

ESG Standards and Guidelines and Information Management at Higher Education Institutions in Croatia

TAMARA ČENDO METZINGER, DAMIR BORAS

Abstract—Higher education institutions are becoming increasingly aware of the importance of establishing and assuring the quality system in the area of higher education. In the European higher education area the quality assurance, assessment of the work quality and achieved results at the higher education institutions is based on the European standards and guidelines (ESG). In order to achieve the high quality level, the higher education institutions have to permanently collect and analyse information about the study programmes, teaching and administrative staff, satisfaction of students and other stakeholders of the higher education institutions. Relevant information represent thus one of the most important resources of the higher education institutions and are an inevitable factor of success and development with information management imposed as imperative. Collecting, analysing, using and exchange of all relevant information among all the system stakeholders in order to realize the strategic objectives and quality assurance of the higher education institutions are particularly processed by ESG standards related to information systems and public information. Therefore, the purpose of this paper is to research the importance and the role of information management at the higher education institutions in the Republic of Croatia regarding the level of development of ESG standards which refer to the access to information of the quality assurance system and public information.

Keywords— ESG standards, higher education institutions, information management, quality assurance

I. INTRODUCTION

OVER the last ten years there has been a growing interest in the field of higher education for establishing quality management systems. Higher education institutions are facing increasing competitiveness in the area of higher education as well as requirements for continuous improvement of quality of their services and activities [1] with the aim of meeting the society needs. Moreover, the role and significance of higher education is becoming a component of the social policies of many countries that base their development on the improvement of higher education institutions and creation of the knowledge society. Education is becoming a generator of success and solutions of economic problems, and well

educated and qualified people are the crucial factor in creating, sharing, dissemination and efficient usage of knowledge [2]. In that sense the concern for quality is at the heart of higher education institutions [3]. They are becoming increasingly aware of the importance of assuring and proving the quality of their study programmes, infrastructure, quality of the teaching and administrative staff and the satisfaction of the students and stakeholders.

Quality in higher education is a multi-dimensional and dynamic term which is related to the context of the education model, mission and goals of the institution and to specific standards of the system, institutions, programmes or disciplines [4].

The quality of higher education institutions and higher education forms the backbone of the idea regarding the creation of the European Higher Education Area. The idea was initiated in Bologna in 1999 at the Conference of Ministers of Higher Education. At the meetings in Prague in 2001 and Berlin in 2003, the need and importance of the development of common criteria and quality assurance methodologies were highlighted which contributed also to the establishment of the European Association of Quality Assurance Agencies (ENQA) with the aim of mutual exchange of information on quality and quality assurance at the European and global level among higher education institutions and quality assurance agencies [5].

Every higher education institution is responsible for the development of quality culture [6] i.e. establishment and implementation of procedures, techniques and activities in compliance with the set objectives of quality assurance.

The reforms in the system of higher education in the Republic of Croatia have begun after signing of the Bologna Declaration in 2001, in order to adapt the higher education system with other signatories of the Bologna Declaration and to create an identifiable and compatible European higher education area accepting the principle according to which the higher education institutions are the primary ones responsible for the quality of their activities [7]. Quality assurance at higher education institutions includes a series of complex activities. This is a permanent, continuous process of estimating the quality of the higher education system, institution, or study programme which provides data and estimate through generally accepted, consistent process and by means of the precisely determined criteria [4]. The assessment of the quality

T. Cendo Metzinger is a postgraduate student at the Department of Information and Communication Sciences, Faculty of Humanities and Social Sciences, University of Zagreb, Croatia (tamara.cendo-metzinger@vvg.hr)

D. Boras is a dean of the Faculty of Humanities and Social Sciences and full professor at the Department of Information and Communication Sciences, Faculty of Humanities and Social Sciences, University of Zagreb, Croatia (dboras@ffzg.hr)

of work and the achieved results of higher education institutions is performed in compliance with the regulations and accepted Standards and guidelines for Quality Assurance in the European Higher Education Area (ESG – European Standards and Guidelines) developed by the European Association for Quality Assurance in Higher Education (ENQA), the European University Association (EUA), the European Students' Union (ESU) and the European Association of Institutions in Higher Education (EURASHE) in 2005.

