

DEVELOPMENTS OF DOCTORAL STUDIES MANAGEMENT PROCESS IN NAS RA

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Abstract

The paper analyzes the developments of doctoral studies in National Academy of Sciences of RA since 1997 and the management process. Education and training of highly qualified personnel is increasingly seen as a fundamental platform that ensures the development of the state. Reforming the national institute for doctoral studies (aspirantura) is aimed at improving the quality of human resources in science, optimizing research topics in accordance with the priority areas of development of science and technology, increasing publication and innovative activities, bringing national science and research closer to the world level and achieving international recognition. We present numbers of defended dissertations both in Armenia and in NAS RA during the last 25 years, the dynamics and the main trends of development of academic degree awarding system. We discuss the possible impact of reforming of the system of training and certification of highly qualified personnel on the organization of third – level doctoral education (doctoral schools) and specialized / dissertation councils in NAS RA. The results of the SWOT-analysis of doctoral education and academic degree awarding processes in the NAS RA are shown. The article presents the main activities and projects aimed at using the advantages and strong points of the NAS RA network in order to improve the quality of doctoral education and training. The paper explores the mechanisms of organizational, methodological and infrastructural support for research and innovation activities of doctoral students and young scientists. There are also suggested the approaches to organization of strong networking between NAS RA research institutes, foreign universities for training and certification of highly qualified personnel. The authors define the role of ISEC in management of doctoral studies at NAS RA and establishment of a competitive third-level education for the sphere of research and development in Armenia.

Keywords and phrases: doctoral studies, academic degree, PhD, certification, highly qualified personnel, dissertation, research and development, innovation, networking, management of doctoral school, NAS RA.

**ԴՈԿՏՈՐԱՆՏՈՒՐԱՅԻ ԿԱՌԱՎԱՐՄԱՆ ԳՈՐԾԵՆԹԱՅԻ
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Համառոտագիր

Աշխատանքում վերլուծվում են 1997 թվականից ի վեր ՀՀ ԳԱԱ-ում ասպիրանտական կրթության (դոկտորանտուրայի) կազմակերպման զարգացումները և կառավարման գործընթացը: Բարձր որակավորում ունեցող կադրերի պատրաստումն ավելի ու ավելի է կարևորվում որպես պետության զարգացումն ապահովող հիմնարար կառուցակարգ: Դոկտորանտուրայի ինստիտուտի (ասպիրանտուրա) բարեփոխումներն ուղղված են գիտության մեջ մարդկային ռեսուրսների որակի բարձրացմանը, գիտության և տեխնիկայի զարգացման առաջնահերթ ուղղություններով տարվող հետազոտական թեմաների օպտիմալացմանը, հրապարակումների և նորարարական գործունեության ավելացմանը, հայրենական գիտության և հետազոտությունների մերձեցմանն համաշխարհային մակարդակին՝ միջազգային ճանաչման հասնելու ակնկալիքով: Հոդվածում ներկայացվում են վերջին 25 տարում պաշտպանված ատենախոսությունների թիվն ինչպես Հայաստանում, այնպես էլ ՀՀ ԳԱԱ-ում, գիտական աստիճանների շնորհման համակարգի զարգացման դինամիկան և հիմնական միտումները: Հոդվածում քննարկվում է բարձր որակավորում ունեցող կադրերի պատրաստման և ատեստավորման համակարգի բարեփոխման հնարավոր ազդեցությունը ՀՀ ԳԱԱ-ում՝ երրորդ աստիճանի բարձրագույն կրթության (դոկտորանտուրա) և մասնագիտական (ատենախոսական) խորհուրդների աշխատանքի կազմակերպման վրա: Ներկայացնելով ՀՀ ԳԱԱ-ում դոկտորական կրթության և գիտական աստիճանների շնորհման

