International Journal of Engineering & Technology, 7 (3.14) (2018) 323-326

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

The Use of Information and Communications Technology to Foster the Competitiveness of the Entrepreneurial Organizations within the Education and Science Sector

Alexander A. Galushkin1-2

1Russian University of Transport, Obraztsov St., 9, Bldg. 9, Moscow, 127994, Russia
1Stolypin International Institute of Informatization and Public Administration, Malaya Semenovskaya St., 11/2, Bldg. 7, Moscow, 107023, Russia

Abstract

In recent years, a new market trading in cryptocurrencies and instruments based on them has been formed. The market of this paper addresses the use of information and communications technology to optimize the operation of institutions of higher learning and scientific organizations, boost their competitiveness through the systematization of their business processes, and enhance their qualitative characteristics. The author looks into employing information and communications technology to organize the institution's distance learning systems, electronic educational environment, and electronic (online) learning system. The paper emphasizes that the use of information systems is of particular convenience with regard to setting up electronic research and scholarly libraries, which could be accessed over the Internet from just about anywhere in the world regardless of their actual physical location. Along with practical aspects, the author also examines some of the issue's regulatory foundations and some of the compliance practices related to it. The paper stresses that, in a climate when virtually any object is vulnerable to attack by intruders, of particular relevance is the issue of ensuring information security both domestically and globally. The author concludes by drawing a set of inferences that are both of a practical nature and of a theoretical one.

Keywords: *Internet, technology, information technology, network, education, science, establishments, organizations, commercial, entrepreneurial.*

1. Introduction

Amid today's rapid and ubiquitous diffusion of digital media into all areas of social life, no serious institution of higher learning or scientific organization is likely to just stand back having adopted retrograde attitude. Given the major changes in the student body dealing with the fact that a great many students entering an institution of higher learning or a scientific organization today are accustomed to using all kinds of gadgets, let alone regular PCs, which may now seem outmoded to many despite their variety of technical characteristics and capacity to run all manner of software programs, most institutions of higher learning will be able to effectively impart relevant knowledge to students and develop in them all relevant competencies solely on the condition that all "communication" with them will be in a language that they understand and accept (including by way of information and communications networks and systems).

Over the past few years, information technology has progressed to the point where there are now in place systems of distance learning, the electronic educational environment, and electronic (online) learning systems. The use of information systems is of particular convenience with regard to setting up electronic research and scholarly libraries, student demand for which, in practice, is a lot greater than that for regular (classic) ones, which work mainly with paper books. The wholesale informatization of society is making the implementation of information systems also invaluable for enhancing the management of an institution of higher learning through putting in place an automated management system.

However, that has not been so apparent until recently. For instance, among the 79 papers presented at the well-known Information Technology and Telecommunications in Education and Science (IT&T ES'2007) international scientific conference, held May 18 through 25, 2007, in Fethiye, Turkey, just one presentation had direct relation to the information/technological organization of strategic management in institutions of higher learning.

On the whole, the reasons behind this lack of attention to the above issue are pretty clear; they have been investigated in detail as part of this study. There currently appear to be serious gaps in terms of both exploratory research and practical implementation, so this area may warrant the investigation of both the more interesting information technology available today in the area of strategic management in institutions of higher learning *and* the prospects for future development in the area.

In addition, it may be also worth looking at other ways of formalizing and automating this kind of solutions with a view to enhancing the process of organizing strategic management. Analysis of the principles underlying the processes of building a system, making decisions, and implementing these decisions in practice may help enhance the process of selecting the most suitable variant and implementing it in the institution of higher learning.

It is worth noting that educational organizations offering higher education programs (bachelor's degree programs) are attended by both of-age and underage individuals, which may impose additional requirements with regard to information and communica-

Copyright © 2018 Authors. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

tions solutions to be chosen. It has been noted by researchers that an issue of relevance for Russia today is protecting the rights of children, with the clear understanding that it is, above all, educational organizations that can and must play a major role in protecting children's rights, enlightening them both legally and culturally, and working across these areas with relevant authorities and other interested establishments (both nonprofit and commercial) [1].

2. Methods

This paper was written based on the findings from the study conducted using general scientific methods of cognition based on the findings from some fieldwork and an analysis of the views of various scholars from around the world.