Considering the social, cultural, and linguistic diversity in the European Higher Education Area, the European Standards and Guidelines represent the agreed set of procedures and guidelines for quality assurance, applicable to all the higher education institutions in Europe regardless of the actual diversities.

In Croatia, the Act on Quality Assurance in Science and Higher Education, adopted in 2009, prescribes ESG standards for establishing quality assurance systems in higher education [7].

ESG Standards and Guidelines are presented in Table 1 [8].

Table 1 European Standards and Guidelines

ESG Standards and Guidelines
1.1. Policy and procedures for quality assurance: Institutions should have a policy and associated procedures for the assurance of the quality and standards of their programmes and awards.
1.2. Approval, monitoring and periodic review of programmes and awards: Institutions should have formal mechanisms for the approval, periodic review and monitoring of their programmes and awards.
1.3. Assessment of students: Students should be assessed using published criteria, regulations and procedures which are applied consistently.
1.4. Quality assurance of teaching staff: Institutions should have ways of satisfying themselves that staff involved with the teaching of students are qualified and competent to do so. They should be available to those undertaking external reviews, and commented upon in reports.
1.5. Learning resources and student support: Institutions should ensure that the resources available for the support of student learning are adequate and appropriate for each programme offered.
1.6. Information systems: Institutions should ensure that they collect, analyse and use relevant information for the effective management of their programmes of study and other activities.
1.7. Public information: Institutions should regularly publish up to date, impartial and objective information, both quantitative and qualitative, about the programmes and awards they are offering.

These standards and guidelines cover the key areas of quality assurance and monitoring the work of higher education institutions, which are related to the establishment of quality assurance procedures, monitoring and evaluation of the programmes and qualifications, student assessment, quality assurance of the teaching staff, resources for study and student support, as well as the development of information systems and public information.

Still, the assessment of the quality of work and achievement of the set goals of higher education institutions can be done only if the higher education institutions have access to relevant information about their own activities, needs, and satisfaction of all the stakeholders, as well as information about the opportunities and threats from the environment.

The timely obtained, full and accurate information form the basis for making high-quality decisions, and are thus becoming the base for achieving the mission, vision and strategic objectives.

The key role is on permanent improvement of information processes, i.e. different methods of insuring the necessary information [9]. For this purpose the higher education institutions have to ensure effective information management, i.e. gathering, analysis, usage and exchange of all relevant pieces of information with internal and external system stakeholders.

These aspects of quality assurance are specially processed by the ESG standards related to the Information systems and Public information.

The purpose of this paper is to analyse the importance and the role of information management at higher education institutions in the Republic of Croatia regarding the level of development of ESG standards which refer to the access to information of the quality assurance system and public information.

II. QUALITY ASSURANCE AND INFORMATION MANAGEMENT

Information represent one of the most important resources in all organizational systems. They are intended for decision-makers and they are an important factor in the decision-making process. They represent the connecting tissue since they connect different parts of organizational systems, different functions and processes and they provide efficient coordination and control of the functioning of the entire organization [10]. Most institutions, whether public, academic, commercial or private, have their own arrangements for managing information [11].

Information and information management are important factors in establishing as well as in continuous improvement of the quality assurance system. Regardless of whether this refers to corporate organizations, higher education institutions, hospitals, government agencies or not-for-profit organizations, incomplete, poor and delayed information, as well as absence thereof represents the main threat to the quality assurance system.

To provide the necessary information at the right time to the

right users is the basic task of information management. The information includes data, meaning, and context. Data represent the content of information, and the information acquires meaning when it is set into a certain context. The meaning is important since only meaningful information can insure purposeful action [12].

The technologically oriented information management, namely, places emphasis on the information systems based on the application of the computer which form the basis for data exchange in the system and emphasise the importance of application of information technologies in the realization of the set goals of the organization. On the other hand, the content-oriented information management places the emphasis on contents and information users, giving special importance to the gathering of information from the external environment, and does not limit the information systems only to the application of computers but rather to the way in which people handle information in reality [13].