գործընթացների SWOT-վերլուծության արդյունքները՝ մատնանշվում է ՀՀ ԳԱԱ ցանցի առավելություններն ու ուժեղ կողմերը՝ երրորդ մակարդակի դոկտորական կրթության և ուսուցման որակի բարելավման նպատակով: Աշխատանքն ուսումնասիրում է դոկտորանտների և երիտասարդ գիտնականների հետազոտական և նորարարական գործունեության կազմակերպչական, մեթոդաբանական և ենթակառուցվածքային աջակցության մեխանիզմները: Առաջարկվում են նաև ՀՀ ԳԱԱ գիտահետազոտական ինստիտուտների, արտասահմանյան բուհերի միջև ամուր ցանցային կապ հաստատելու մոտեցումներ՝ բարձր որակավորում ունեցող կադրերի պատրաստման և ատեստավորման համար: Հեղինակները կարևորում են ԳԱԱ գիտակրթական միջազգային կենտրոնի դերը ՀՀ ԳԱԱ դոկտորանտուրայի կառավարման և Հայաստանում հետազոտության և զարգացման (R&D) ոլորտի համար մրցունակ երրորդ մակարդակի բարձրագույն կրթության կազմակերպման գործում:

Քանակի բառեր և բառակապակցություններ. դոկտորանտուրա, գիտական աստիճան, ասպիրանտուրա, բարձր որակավորում ունեցող կադրեր, ատենախոսություն, գիտահետազոտական և նորարարական գործունեություն, ՀՀ ԳԱԱ ցանց, դոկտորական դպրոցի կառավարում:

РАЗВИТИЕ ПРОЦЕССА УПРАВЛЕНИЯ АСПИТАНТУРЫ В НАН РА

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Аннотация

В статье проанализирован процесс управления и развитие организации послевузовского образования (аспирантуры) в Национальной академии наук /НАН/ РА с 1997 года. Подготовка высококвалифицированных кадров все больше используется как фундаментальная структура обеспечения развития государства. Реформы института докторантуры (аспирантуры) направлены на повышение качества кадрового потенциала науки, оптимизацию тем исследований в соответствии с приоритетами науки и технологий, увеличение публикаций и инновационной деятельности, что поднимет уровень отечественной науки и исследований до уровня международного признания. Представлено количество диссертаций, защищенных за последние 25 лет как в Армении, так и в НАН РА, динамика и основные тенденции развития системы присуждения ученых степеней. Обсуждено возможное влияние подготовки высококвалифицированных кадров и реформы системы аттестации на организацию работы специализированных (диссертационных) советов и высшего образования третьей степени (докторантуры) в НАН РА. Представлены результаты SWOT-анализа процессов докторского образования и присуждения ученых степеней в НАН РА. Подчеркнуты преимущества и сильные стороны сети НАН РА в организации управления и повышении качества докторантуры. Изучены механизмы организационно-методической и инфраструктурной поддержки аспирантов и научно-инновационной деятельности молодых ученых. Предложены подходы установления прочной сетевой связи между научно-исследовательскими институтами НАН РА и зарубежными вузами для подготовки и аттестации высококвалифицированных кадров. Подчеркнута важная роль Международного научно-образовательного центра НАН РА в организации конкурентоспособного образования третьего уровня и управления докторантуры в Армении.

Ключевые слова и словосочетания: докторантура, ученая степень, аспирантура, высококвалифицированные кадры, диссертация, научно-инновационная деятельность, сеть НАН РА, управление докторской школой.

Tasks related to preparation of qualified specialists for science, education, high-tech sectors of the economy are in the focus of attention of the National Academy of Sciences (NAS RA), state government and the scientific and pedagogical community of Armenia [1]. Education and training of highly qualified personnel is increasingly seen as a fundamental platform that ensures the development of the state, and, first of all, priority directions and technological trends [2]. Reforming the national institute for doctoral studies (aspirantura) is aimed at improving the quality of human resources in science, optimizing research topics in accordance with the priority areas of development of science and technology, increasing publication and innovative activities, bringing national science/research closer to the world level and achieving international recognition.

Traditionally NAS RA prepares most of the highly qualified scientific personnel of Armenia: more than 20% of those who have been admitted to doctorate and have received an academic degree every year. The highest number of doctoral students we had in 2004 – more than 300 and plus PhD candidates (հայցորդներ, соискатели), table 1.

