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**Restructuring and development of doctoral studies in Azerbaijan
in line with requirements of European Higher Education area**

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**Comparative innovative Doctoral training principles,
schemes and development in Azerbaijan and Europe**

Report coordinated by *Universitat de Barcelona*



Erasmus+ - Key Action 2 - Capacity building in the field of higher education

Key Action 2: Cooperation for innovation and the exchange of good practices

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Forewords

NIZAMI is a Capacity Building project in the field of Doctoral studies that bridges Azeri and European Systems.

Strengthening international cooperation in research and development implies to have common objectives for doctoral education.

This report has been designed to give a concrete vision of the main gaps and how to reduce them to approximate both systems.

A clear understanding of the different national characteristics in doctoral education is an essential pre-requisite that has been previously completed through the two reports of work package 1.

This document does not pretend to be exhaustive, but to collect the main aspects not to forget when the so-called European model will be fully implemented in Azerbaijan.

Based on these aspects, the framework to reach the objective of NIZAMI will be culminated.

Disclaimer

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Executive summary

Doctoral studies at NIZAMI partnership universities aim to train the next generation of researchers to the highest skill levels to launch creative, critical and autonomous intellectual risk takers who will push back the frontiers of research. To achieve the common objectives its necessary to provide excellent training, preparing doctoral graduates for a variety of careers, adapting administrative structures and research to the specific requirements of the societies we serve.

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1. PRINCIPLES and RECOMMENDATIONS for INNOVATIVE DOCTORAL TRAINING

Both doctoral systems share the need to balance research excellence, knowledge creation for complex societal problem-solving and preparation of doctorate holders not only for academic careers but for professional links with the productive sector. Although none of the Azeri universities is integrated into the EUA-CDE (European University Association- Council for Doctoral Education), some of its well-known principles of Salzburg are fully assumed, in the same way and grade as they are in the European universities considered.

Among shared principles we can list:

1. **The core component of doctoral training is the advancement of knowledge through research**, recognising at the same time that doctoral training must meet the needs of an employment market that is wider than academia.
2. **Embedding in institutional strategies and policies:** universities/agencies/National Academy of Sciences need to assume responsibility for ensuring that the doctoral programmes and research training are designed to meet new challenges and include appropriate professional career development opportunities.
3. **Doctoral candidates as early stage researchers should** be recognized as professionals with rights, specifically as publication authors who make a key contribution to the creation of new knowledge.
4. **The crucial role of supervision and assessment:** in respect of individual doctoral candidates, arrangements for supervision and assessment should be based on a **transparent** framework of shared responsibilities between doctoral candidates, supervisors and HEIs (including other partners when necessary).
5. **Duration:** doctoral programmes should operate within appropriate time duration: (3 to 4 years fulltime as a rule in Europe), (in Azerbaijan: 3 years for Doctor of Philosophy (PhD) programs, 4 years for Doctor of Sciences (DS) programs, at a fulltime basis).
6. **The promotion of innovative structures:** to meet the challenge of interdisciplinary training and the development of **transferable skills**.
7. **Increasing mobility (triple I: Intersectoral, International and Interdisciplinary):** Doctoral programmes should seek to offer geographical as well as interdisciplinary and intersectoral mobility and international collaboration within an integrated framework of cooperation between universities and other partners. Two-way mobility counteracts “brain-loss” and benefit all actors.
8. **Ensuring appropriate funding.** High quality doctoral education requires adequate, sustainable and doctorate-specific funding schemes that aim at increasing the quality and capacity of the programmes. It is crucial to be aware of how the funding can lead to different career prospects.

Regarding Salzburg recommendations, analyzed universities of both systems are sharing the following:

- **The doctorate is and must be research based.** It is important to stress that training through research creates a certain mind-set for many sectors and careers, but it is cultivated by having done original research.
- **Supervision remains central to doctoral education.** Supervision is seen as a collective effort with clearly defined and written responsibilities (main supervisor, supervisory team, doctoral candidate, doctoral school, research group and the institution), leaving space for the individual development of the doctoral candidates.
- **Doctoral education is an institutional responsibility and requires a collective effort.** Assuming institutional responsibility does not happen without challenging some well established traditional practices and positions within our respective national academic cultures.
- **Autonomy** for the institution to choose mission and strategy and to set up the appropriate structures. Autonomy must secure the critical diversity needed to sustain an adequate environment for doctoral education.
- **Space for individual development** is recommended. Doctoral education obtains a large part of its value from the unique and individual paths that doctoral candidates take.
- Institution’s (universities/agencies/National Academy of Sciences) responsibilities include to **provide support structures for doctoral studies development**.