Efficient information management requires an integration of these approaches. Starting, namely, from the assumption that the information is data that eliminate a certain amount of uncertainty and assist in decision-making, the building of information systems that have to satisfy the needs of their users, provide gathering, storing, analysing, usage and exchange of all relevant information from the internal and external environment through the application of advanced information technologies with the aim of improving the quality of work and achieving of the set strategic goals, is an imperative.

Because of that, information management must involve the following tasks:

- ensuring that each member of the organization has access to the information they need;
- ensuring that members of the organizations can easily communicate with each other;
- setting up systems for storing, organizing and retrieving internally generated documents;
- storing in-house information;
- disseminating new information to those who need to be aware [11].

Quality assurance is a methodology for judging the degree to which organisational aims, objectives and outcomes have been achieved [14].

The European Standards and Guidelines for internal and external quality assurance of higher education have been developed for the needs of higher education institutions and quality assurance agencies and cover the key areas related to the quality and standards. Their task is to assist the higher education institutions in quality management, stimulate the development of higher education institutions and development of quality assurance culture, and contribute to the creation of a common reference frame to provide higher education and quality assurance within the European Higher Education Area [8].

The assessment of the level of development and efficiency

of the quality assurance system according to ESG standards is the backbone for the determination of the positions of higher education institutions, and it is not possible without relevant information about the higher education institution itself, its mission and vision, strategic goals, quality of study programmes, teaching and administrative staff, satisfaction of students and other stakeholders.

In this sense, the higher education institutions should pay special attention to the establishment of information systems for gathering, storing, searching, using and exchanging information from the internal and external environment among all stakeholders in order to achieve the strategic goals of the higher education institutions, satisfaction of the needs of stakeholders and continuous improvement of the quality assurance system.

A. ESG standards - Information systems and Public information

Information systems form a structured interconnected unit of people, machines, and procedures planned to generate a continuous flow of relevant information gathered from the internal and external environment serving as the basis for decision-making [15]. It is precisely because today numerous information are available, that only well-thought and high-quality information systems can ensure support in decision-making [16].

L. Lukas, L. Necesal and A. Paduchova [17] stressed that the goal of information systems is in the information support to users in the performance of their activities and that the level of this support is determined by the quality of information system and by the skill of the user to use information in order to realize the performed operations.

Their task is to ensure gathering, storing, searching, using, and exchange of information among all users in the system.

ESG standard which refers to Information systems emphasises that the higher education institutions have to gather, analyze, and use relevant information for efficient management of their study programmes and activities. This means that the information systems at higher education institutions have to include:

- information about progression and pass rate of students;
- opportunities for their employment after the completion of the study programme;
- satisfaction of students with the study programmes;
- efficiency of the teaching staff;
- profile of student population;
- available resources for studying and their price;
- key indicators of the efficiency of the higher education institution [8].

ESG standard which refers to Public information starts from the importance of the regular publication of the latest, impartial and objective qualitative and quantitative information about the study programmes and qualifications. The information published by the higher education institutions have to be precise, complete, adequate, and timely.

Based on the published data obtained by external audit of the quality assurance system of higher education institutions in the Republic of Croatia further in the text the level of development of the ESG standards which refer to the information systems and public information at higher education institutions in Croatia will be presented.

III. ANALYSIS OF THE LEVEL OF DEVELOPMENT OF ESG STANDARDS – INFORMATION SYSTEMS AND PUBLIC INFORMATION AT HIGHER EDUCATION INSTITUTIONS IN CROATIA

External audit of the quality assurance system of the higher education institutions in Croatia has been performed since 2010 in Croatia. This procedure is used to assess the compliance of the activities and the work of the higher education institutions with the accepted European Standards and Guidelines.

External audit of the quality assurance system at higher education institutions is performed by the Committee of the Agency for Science and Higher Education. After a period of follow-up monitoring, the results of the assessment are presented in the final reports and published on the Agency for Science and Higher Education website.

