completely limited to the organization of practical classes for students. Moreover, this process has turned out to be somewhat like a responsibility instead of being a mutually beneficial process.

Assistance of students in getting employed

Finding employment and launching a career are problems for all graduates. The managers of educational institutions understand this and try to secure employment for their best students. Recommendations of educational institutions are valuable for the business community, and managers of both entities often keep close relations. Sometimes the employment of a student in Armenia is a matter of a simple phone call from the dean or other manager of an educational institution.

¹² Some producers even complain that students bother the production process and create problems. Furthermore, not all producers possess proper facilities for conducting practical classes at their production sites.

Not all educational institutions provide personal references. Many institutions have established special units that help students find jobs after graduation. For example, Mehrabyan Yerevan Medical Institute, Saint Teresa Medical University, and other institutions maintain close ties with a wide network of pharmacies. Yerevan State Basic Medical College SNPO and YSU cooperate with Yerevan CPF and Noki and provide them with qualified workers. Some educational institutions have gone further and established specialized career centers for their students.

Pharmaceutical industry influence on educational processes

The purpose of attempting to understand pharmaceutical enterprises' influence on educational processes is to evaluate the intensity of cooperation between producers and educational institutions. Although representatives of educational institutions claim close and effective cooperation, we agree more with producers' opinion: cooperation is simply marginal.

In fact, pharmaceutical enterprises have no real influence on education processes. Producers are allowed to apply for an educational place for a student that will not participate in entry competition. In fact, producers purchase educational places, if they need. In some cases, managers of enterprises are invited to participate in examination committees; sometimes producers are invited to discuss *minor modifications* in educational programs (mainly editing). These relations are a very tiny part of potential cooperation opportunities.

4.2.5. Awareness of the pharmaceutical industry

Awareness of educational institutions of Armenian producers of pharmaceuticals is the last indicator of the current assessment that characterizes the cooperation between these two types of entities. It would seem logical that all educational institutions that have pharmacy schools would be aware of local producers of pharmaceuticals. Unfortunately this is not true—only a few institutions are aware of producers.

APPENDIX

TABLE A-1. RESPONDENTS FROM PHARMACEUTICAL ENTERPRISES

NN	Name	Enterprise	Position
1.	Sergey Matevosyan	Liqvor	Director
2.	Vachagan Ghazaryan	Arpimed	General Director
3.	Siraz Matevosyan	Yerevan CPF	Director
4.	Hrach Minasyan	Esculap	Director
5.	Shahe Qasis	Medical-Horizon	Assistant Director
6.	Eduard Dilanyan	Vitamax-E	Director
7.	Gagik Alexanyan	Leyko-Alex	Director
8.	Suren Harutyunyan	Bizon-1	Director
9.	Gevorgyan Xachik	Hagenas	Director

TABLE A-2: RESPONDENTS FROM EDUCATIONAL INSTITUTIONS

NN	Name	Educational institution	Position
1.	Hasmik Hasratyan	Mkhitar Heratsi Yerevan State Medical University	Dean of Pharmacy Department
2.	Aida Avetisyan	Yerevan State University	Dean of Chemistry Department
3.	Geghetsik Hovhannisyanyan	State Engineering University of Armenia	Deputy Head of the Chemical Technologies Department
4.	Bogdan Gasparyan	"Haybusak" Yerevan University	Pro-rector (educational and scientific affairs)
5.	Larisa Hambarzumyan	Saint Teresa Medical University	Rector
6.	Luiza Mehrabyan	Mehrabyan Yerevan Medical Institute	Rector
7.	Donara Hakobyan	Yerevan N1 Medical College	Assistant Director (educational affairs)
8.	Marine Hayrapetyan	National Public Health Institute	Dean of Public Health Department
9.	Madlena Gevorgyan	Erebuni State Medical College	Assistant Director (educational affairs)
10.	Arthur Vardanyan	Grigoris Medical-Humanities College	Director

REFERENCES

1. GMP EU/WHO
2. <https://www.reed.co.uk/job-details/North-London/Production-Operator/?JobID=16972225&&set=7&sb=7&so=1&ProfileID=1341&lit=2>
3. <http://www.hirediversity.com>
4. <http://us.gsk.com/html/career/jobsearch.html>
5. https://careers.peopleclick.com/careerscp/client_bayer/
6. <http://careers.roche.com>
7. http://friendsreunitedjobs.co.uk/cgi-bin/vacdetails.pl?selection=929939944&src=search_channel_EMEN
8. <http://pharmaceutical.ie/jobseekers-details.cfm?ld=40115>
9. http://www.msd.com.pr/content/corporate/careers/search_jobs_outside.html
10. http://www.msd.com.pr/content/corporate/careers/search_jobs_outside.html
11. <http://careers.astrazeneca-us.com/azd/maine.d?s=5867DB59833D3D13E0440003BA74ACCF>
12. https://wyeth.recruitmax.com/MAIN/careerportal/Job_Profile.cfm?szOrderID=22111&szReturnToSearch=1&szWordsToHighlight
13. <http://lifescience.ie>
14. <http://www.biospace.com/jobs/seekersignin.aspx>
15. http://www.careerbuilder.com/JobSeeker/Jobs/RecommendedJobs.aspx?IPath=JELX&exjob=true&job_id=J8A5PH64MKBY38LCS50
16. http://www.learn4good.com/jobs/jobfind.php?action=find&jids%5B%5D=00&lids%5B%5D=00&cityid=000&bx_plng%5B%5D=0&bx_kwd=pharmaceutical&rdKeyw=1&bx_minsalary=&bx_maxsalary=&bx_lngids%5B%5D=-&rdLang=2&tids%5B%5D=0&posted=0&cmdSearch=%2B%2BSearch%2B%2B
17. <http://www.mybayerjob.de/en/sapiframe.html>
18. http://www.drugs.com/drug_pharmaceutical_company_employment_jobs.html
19. <http://www.elan.com/Careers/JobSearch/>
20. http://www.merck.com/careers/search_jobs/experienced.html
21. <http://www.sanofi-aventis.us/live/us/en/layout.jsp?scat=193F8DF4-6B89-4BB7-987C-DA04812D1EB4>
22. http://www.icejobs.com/effrecruiting_quest1.htm
23. <http://pharmaceutical.jobs.jobsearchsite.com/>
24. <http://www.eliasassociates.com/pharmaceutical.htm>
25. <http://www.hr-guide.com/cgi-local/search.cgi?q=pharma&p=025A>
26. <http://www.wikihow.com/Write-an-Effective-Job-Description>
27. <http://www.ewin.com/articles/jdq.htm>
28. <http://www.brandeis.edu/humanresources/forms/questionnaire.html>
29. <http://www.hr-guide.com/data/G022.htm>