TABLE 1: Total number of doctoral students (full time, part time and paid) and PhD candidates in NAS RA by year

year	Total number of doctoral students	Full-time education	Part-time / Remote education	Paid education	PhD candidate (հայցորդ, соискатель)
1997	185	62	122	1	137
1998	189	75	107	7	207
1999	215	107	83	25	188
2000	201	101	76	24	196
2001	242	99	118	25	228
2002	254	116	125	13	119
2003	285	124	127	34	140
2004	314	136	134	44	174
2005	279	121	114	44	184
2006	248	212	106	30	192
2007	293	119	126	48	206
2008	264	99	111	54	221

2009	190	98	81	11	173
2010	175	105	60	10	243
2011	162	98	55	9	305
2012	154	91	63	3	362
2013	161	85	75	1	337
2014	161	88	73	0	316
2015	192	95	74	23	286
2016	184	96	73	15	283
2017	140	75	57	8	241
2018	108	47	57	4	200
2019	94	34	54	6	101
2020	113	55	43	15	168
2021	125	66	46	13	144

It is obvious that the number of doctoral students at NAS RA has been decreasing in recent years, but it is almost always higher than 250, in some years – more than 450.

The number of free places for doctoral students available for the NAS RA has ranged from 30 to 40 per year since the 1990s. Approximately as much places are reserved for part-time (remote) PhD students. There was a high competition in 90s and beginning of 2000's but since 2017 the competition has decreased and the number of PhD students in NAS RA has been also decreased, (see table 2). Most of doctoral students have dropped out in recent years. They didn't finish the whole doctoral program or didn't defence the PhD dissertation.

TABLE 2: Entered and graduated doctoral students in NAS RA by years

year	Total number of doctoral students entered: full time / part time (remote)	Total number of doctoral students graduated: full time / part time (remote)
1997	32 / 17	74 / 17
1998	33 / 32	57 / 9
1999	30 / 27	28 / 18
2000	30 / 10	36 / 16
2001	42 / 55	38 / 11
2002	42 / 34	46 / 26

2003	37 / 28	29 / 27
2004	43 / 24	45 / 13
2005	38 / 29	41 / 52
2006	31 / 27	40 / 32
2007	26 / 24	44 / 32
2008	39 / 15	44 / 30
2009	35 / 12	34 / 38
2010	33 / 17	28 / 39
2011	28 / 15	35 / 20
2012	27 / 21	33 / 14
2013	32 / 27	35 / 11
2014	31 / 13	27 / 17
2015	35 / 17	25 / 12
2016	32 / 21	33 / 20
2017	10 / 10	28 / 25
2018	10 / 18	35 / 14
2019	13 / 10	28 / 16
2020	32 / 5	11 / 19
2021	17 / 1	10 / 9

Meanwhile it should be noted that the number of joint defences of dissertation is increasing. Joint specialized / dissertation councils are formed in cooperation with foreign higher education institutions and after the defense the PhD student receives a double academic degree (French PhD and Armenian PhD – գիտությունների թեկնածու, for example). Moreover, the number of defended PhD theses / dissertations at the NAS RA is almost constant and makes about 20% of all defended dissertations in Armenia (see Figure 1). The blue lines show the numbers of defended PhD dissertations in Armenia by year, and the orange lines shows the numbers of defended PhD dissertations in NAS RA (the author have been a doctoral student in NAS RA). The maximum number of defenses in Armenia was in 2013 – 564 dissertations, and for NAS RA it was in 2013 and 2014 – 113 PhD theses. The minimum number of PhD thesis defences was in 2020 (the year of COVID – 19 and war in Artsakh): 147 totally in Armenia and only 30 among them in NAS RA.

Figure 1. Defense of PhD dissertations per year in Armenia (data collected from the Supreme Certifying Committee of the Ministry of Education, Science, Culture and Sport of RA)

For the comparison, let us introduce also the numbers of organised defenses for «Doctor of Sciences» academic degree – Grand doctor [3], the 2nd academic degree in Armenia – defined by the law “On scientific and scientific-technical activities”. The Figure 2 shows that the number of dissertations defended since 1997 in Armenia fluctuates between 40 and 50, if we don’t count the last 3 years (when the numbers have decreased for objective reasons). This number was stable also in the case of NAS RA and approximately equal to 10 per year (20-25% of highly qualified personnel in Armenia – Grand doctors – are from NAS RA).