In the period from 2010 till the end of 2012, external audit of the quality system was performed at 21 higher education institutions, and after the follow-up period, the final reports about the performed procedure of external audit of the quality system were published for 17 higher education institutions in the Republic of Croatia. In 2010, the reports for three higher education institutions (17.65%) were published and these meant the completion of the external audit of the quality system. In 2011 external audit of the quality system encompassed nine higher education institutions, and eight reports (47.06%) were published. In 2012 external audit was performed at nine higher education institutions, whereas final reports were published for six of them (35.29%) (Fig. 1).

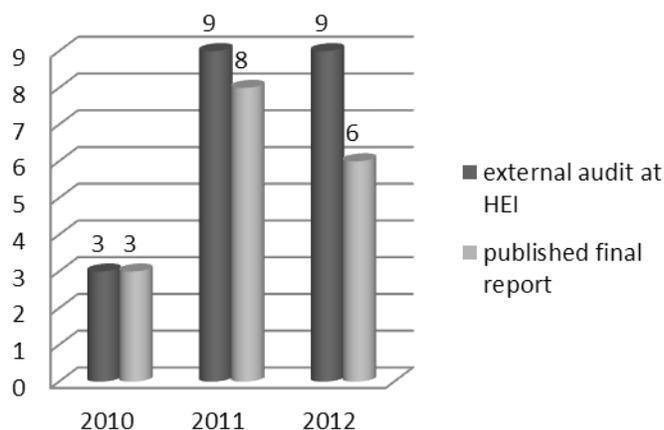


Fig. 1 External audit at HEI and published final reports

Table 2 contains data about the higher education institutions at which the external audit procedure has been completed and which are included in the analysis of the level of development of the ESG standards Information systems and Public

information.

Table 2 Names of higher education institutions at which the external audit procedure of quality assurance has been performed

Higher education institution	Year of audit
Faculty of Civil Engineering in Osijek	2010
Faculty of Humanities and Social Sciences in Osijek	2010
Faculty of Metallurgy in Sisak	2010
College of Agriculture at Križevci	2011
Faculty of Engineering University of Rijeka	2011
Faculty of Electrical Engineering and Computing University of Zagreb	2011
Algebra - University College for Applied Computer Engineering	2011
Academy of Applied Arts University of Rijeka	2011
Faculty of Organization and Informatics in Varaždin University of Zagreb	2011
Faculty of Medicine University of Zagreb	2011
University of Dubrovnik	2011
University Juraj Dobrila in Pula	2012
University of Applied Sciences in Rijeka	2012
University of Rijeka	2012
University of Zadar	2012
University J.J.Strossmayer in Osijek	2012
University of Applied Sciences in Požega	2012

External audit of the quality system encompassed five universities and their constituents (29.41%), eight faculties (47.06%), two colleges (11.77%) and two universities of applied sciences (11.77%) (Fig.2).

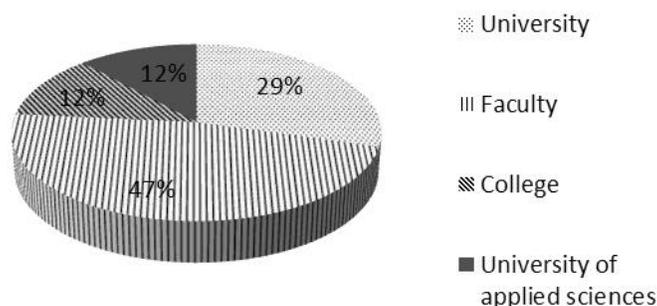


Fig. 2 Type of HEI in which external audit was performed

The quality assurance system audit has been developed on the basis of the criteria for assessing the level of development and efficiency of the quality system of higher education institutions in compliance with the Standards and Guidelines

for quality assurance in the European Higher Education Area. These criteria are the starting point for determining the actual position of the quality assurance system at higher education institutions.