2. GOALS WHEN IMPLEMENTING AND DEVELOPING INNOVATIVE STRUCTURED DOCTORATES

Institutional Environment Attractiveness

Doctoral candidates should find good environmental conditions, facilities and resources (access to book collections, related periodicals or specialist publications, funding for attending meetings or congress, ...) to empower them to become independent researchers taking responsibility at an early stage for the scope, direction and progress of their project.

The importance of the working environment and working conditions for researchers is recognized, but the implementation is highly context dependent and influenced by the countries' historical, economic crisis, and economic backgrounds.

Research Excellence

New generations, specially the elite group, should be trained to become creative, critical and autonomous intellectual risk takers. The main reason for institutions to be concerned about research excellence is the need to maximize efficiency when allocating resources to research through different schemes. Measuring excellent research activities at doctorate, something considered mandatory, should include: impact, **openness** and attractiveness of the research and innovation system. Impact is more closely associated with knowledge production, while openness and attractiveness are more closely associated with institutional arrangements and interaction schemes.

Available **indicators** proposed by the Expert Group for the assessment of Research Excellence (WP3 Deliverable: Project ERA_MONITORING, 2012) could be easily implemented:

- 1a1 **Publications per 1000 researchers in public research**
- 1a2 **% Highly cited publications/ % publications**
- 1a3 **Average of relative citations (ARC)**
- 1a9 **Specialisation in publications in the fields of the Grand societal challenges**
- 1b5 **% Foreigners in doctoral programmes**
- 2a7 Specialisation in patenting in the fields of Grand social challenges
- 2b1 Public – private co-publications per million population
- 3b. Engagement with societal and political actors - Interaction schemes.

But also others like: gender distribution, incorporation of refugees or race equality should be included according local interest.

The promotion of equality and diversity is a key component of strategic doctorate. Robust interventions at the doctoral level are clearly critical for readdressing deeply entrenched issues that negatively impact our societies.

Interdisciplinary Research Options

Most global challenges, but especially those related to health, population aging and population dynamics, cultural diversity, religious tolerance, migration fluxes, environmental sustainability, climate change or the diminishing supply of natural resources, are by their very nature complex, and tackling them requires drawing on insights, perspectives and methodologies from across the entire research base.

Doctoral training must be embedded in an open research environment and culture to ensure that any appropriate opportunities for cross-fertilisation between disciplines can foster the necessary breadth and interdisciplinary approach.

The majority of institutions are in favour of facilitating interdisciplinarity and some have installed structures in doctoral training to promote it (e.g. interdisciplinary doctoral programmes). At other institutions interdisciplinarity comes more naturally to doctoral training (e.g. students working on interdisciplinary topics and choosing co-supervisors from other disciplines).

Existing legislation and accreditation criteria do not support the implementation of interdisciplinarity many times. Because interdisciplinarity is essential to the creation of new knowledge, the challenge is now to make interdisciplinarity a real force in universities while continuing to build on the strength of the disciplines.

Implementation of strategies such as:

- Interdisciplinary doctoral programs
- Rotation of doctoral candidates between fields before starting their PhD
- Institutional interdisciplinary research grants.
- Doctoral schools that are no longer mono-disciplinary
- Allow interaction between doctoral candidates and supervisors from different research fields.
- Interdisciplinary supervision committees
- Tailor-made course programmes, are considered feasible.

Quality Assurance

Standards and Guidelines for Quality Assurance already in application to any process in our institutions can be applied to doctoral education. However, it is necessary to focus on the spirit of doctorate and adjust them to specific contexts.

The common goal of quality assurance at doctoral level is to enhance the quality of the research environment as well as promoting transparent and accountable procedures for processes such as admission, supervision, awarding doctorate degree and career development.

Three levels of quality are usually considered:

1. Quality of structural, administrative and research environment aspects (in Departments, Institutes, Faculties, Schools, Programmes, ...)
2. Quality of programmes
3. Quality of the outputs.

Some institutions have shifted responsibility for doctoral education by implementing graduate/doctoral schools. Doctoral schools (in its two meanings within the set of NIZAMI universities) have introduced in practice transparent and formalised admission processes, as well as focused on monitoring and ensuring the progress of doctoral candidates, for example through individual study and research plans that are submitted for approval to relevant juries.