Figure 2. Defense of 2nd academic degree – Grand Doctor (Доктор наук, Գիտությունների դոկտոր) dissertations per year in Armenia (data collected from the Supreme Certifying Committee of the Ministry of Education, Science, Culture and Sport of RA)

Reforming the laws "On Higher and Post-Graduate Professional Education in the Republic of Armenia" and "On Scientific and scientific-technical activities" should be the next stage in reforming the system of third-level higher education and preparation of highly qualified personnel in Armenia. It should be fixed in the law that postgraduate studies - doctorate, is the third level of higher education. This transition, on the one hand, leads to stricter regulation of the conditions for the implementation of doctoral programs and the assessment of training results, on the other hand, it makes possible to provide doctoral students wider networking possibilities and accelerated forms of training as it was in the case of Russian Federation [4].

Fundamental changes should concern not only the process of training highly qualified personnel, but also the system of their certification (obtaining an academic degree). The procedure for awarding academic degrees should be changed, the requirements for the work of specialized (dissertation) councils should be increased. The current reform of the system of attestation of scientific and scientific-pedagogical personnel, which consists in ensuring the transparency of the dissertation defense procedure, communicating the results of scientific research to the general public, establishing the reputational responsibility of all participants in the dissertation defense (applicant, scientific advisor, opponents, leading organization, council members), cites to the need to create an optimal system of attestation of scientific and scientific-pedagogical personnel, to eradicate the corruption component at all levels of preparation and defense of the thesis/dissertation. Discussions and preparation of innovative models for reforming the doctoral education in National Academy of Sciences are continuing at International Scientific – Educational Centre (ISEC) which is responsible for doctoral education [5].

Innovations, which are actively being introduced into the model of training scientific and scientific-pedagogical personnel, need a strategically verified management system at the national and NAS or university levels. The complexity of strategic planning and management of the processes of training and certification of scientific and pedagogical personnel in modern conditions is associated with a constantly changing and not always clear regulatory and legal framework that allows for ambiguity in the interpretation of documents, with the uncertainty of the status of doctoral students and candidates for academic degrees, lack of data on the results of monitoring specialized / dissertation councils, etc. This process is also significantly complicated by the need for a constant "split personality" when making decisions simultaneously in the old, in the transitional, and in the new formats of doctorate management.

In order to improve the efficiency of the management of training and certification of doctoral students in the National Academy of Sciences, a SWOT analysis was carried out. Its results are presented in table 3.

TABLE 3. Results of SWOT-analysis of preparation and certification of doctoral students at NAS RA

Strengths
<ul style="list-style-type: none"> • availability of well-developed infrastructure at NAS RA to support educational, scientific and innovative activities; • a high level of professionalism of the teaching staff, scientific advisors which is developing and implementing programs for doctoral students; • availability of scientific schools since Soviet times, productive scientists and research teams at the scientific institutes of NAS RA; • an increasing number of doctoral students motivated to continue scientific and pedagogical activities at research institutes of NAS RA; • wide Armenian Diaspora and good relations with Russian, American and European scientists with Armenian origin
Weaknesses
<ul style="list-style-type: none"> • incomplete requirements and regulating documents managing the doctorate in general at the national level and at NAS RA; • a significantly increased volume of workload on teachers in connection with the potential transition to a new education system; • the priority of developing educational and methodological complexes for master level at the ISEC NAS RA; • insufficient provision of doctoral students with educational, methodological and information resources; • the lack of centralized events, lectures for doctoral students at NAS RA; • the lack of specialized / dissertation councils in Armenia in general and particularly in NAS RA, especially on merged and newly introduced specialties
Opportunities
<ul style="list-style-type: none"> • Integration of information, methodological, material, technical and human resources of NAS RA research institutes and ISEC within the framework of network interaction; • participation of doctorate students in competitions for scholarships and grants both on national and international levels; • expanding the system of internships and international mobility of doctorate students; • strengthening the material and technical base of the ISEC's research and development sector; • running of EU funded ArmDoct project on Reforming Doctoral Education in Armenia in line with the Salzburg Principles with the emphasis on policy, legal framework (including by-laws) and institutional procedures supporting integrative and internationally-oriented doctoral studies involving universities, research institutions and industry [6]. ISEC of NAS RA involved as a partner institution in ArmDoct project
Threats
<ul style="list-style-type: none"> • insufficient elaboration of documents regulating the doctorate in general and training and certification of highest qualification personnel; • lag of the schedule for accepting documents from the previously announced

deadlines;