The criteria for assessing the level of development and efficiency of the quality assurance system at higher education institutions in the Republic of Croatia for ESG standards Information systems and Public information are described in Table 3 and Table 4 [18].

In case when a higher education institution is in between two phases, for the assessment of the level of development of an individual ESG standard also the transition phases are used, phases between preparation and initial phase, initial and developed phase, and developed and advanced phase.

Table 3 Criteria for assessing the level of development and efficiency of QA systems at HEI in the Republic of Croatia (ESG standard 1.6)

ESG standard - Information Systems (1.6) Importance and availability of QA system data	
Preliminary phase	Quality Assurance does not provide any information on system and institution to the stakeholders.
Initial phase	There is no systematic gathering and processing of data. Data are only partially available to internal and external stakeholders. Use of information for planning and continuous development of QA system is unsystematic.
Developed phase	Relevant information is available to all the stakeholders and mainly used for planning and continuous development of QA system.
Advanced phase	Quality assurance system is entirely transparent. There is a systematic exchange of relevant information between all the stakeholders/parts of HEI. Relevant information is the basis for planning and continuous development of QA system.

The level of development of standard which refers to the information systems is estimated regarding the quality of information, method of their collection, exchange among internal and external stakeholders and their usage in the process of planning and continuous improvement of the quality assurance system.

The level of development of the standard Public information ranges from failure of publication to regular publication of relevant and unbiased information about the study programmes, work and activities of the higher education institutions.

Table 4 Criteria for assessing the level of development and efficiency of QA systems at HEI in the Republic of Croatia (ESG standard 1.7)

ESG standard - Public information (1.7)	
Preliminary phase	Institutions do not publish relevant, unbiased information on their programmes and educational levels.
Initial phase	Institutions only partially publish relevant, unbiased information on their programmes and educational levels.
Developed phase	Institutions often publish relevant, unbiased information on their programmes and educational levels.
Advanced phase	Institutions publish relevant, unbiased information on their programmes and educational levels on regular basis.

Based on the published final reports about the carried out procedures of external audits, the analysis of the level of development of ESG standards that refer to availability of information of the quality assurance system and public information at higher education institutions in Croatia has been performed.

The data about the level of development of ESG standard Information systems are presented in Table 5.

Table 5 Level of development of ESG standard Information systems at higher education institutions in Croatia

Criteria for Assessment	f	%
Preliminary phase	0	0
Initial phase	1	5.88
Initial - developed phase	6	35.29
Developed phase	8	47.06
Developed - advanced phase	2	11.77
Advanced phase	0	0
Total	17	100%

The obtained results indicate that at the majority of higher education institutions in Croatia – eight of them (47.06%), the ESG standard Information systems is in the developed phase. Six higher education institutions (35.29%) are in the transition from the initial to the developed phase of this standard, and two higher education institutions (11.77%) are at the transition from the developed into the advanced phase. The analysis of the published reports has determined that only at one higher education institution (5.88%) this ESG standard is in the initial phase (Fig.3). It has also been determined that there is no higher education institution included in the analysis at which ESG standard Information systems is either in the preliminary nor in an advanced phase. This shows that all the higher education institutions included in the analysis have established their own information systems, but there is still enough room remaining for their improvement and development.

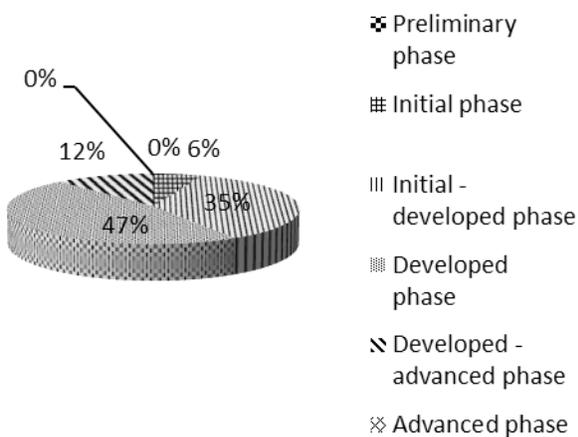


Fig. 3 Level of development – Information systems

With the aim of efficient management of study programmes and other activities, it is necessary for the higher education institutions to work systematically on the improvement of their information systems. Their task is to ensure systemic information collection about the characteristics of student population, their advancement and possibility of employment after completion of the study, success of the teaching staff and key indicators of success of higher education institutions. It is also very important that the higher education institutions ensure access to relevant information of all the system stakeholders and use the obtained information systematically and in an organized manner in the process of planning and defining of strategic goals.