We have found, regarding admission, the most significant differences between both systems. The requirement of candidates passing written exams in Azerbaijan to prevent drop-outs, is substituted in European universities by a first year of trial/probation, after which the candidate may lose his/her status as a student of the corresponding program.

It is very important to address the intake of national and international PhD students (this one being very complex at Azerbaijan universities), transition from master's programmes to PhD programmes, and students' motivation for starting a PhD programme, which can change according to economic vicissitudes.

Matters that might affect doctorate engagement in our countries can be:

- Time limited positions, because of the research projects the positions pend on
- Difficulties in mobility for fieldwork, internships, conferences, study periods abroad, etc... for certain ethnic groups. Cultural acceptance in new environments can imply waste of time.
- Administrative barriers causing added mobility difficulties (visa, employment rules, ...)
- Issues for maternity – for students' stipend are often halted, particularly problematic for doctoral candidates (as students) on a visa
- Limitations due to religious observance if not previously considered
- Age discrimination in researcher recruitment
- Perception that academic career is the only option

- Disability limitations in the laboratory, archive or fieldwork.

Feedback mechanisms and quality enhancement measures that are not considered yet in the Azeri system are:

- Supervisors surveys and training
- Feedback meetings with candidates
- Mechanisms to collect the opinion of Doctoral candidates
- well-being of doctoral students
- Quality enhancement through academic incentives
- Quality reviews outcomes.

Providing professional development to supervisors is an institutional responsibility, whether organised through formal training or informal sharing of experiences among staff.

International networking

Doctoral training is per se international in nature and sufficient opportunities should be provided for doctoral candidates to engage internationally. This can be done, for example, through the recruitment of more international staff; the organisation of international workshops, research trips, conferences and summer schools; the development of joint doctoral programmes and co-tutelle arrangements, international publishing, etc.

We must pay attention to the differences observed in the definitions of what a joint doctorate is or is not in each of the systems.

The definitions internationally established for the different types of collaborations between universities are the following:

<p>Joint degree</p> <p>vs</p> <p>Double Degree</p>	<p>Joint degree: <u>One</u> diploma, jointly delivered by two institutions. One specific common curriculum combining complementary courses and training.</p> <p>A contractual agreement defines the content of the curriculum, the distribution of fees between the institutions according to their responsibilities.</p> <p>The joint diploma needs to be recognized by each national authority.</p>
	<p>Double degree: <u>Two</u> diplomas, delivered by each participating institution. Two curricula, with variable recognition of the courses by the partner institutions. A contractual agreement indicates which nationally recognized diplomas are concerned and mentions how registration fees are maintained/split/waived by the participating institutions.</p>
<p>Co-supervision</p> <p>vs</p> <p>Cotutelle</p>	<p>Co-supervision: 3rd cycle degree leading to <u>one</u> diploma delivered by one institution, with the scientific input of an external supervisor. Does not require time at the partner institution. Can be organized without contractual agreement.</p> <p>Cotutelle: 3rd cycle double degree, leading to <u>two</u> diplomas, each delivered by the participating institutions.</p> <p>It is a more structured form of co-supervision. The PhD candidate benefits from the guidance of two supervisors, one from each institution. It requires time for training and/or research at the partner institution (possibly as sandwich).</p> <p>The contractual agreement should also indicate the funding allowing for each supervisor (at least) to attend the final defense jury, and other potential meetings during the cotutelle.</p>
<p>Sandwich</p>	<p>Simply describes the time organization of the training: Usually, 1 year at home – 1 year at partner institution – 1 year at home.</p>

The need to interact with researchers from all over the world is recognised as a central feature of modern science/doctorate. International networking is actively encouraged in the majority of the doctoral programmes or schools.

The use of new technologies, such as teleconferences, e-learning, etc. should be implemented to foster the internationalisation of doctoral programmes.

The main barrier is the lack of funding. Administrative or regulatory burdens might also be demotivating, e.g. for dual degrees' implementation. The implication of the (main) supervisor(s) plays a significant role for the doctoral candidate to undertake or not international networking.

Depending on the age of the doctoral candidate, family responsibilities might also prevent him/her from going abroad.

Exposure to non-academic sectors (Administration, Industry ...)

In Computational Sciences, Medical Sciences or Chemistry, for instance, interactions with the productive sector are frequent, especially in form of Industrial Doctorates.

In countries with low degree of industry-university collaboration, industry representatives ask for a greater involvement of industry from the start of the doctoral education and during the definition of research topics, in order to improve the applicability of research to technical or scientific solutions. In the Social sciences and Humanities research fields, less importance until now have been assigned to interactions with non-academic partners.