3. Results

In present-day realities, ensuring the sustainable development of institutions of higher learning requires competently organizing and synchronizing all of their business processes, including making competent managerial decisions in a timely manner. Those in charge of a modern-day institution of higher learning are tasked with systematic decision-making regarding the various aspects of the institution's operation, like taking care of resource support, funding, and major items of expenditure and preserving and upgrading its buildings, equipment, and other resources.

Also, of major importance for colleges is staffing. Today, there is special relevance in ensuring the full-scale operation of all establishments within the college across such crucial areas as strategic management, innovation-focused scientific activity, and provision of paid services [3]. While the spectrum of strategic management objectives is quite broad, there is a need for well-considered decisions that are based on the effective monitoring of the current situation. This may require having in place relevant information environment.

Evidence from modern-day practice suggests that one of the best ways in which a college can develop is through actively engaging its staff in self-managing the institution. Fostering self-management at institutions of higher learning should not be seen as a latest trend but as an indispensable element in their sustainable development, as engaging their staff members, especially their teaching staff, may help attain, by way of horizontal linkages, many of the desired outcomes using much fewer resources than would be required by vertical relationships. Thus, the potential of the school's teaching staff could be put to effective use to attract new students, obtain various grants and commercial contracts, establish international ties, and much more.

Over time, most colleges with a powerful self-management institution in place tend to develop a disposition to arrange conferences between staff and students, with the academic board convening during the breaks between them. Thus, the college's entire team take as much part as possible not only in its current activity but in the strategic planning of its sustainable development as well.

Unfortunately, this is hardly possible to achieve in sufficient measure with most institutions of higher learning and scientific organizations at this time. For the most part, a significant portion of staff at institutions of higher learning are not interested in making extra efforts without being offered additional material incentives and, therefore, fail to take a sufficient part in the development of the institution of higher learning they work for. Sometimes, this may be due to one's poor civic attitude or a lack of information on potential areas for participation. A vivid illustration of the difficulties of implementing strategic management is the fact that those in actual charge of an institution of higher learning often experience the same type of difficulties themselves.

In today's conditions of the rapid development and ubiquitous penetration of information technology, a major role in the development of self-management institutions in colleges and scientific organizations and creation of the preconditions for strategic development, as has already been mentioned above, is played by the information environment, through which there is disseminated reliable information on all aspects of life activity within an institution of higher learning or a scientific organization, as well as on the prospects for future development. It is worth paying attention to the fact that in recent years the volume of information in institutions of higher learning and scientific organizations has increased several times as opposed to the Soviet era. It would be impossible to keep track of these continually growing volumes of information without the use of cutting-edge information and communications technology.

Thus, many executives and researchers concur in the view that one of the key issues often impeding the sustainable development of institutions of higher learning and scientific organizations is the lack of a well-oiled integrated automated management system. In present-day realities, having a system of this kind in place helps enhance the process of making managerial decisions, while when it is not in place those who have to make those decisions may lack prompt access to relevant information and have to spend a lot of time to obtain it, which, accordingly, may impede competent and timely decision-making.

In large institutions of higher learning and scientific organizations information is often gathered from various staff members and persons in charge in a somewhat chaotic manner. Furthermore, the centralized generalization of information is, normally, quite a resource-intensive process. A possible solution to this is implementing an automated system for managing an institution of higher professional education which will possess extensive functionality.

However, the complexity and multifacetedness of different programming solutions from different developers who are independent from each other may require the institution of higher learning pay special attention to issues of integration and interaction among various programming solutions.

With that in view, scholars V.V. Kryukov and K.I. Shakhgeldyan suggest that the basis for implementing information technology is putting in place a full-featured infrastructure and creating a single environment to enable one to easily access all relevant information and effectively manage it, including within the context of objectives set before the institution [5]. The implementation of information technology in an institution of higher learning can be translated into putting in place a corporate-use information environment, which may help not only integrate all information resources within the institution of higher learning but put in place an integrated information system customized to the organization's structure.