- reduction of the expenses and target figures for admission to doctorate of NAS RA from the state budget;
- reduction in the number of specialized / dissertation councils, lack of specialists in certain specializations;
- insufficient integration of the efforts of Armenian universities in the development of educational and methodological support for doctoral study programs, creation of doctoral schools;
- non-adoption of the draft law «On higher education and science» by the parliament of the Republic of Armenia in short period of time

Based on the results of the SWOT analysis, the main activities were identified, aimed at using the opportunities and strengths of the organization of doctoral studies at ISEC NAS RA and training highly qualified personnel with constant monitoring of the weaknesses and threats of the external environment. When developing measures, a systematic approach was used, which is expressed in the fact that the training and certification of scientific and pedagogical personnel are considered as a subsystem of the scientific and educational system of the ISEC NAS RA as a whole. Projects to improve this subsystem are closely related and coordinated with other projects of the strategic development program of the ISEC NAS RA for 2019–2023 [7].

To ensure the effective work of the doctorate and specialized / dissertation councils, we are planning to create a favorable condition that promote both the improvement of curricula and the conduct of internal audit in preparation for the accreditation of educational programs at the doctorate of NAS RA.

The work with doctoral candidates at NAS RA was mainly the prerogative of scientific advisers at the research institutes of NAS RA. Now, when the reforms started, ISEC's Department of Aspiratura providing preparation for exams in foreign languages, lectures of research methodology, providing consulting and methodological support for doctoral students from the whole system of NAS RA. PhD students receive advice on the effectiveness of research, development, technological work, patent and licensing activity, increasing the citation index, business planning, innovative entrepreneurship and other actual issues.

The reforms of the NAS RA doctorate management system will create appropriate conditions to streamline the procedures for preliminary examination of dissertations, check the texts of dissertations for the presence of incorrect borrowings (plagiarism), that is, provide methodological support for candidates for an academic degree at the final stage of preparing documents and increase their disciplinary responsibility. These reforms will play an important role in the preparation of materials for the monitoring of specialized / dissertation councils functioning in NAS RA, as well as in the preparation of materials for the creation of joint dissertation councils with foreign partner universities, adjusting local regulations governing the process of preliminary examination, acceptance of dissertation papers and their defense in specialized / dissertation councils of NAS RA.

ISEC, since 2017, has been implementing a modular-type program "Methodology of scientific research" with a volume of 120 hours (4 credits ECTS, including 40 hours' lectures). Without dwelling on the content of individual modules, we plan that doctoral students and PhD candidates will perform various practice-oriented tasks, for example: they register in the Science Index system, form a list of their own scientific publications and search for citations of their works, carry out an expert assessment of the investment attractiveness of an innovative project according to predetermined criteria, fill out an application for grant support for their research with a description of the relevance and scientific significance of their area of research, etc.

In the future, it is planned to improve the content of the modules, teaching methods and monitoring the results, preparing didactic information and reference materials, as well as monitoring the achievements of the program graduates in research and innovation.

The given example illustrates the use of one of the strengths of the ISEC NAS RA ("Availability of a modern and developed infrastructure to support educational, scientific and innovative activities") for the formation and development of competencies of doctoral students in the field of research and innovation.

Let us explain how one can use another strength of the NAS RA - "the presence of scientific schools, productive scientists and research teams". At the meeting of Scientific Council of ISEC, it was noted that improving the quality of dissertation research involves the preparation and certification of applicants for academic degrees on the basis of leading scientific schools. Of course, this applies to all areas of training for doctoral students and specialties of scientific workers, but it is especially important for the processes of training and certification of highly qualified personnel in priority areas of modernization and technological development of the Armenian economy. The most important distinguishing features of NAS RA system are the presence of a highly effective system of continuous training and retraining of personnel, the ability to generate knowledge through a wide range of fundamental and applied research and ensure effective transfer of technologies to the social sphere and the economy of the country.

Experience has shown that in a system that has authoritative scientific schools, scientific and educational centers, specialized small innovative enterprises, ideal conditions are created for the formation and development of research and innovative competencies among doctoral students through the integration of higher education, research and innovation.