The institutions acknowledged this point but not entirely, because they want to safeguard scientific independence. Firms' lack of 'preparedness' to adapt to the specific requirements of doctoral training is mentioned as a barrier here.

The presence of hightech companies in the region of the university facilitates the university-industry interaction and/or funding for research projects.

Good practices to enhance collaborations can be:

- Presence of a science park/Incubator.
- Establishment of an Innovation Academy for innovation and entrepreneurship training
- Organisation of (job) fairs with industry.
- In social sciences, establishment of links through informal & formal collaborations or courses from state agencies or the government.
- Allowing for the participation of an external co-supervisor in the doctoral committee.
- Special funding schemes for 'industrial doctorates'/collaboration with industry.

Professional development (transferable skills training) in and outside academia

There is often a lack of structural framework, although in many cases the development is ongoing but reduced to a limited set of topics such as presentation and writing skills. In few cases, The majority of institutions recognise nevertheless the value of these types of skills.

Regarding *research training* the skills try to:

- Strengthen the impact of training across and within disciplines and sectors
- Promote the development of interdisciplinary skills in the research base and inter-sectoral mobility
- Support the professional development of researchers at all career stages and articulate clear expectations regarding postgraduate training, but there is a lack about professional development and equality and diversity
- Provide new and more robust evidence of the impact of research training on the wider

economy using methods such as case studies and citizen science.

- o And recently, provide Open Science principles and the OS aspects that follow as part of doctoral education.
 - *Publication*: ways of open access publishing (green, gold, etc.) – OS journals - costs – incentives
 - *Data*: Data management plans – where/how to deposit – data curation – data citation – FAIR principles
 - *Citizen science*: engaging citizens (non-professional researchers) in academic research
 - *Stakeholder engagement*
 - *Research integrity*.

It is necessary to work deeply and jointly on the following skill areas and aspects collected from studies conducted in the Anglo-Saxon world that doctoral students and postdocs need to develop:

- A. *Knowledge and Engagement*: Knowledge base, cognitive abilities, creativity
- B. *Personal effectiveness*: personal qualities, self-management, career development
- C. *Research Governance*: Professional conduct, research management, finance funding and resources
- D. *Engagement and Impact*: Working with others, communications and dissemination, engagement and impact

Personal and professional management desirable skills:

- ✓ Persist in achieving long-term goals
- ✓ Manage projects with uncertain outcomes in diverse settings and organisations
- ✓ Be self-motivated and autonomous
- ✓ Work to achieve results with minimum supervision
- ✓ Be flexible and adaptable in approaching complex and uncertain problems
- ✓ Communicate very complex concepts
- ✓ Network internationally
- ✓ Working in teams
- ✓ Speak and present effectively in public.

As research leaders our doctorates will need to be looking into future needs to identify new fruitful research areas that will make an impact:

1. Broaden their research perspectives and explore new research areas particularly through crossing disciplines to tackle societal challenges
2. Strategic thinking and developing road-maps
3. Demonstrate the ability to think independently to develop new major research lines that are realistically deliverable and will have impact

Learning to lead the business of research and innovation across society:

4. Financial management, grant getting (from sources internal to an organisation as well as external sources), exploring varied funding sources (venture capital, crowdsourcing etc.)
5. How to pitch ideas, influence others and negotiate their stance
6. Advanced public impact and engagement skills
7. Understand and support intercultural perspectives (in society's research needs and fears and also within research teams)

Learning the business of research management

8. How to deliver on multiple projects
9. Legal obligations
10. (Team) Leadership and management skills – including the adoption of a coaching style
11. How recruiting is done and used to build teams and expertise
12. How to mentor others and support career objectives

Communication of ideas and building working practices both within academic and outside:

13. Teaching and facilitation skills

3. IMPLEMENTATION ISSUES

Specific socio-economic context

It is clear that national and regional policies but also the economic context play a crucial role in the implementation at the institutional level. The policy context determines, among other things, the degree of autonomy and flexibility of the institutions, the vision and emphasis given to doctoral training and the funding available to shape doctoral training and attract national and foreign doctoral candidates. This observation also links to the importance of a number of factors exogenous to the institution that play a crucial role in the organisation of doctoral training and implementation of the principles: funding, regulatory stability, economic structure, or admission distribution quota among universities.

Funding mechanisms, level of funding assigned to doctoral training, and stability of this funding, are all factors that determine everywhere the sustainability of the organisation of doctoral training according to the principles, but also the overall attractiveness of doctoral training.