It may be concluded that higher education institutions are aware of the importance of information management and that they are developing information systems that make it possible to gather, analyse and understand all the relevant information among all the stakeholders of the higher education institution.

Table 6 shows data about the level of development of ESG standard Public information.

Table 6 Level of development of ESG standard Public information at higher education institutions in Croatia

Criteria for Assessment	f	%
Preliminary phase	0	0
Initial phase	0	0
Initial - developed phase	1	5.88
Developed phase	7	41.18
Developed - advanced phase	3	17.65
Advanced phase	6	35.29
Total	17	100%

ESG standard related to Public information at the majority of higher education institutions encompassed by the analysis is in the developed phase (41.18%). 17.65% of analysed higher education institutions regarding this standard are in the transition from the developed into the advanced phase, and 35.29% are in the advanced phase. This standard is in the transition from the initial into the developed phase only at one higher education institution (Fig.4).

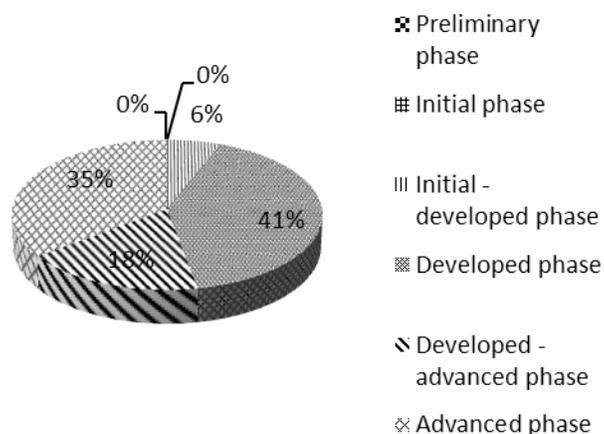


Fig.4 Level of development – Public information

This means that the higher education institutions are aware of the importance of regular, precise and objective information of the public about the study programmes, qualifications, and other activities of the higher education institution. Relevant information is regularly published by the higher education institutions.

To publish information about their activities, study programmes and competencies of graduated students, the higher education institutions use different information methods. Along with publishing of information on network sites, as the most common form of information, higher education institutions inform the public about their work and activities by participating at numerous professional, scientific and economic national and international conferences, by publishing brochures, leaflets, and other publications about the higher education institutions and by using the mass media (TV, radio, newspapers).

Higher education institutions should not use public information just for marketing purposes but rather with the aim of continuous management of the quality assurance system and by raising the awareness about the importance of the quality in the area of higher education area in all stakeholders of the higher education institution. Thus, public information acquires an important role in the construction of a positive image of a higher education institution and in creating a competitive edge.

By analysing the published final reports about the carried

out procedures of external audits of the quality assurance system the data have been obtained about the level of development of ESG standard 1.6. (Information systems) and 1.7 (Public information) at seventeen higher education institutions in the Republic of Croatia. These data are presented in Table 7.

Table 7 Level of development of ESG standards Information system and Public information at higher education institutions in Croatia

Criteria for Assessment	f	%
Initial/initial developed	1	5.88
Initial developed/initial developed	1	5.88
Initial developed/developed	4	23.53
Initial developed/developed advanced	1	5.88
Developed/developed	2	11.77
Developed/developed advanced	1	5.88
Developed/advanced	5	29.41
Developed advanced/developed advanced	1	5.88
Developed advanced/advanced	1	5.88
Total	17	100%