The largest number of achievements: grants and scholarships, internships in foreign universities, victories in competitions for innovative projects - mainly falls on the share of doctoral students who are part of the teams of Armenian scientific schools. It should be noted that the allocation of "points of growth" allows you to concentrate efforts on supporting these areas, including young scientists, which can be regulated, for example, when forming proposals for setting target numbers for admission to

doctorate (doctoral school), allocating funds for targeted training of PhD students, when stimulating research teams and specific young scientists.

Let us turn from examples of using the strengths of ISEC to opportunities (see Table 3). One of them is "the possibility of integrating information, methodological, material and technical and human resources". The practice of networking, aimed at developing cooperation in educational, research and innovation activities, is becoming more common.

In the publication [8], various approaches to organization of network integration, management of network interaction and demonstrated the effects obtained by the participants of the network structure: universities, research organizations and partner enterprises. The paper [9] analyses the impact of reforming of the system of training and certification of highly qualified personnel in Russian Federation on the organization of postgraduate education (aspirantura) and dissertation councils at the regional universities. In our case - the NAS RA is a network of research organizations and the ISEC - as an educational institution – is an important point in this network to create a framework for effective cooperation between scientific research and higher education, by organising the management of doctorate of the NAS RA.

In the context of the topic of the article and the characteristics of ISEC, we will consider the features of network interaction associated with the organization of doctoral education, training and certification of highly qualified personnel in NAS RA. The main areas of work in the framework of NAS RA system network cooperation are schematically presented in Figure 3.

Fig. 3. The main directions of network interaction within NAS RA system

For effective work in a network format, it is necessary to create a legal framework that regulates network interaction and the distribution of responsibilities between all participants within the NAS RA. So, for the implementation of joint educational programs for the preparation of PhD students, it is necessary to draw up a register of educational programs for doctoral students of partner research institutions and determine the list of programs for implementation in a network form. In addition, it is advisable to develop models of network interaction for individual large groups and areas of training. The following steps seem to be important for the implementation of joint programs: collecting the necessary information, analysing resource provision, conducting training seminars for heads of doctoral educational programs, scientific supervisors of doctoral students, specialists of structural units coordinating the training of highly qualified personnel at the research institutes, creating a single educational network portal.

Within the framework of NAS RA network interaction, it is also planned to create a network of joint specialized / dissertation councils, especially in those specialties that are priority for the economy of Armenia, and also for merged and interdisciplinary specialties. It is planned to use the links of network member research institutes and include there also specialists from abroad (including scientists of Armenian origin from Diaspora). This area of network cooperation will provide an opportunity for the participants and international partners to recognize the results of the defence of dissertations in partner foreign universities, increase the independence of scientific and educational organizations, their reputation and disciplinary responsibility in matters of certification of highly qualified personnel. The concept of organizing a network of joint dissertation councils working at the inter-section of different research areas, created on the basis of leading scientific schools of Armenia, is also important, taking into account the academic activity of Armenian scientists and the possibility of personnel support for priority areas of development of science and technology. This approach can become one of the methods for NAS RA network optimization and close cooperation with foreign institutions (HEIs and research centres).

The development of network integration between the ISEC, NAS RA research institutes, partner enterprises and international partners, the creation of an effective system of network educational programs for third-level doctoral education will ensure the concentration of human, material and research resources of Armenia on the priority areas of development of economic sectors, will give competitive advantages to NAS RA network participants in the market of educational services [10].

The adoption of competent management decisions is impossible without the prompt exchange of information between ISEC, NAS RA and its network research institutes, Ministry of Education, Science, Culture and Sport of RA (including Science Committee and Supreme Certifying Committee). The introduction of new ways of working with documentation in the process of organising the third-level doctoral education, training and certification of highly qualified personnel guarantees the availability of information for all interested parties. Discussion of topical issues in the

format of on-line and off-line conferences, seminars, round tables will improve the quality of the regulatory and legal documents developed by the Ministry of ESCS of RA, taking into account the point-of-views of the professional community, as well as generate analytical reports, statistical compilations and other information materials that will facilitate the work of the relevant structural divisions of Armenian universities and NAS RA network research institutes.

In conclusion, we note that in the context of effective reforming the system of doctoral education at ISEC NAS RA, training and certification of scientific and pedagogical personnel, all the responsible structures and persons must quickly respond to the challenges of the current external environment and make the right management decisions.

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