Funding is encountered in different forms with different options and obligations:

- Stipends and scholarships usually offer the largest freedom for the doctoral candidate but are often the lowest funding and sometimes lack close link to the social security system.
- University contracts offer generally more security but might come with teaching obligations or similar duties (administration, organization, supervision).
- Payment per supervision (only in Azerbaijan).
- Research funding from EU projects, science foundations or academies are usually linked to specific research projects, thus having influence on the choice of the topic and the research plan.
- Third party founding from the private sector to support ground research is rare. While contracts with companies are usually the best-paid option, influences of the employer on the project and priority of research lines as well as publication restrictions must be negotiated thoroughly by the project leader/supervisor to make this funding line viable for doctoral projects and their need of free research and open publication.

The level and number of stipends/scholarships/contracts and the quality of the infrastructure are important factors for creating an attractive institutional environment. They depend heavily on the level of funding attributed to research by the government, which is not the case in Azerbaijan.

The quality/excellence of research also depends on funding in that respect, for example through modern infrastructures, access to international publications and libraries, attraction of excellent researchers as doctoral supervisors and teachers, etc.

Schemes for international mobility and transferable skills training seem most vulnerable to budgets cuts. For transferable skills training, insufficient funding often results in the lack of structured approach, lack of high-level specialist teachers, or postponement of the transferable skills training programme.

Among other issues, the lack of a long-term vision plays against sustainability of the programmes. In Azerbaijan, relevant doctoral policy makers have been distributed over several ministries or government bodies that did not guarantee good communication schemes in the past. Bureaucracy and administrative burden related to rigid legislative systems are potential barriers to the implementation of the principles of structured doctorate that must be taken into account.

Regarding academia-productive sector interactions, there should be more mechanisms in place to make research relevant to non-academic sectors. Examples mentioned are stronger involvement of industry representatives in the doctoral education phase, instead of only in the examination committee (that is not provided in Azeri universities), monitoring and rewarding of applications of their research, patents, etc.

Facing academic culture against changes

The education system is everywhere usually rather conservative: supervisors, university administration and deans object harsh changes in well-established education procedures, making it hard for innovators to implement new structures, principles, etc. This inertia is double-edged: while it successfully forms a barrier against changes resulting from fast trends, it also leads to resistance against reforms such as those inspired by the Innovative Doctoral Training Principles.

Until now, supervisors have been the maximum and only authority against the doctoral students. The relationship between supervisor and PhD student is complex; and when this relationship is neither effective nor efficient, it may yield negative consequences, such as academic failure. Therefore, structured doctorates try to reinforce successfully both parts of the main equation. Structured doctoral programmes often have a strong international orientation that goes beyond the mere relationship between supervisor – PhD student.

The role of a successful change management cannot be over-emphasized in this regard. Involving all stakeholders in the process and implementing new regulations transparently with the support of the majority of the participants is a key step towards success against old habits.

Consensual stages until the achievement of the objectives

- Enhancing the quality and relevance of researching and supervising;
- Fostering the employability of doctorates throughout their working lives;
- Making systems more inclusive;
- Implementing agreed structural reforms.

Terminal objectives

On the Azeri side, the aim is to facilitate mobility of PhD students, and staff; European universities add to prepare students for their future careers and for life as active citizens in democratic societies, and support their personal development; offer broad access to the higher education level, based on democratic principles and academic freedom.

The process as well as the selection of terminal objectives must be, according to our experience in Europe, a collective effort of public authorities, universities, staff, and students, together with stakeholder associations, employers, quality assurance agencies, international organisations, and institutions in charge.

4. CONCLUSIONS

Challenges to face jointly

- Including structured skills training to individual supervision, guidance and autonomous research
- Creating critical mass (of bright, ambitious scholars, but also refers to the minimum number of candidates necessary for programmes sustainability) whilst recognizing different cultures, needs and expectations of different disciplinary groups (sciences vs. social sciences);
- Efficiency in terms of time to degree vs. allowing individual development;
- (Mis-) matching of supply of researchers and demand for researchers;
- Level of academic education vs. skills for future career development outside academia;
- Skills for immediate employability vs. skills that will aid progression through the course of the career;
- Specialized individual skills vs. wider academic and generic skills;
- Thesis modality (articles vs thesis monography);
- Quality vs. Quantity. Early quality or quantity can attract resources that foster both;
- Conflicts resolution;
- Commitment to address and prevent misconducts;
- Mutual recognition of academic diplomas.