The obtained results show that at the majority of higher education institutions included in the analysis the ESG standard 1.6. is in the developed phase, whereas ESG standard 1.7. is in the advanced phase (29.41%). Four higher education institutions (23.53%) have the standard 1.6. in the transition from the initial to the developed phase, and standard 1.7 in the developed phase. At two higher education institutions both standards are in the developed phase (11.77%). At other higher education institutions included in the analysis the standards that refer to information systems and public information are as follows: initial phase and transition from initial to developed phase (5.88%), transition from initial to the developed and transition from the initial to the developed phase (5.88%), transition from the initial into the developed and transition from the developed into the advanced phase (5.88%), developed phase and transition from the developed into advanced phase (5.88%), transition from the developed into the advanced and transition from developed into the advanced phase (5.88%) and transition from developed into the advanced and advanced phase (5.88%) (Fig.5).

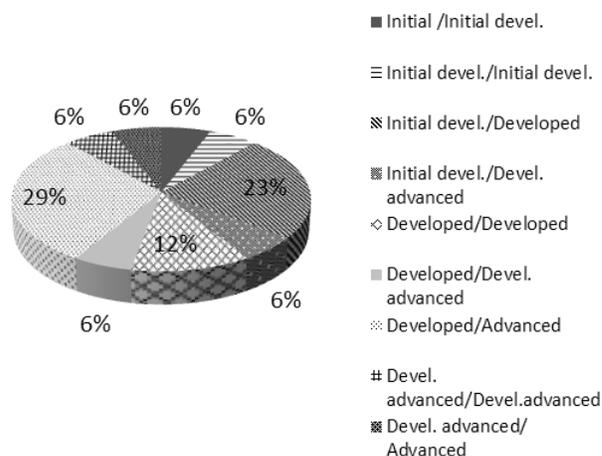


Fig. 5 Level of development – Information system and Public information

It may be concluded from the obtained data that ESG standard is related to Public information at all the higher education institutions included in the analysis at a higher level of development in relation to the standard of Information systems. Although higher education institutions have established different methods of collecting, analysing and using relevant information, with the aim of developing the system of quality assurance, their tendency has to be the achievement of a higher level of development of their own information systems.

IV. CONCLUSION

During the recent decade increasing importance is placed on achieving quality at higher education institutions both in Europe and in the Republic of Croatia. The aim of promoting quality is to achieve high standards of teaching, professional and research work of higher education institutions, satisfaction of students and other stakeholders and finally, successful realization of the set strategic goals.

The quality assurance system is a dynamic process which has to be developed and improved continuously, and in this process a special role belongs to information systems and public information which should support the construction of the culture of quality of all the stakeholders of the higher education institutions and the realization of the set strategic goals.

Information systems of higher education institutions should first of all allow collection, analysis and usage of all relevant information about the higher education institution as well as their exchange among all the stakeholders of the higher education institutions. Public information is used by higher education institutions in order to inform the local and international community about their study programmes developing thus the inter-institutional cooperation as well.

The assessment of the quality of work of higher education institutions is performed in compliance with the Standards and Guidelines for quality assurance in the European higher

education area – ESG standards.

The analysis of the published reports about the performed procedures of assessing the quality assurance system at higher education institutions in Croatia has shown that the majority of higher education institutions included in the analysis have ESG standards that refer to Information systems and Public information in the developed, i.e. advanced phase.

Out of all higher education institutions included in the analysis only one is in the initial phase of development regarding ESG standard which refers to Information systems. There are six higher education institutions in the transition between the initial and developed phase, whereas the information systems of eight higher education institutions are classified into the developed phase. The obtained data are at the same time indicators of higher development of standard which refers to Public information. According to this standard, namely, only one higher education institution is in the transition from the initial to the developed phase whereas all the remaining higher education institutions are classified into the developed phase, transition between the developed and the advanced phase and in the advanced phase.

Also, the data have shown that at all higher education institutions included in the analysis, the standard Public information is at the higher level of development in relation to the standard Information systems. Higher education institutions in the majority of cases have standard 1.6. in the developed phase, and standard 1.7 in the transition from the developed into the advanced phase.

This may lead to the conclusion that higher education institutions in the Republic of Croatia are aware of the importance of information management. Information management is an important factor in establishing and providing the quality assurance system. Therefore, higher education institutions, by applying advanced technologies have to continuously invest efforts in establishing information systems that will allow systemic gathering and usage of all relevant information from internal and external environment and provide information exchange with all the stakeholders in order to meet the needs of other stakeholders, building of the quality culture and realizing of strategic goals of the higher education institution.

REFERENCES

- [1] Quang Hung Do, Jeng – Fung Chen, “An Evaluation of Teaching Performance: The Fuzzy AHP and Comprehensive Evaluation Approach”, *WSEAS Transactions on Information Science and Applications*, Vol.10, No.3, pp. 90-99, 2013.
- [2] L.Batagan, C. Boja, “Smart Educational Systems and Education Clusters”, *International Journal of Education and Information Technologies*, Vol.5, No. 4, pp. 452-460, 2011.
- [3] D. Crosier, L. Pursier, H. Smidt, *Universities shaping the European Higher Education Area*, European University Association, 2007.
- [4] L.Vlasceanu, L.Grünberg, D.Parlea, *Quality Assurance and Accreditation: A Glossary of Basic Terms and Definition*, UNESCO – CEPES, 2007.
- [5] T. Lazibat, *Sustavi upravljanja kvalitetom u visokom obrazovanju = Quality Management Systems in Croatian Higher Education*, Sinergija, 2005.
- [6] I. Moisil, C. Oprean, C. Kifor, C. Candea, “e-Edu-Quality – Software Tools for Quality Management in Higher Education”, *In proceedings of the 6th WSEAS International Conference on E-ACTIVITIES (E-ACTIVITIES '07)*, World Scientific and Engineering Academy and Society (WSEAS) Press, pp.268-272, 2007.
- [7] J. Havranek, V. Dodiković Jurković, V. Petrović, “Implementation of Quality – Management Systems at Higher Education Institutions in Croatia”, *Zbornik radova 13. Hrvatska konferencija o kvaliteti*, Hrvatsko društvo za kvalitetu, 2013.
- [8] *Standards and Guidelines for Quality Assurance in the European Higher Education Area*, European Association for Quality Assurance in Higher Education, 2009.
- [9] J. Jaklic, P. S. Coelho, A. Popovic, “Information Quality Improvement as a Measure of Business Intelligence System Benefits”, *WSEAS Transactions on Business and Economics*, Vol.6, No.9, pp.502-512, 2009.
- [10] M. Spremić, *Menadžment i elektroničko poslovanje = Management and E-commerce*, Narodne novine, 2004.
- [11] W. M. Hill, *The Impact of Information on Society: an examination of its nature, value and usage*, K.G. Saur, 2005.
- [12] P. Lillrank, “The quality of information”, *International Journal of Quality & Reliability Management*, Vol.20, No.6, pp.691-703, 2003.
- [13] C. Schlögl, “Information and knowledge management: dimensions and approaches”, *Information Research*, Vol.10, No.4, paper 235, 2005.
- [14] G. D. Doherty, “On quality in education”, *Quality Assurance in Education*, Vol. 16, No.3, pp. 255-265, 2008.
- [15] P. Sikavica, B. Bebek, H. Skoko, D. Tipurić, *Poslovno odlučivanje = Corporate Decision Making*, Informator, 1999.
- [16] J. Komarkova, M. Hub, J. Neumannova, O. Visek, “Information system supporting spatial decision making and its quality”, *International Journal of Computers and Communications*, Vol.4, No.2, pp.31-38, 2010.
- [17] L. Lukas, L. Necesal, A. Paduchova, “Evaluation of Information Support Management by Using Web Applications”, *International Journal of Computers and Communications*, Vol. 7. No. 2, pp. 27-34, 2013.
- [18] *Criteria for assessing the level of development and efficiency of quality assurance systems at higher education institutions in the Republic of Croatia*, Agency for Science and Higher Education Croatia (ASHE)