It is worth noting that when it comes to institutions of higher learning and scientific organizations, a single information environment, which incorporates a single automated management system, is to be construed as a distributed hardware-and-software complex with extensive functionality that is accessible to all authorized staff members (and sometimes students) from the local environment and/or the external network (the Internet). Put differently, this is a set of software programs, computers, and other devices (switches, hubs, routers, etc.) employed in resolving various objectives related to information support for the management of an institution of higher learning.

To ensure its functional operation, a college's information environment ought to be competently planned out and well developed, and the hardware systems in place ought to meet the objectives set, be reliable, and, where possible, lend themselves to a reasonable price/quality combination. In implementing a system in a peculiar environment like the one in an institution of higher learning, a major consideration is not only functionality but convenience of use for all categories of users as well.

Many institutions of higher learning and scientific organizations are engaged in work on implementing cutting-edge information technology developed by third-party organizations, as well as in work on creating hardware-and-software solutions of their own, which are then implemented. However, relatively little success has been achieved in this area so far. Of interest in this regard is a paper by scholars S.L. Atanasyan, S.G. Grigorev, and V.V. Grinshkun, which has been presented at a major international research-to-practice conference and wherein they note that "evidence from the work of Moscow City Pedagogical University indicates there is currently no system of any kind in place in terms of processing, accumulating, and putting to practical use all manner of disaggregated information resources that are available out there. As a rule, the systems that are available at the moment are not linked to each other in any way, and unjustifiably tend to duplicate the same information, which often leads to conceptual and methodological collisions" [2]. This is not the only opinion of this kind voiced on the issue, with similar concerns raised by numerous managers at institutions of higher learning and scientific organizations around the country.

Note, though, that in Russia the actual preconditions for the development of the information environment in institutions of higher learning were created at the government level quite a long time ago. Thus, for instance, pursuant to Resolution of the Government of the Russian Federation No. 676 'On University Complexes' of September 17, 2001, at institutions of higher learning (universities, academies, etc.), in a manner consistent with the relevant legislation of the Russian Federation, there can now be set up a university complex that will bring together several educational institutions offering educational curricula of different levels, other institutions and nonprofit organizations, or particular business units thereof [7].

Afterwards, in furtherance of the above resolution, there came out a policy letter by Russia's Ministry of Education – Letter of the Ministry of Education of the Russian Federation No. 17-55-99in/17-11 'On Recommendations on the Creation of University Complexes' of November 9, 2001, under which special recommendations were forwarded to relevant subordinate organizations regarding the creation of university complexes and which established a total of 6 goals, 11 objectives, 4 principles, and 7 regulations on the procedure for creating university complexes [6].

However, the above provisions were not introduced by way of amendment into the Resolution of the Government of the Russian Federation No. 264 'On Signing into Law the Model Regulation on Institutions of Higher Professional Education (Institutions of Higher Learning) in the Russian Federation' of April 5, 2001, adopted later on, which maight be viewed as testimony to one's failure to comprehend the need for and significance of single information environment. It may be worth noting that presently, after the passage of a considerable amount of time, most of the above objectives and principles have finally been added to the armory of the administrations of various institutions of higher learning, of which there are numerous examples.

4. Discussion

One of the key objectives facing Orenburg State University as part of the implementation of the institution's innovative curriculum, as per its rector V.P. Kovalevskii, is to "ensure the sustainable development of the university complex's information/technological component to enable the optimization of the export of educational and research services, cultivation of robust information and innovation culture, and analysis, processing, and transmission of best innovative practices into the region" [4]. This, inter alia, requires the development of information technology. The complexity of creating a system of this kind dictates the need to first work out a concept on its design and creation, with each specific institution of higher learning expected to reconceive this from scratch.

One of the potential elements of the concept of corporate information systems is semantic portals. Semantic portals are elements that have yet to be materialized. They are only in design form at the moment. Semantic portals are among the more interesting characteristics of the development of the information environment within institutions of higher learning, being indispensable for getting relevant goals, objectives, and methods of strategic management across to the team and organizing an effective two-way linkage with the college's administration. These portals are needed in order to enable the use of decision support systems (DSS), for to make them work one needs relevant domain models, more specifically for the entire management, material/technical, and information environment within the institution of higher learning.

Creating this kind of models is quite a laborious process, and their creation only for DSS systems substantiates such of the model's weaknesses as inaccuracy, incompleteness, and staticity. In this context, invaluable assistance may be afforded by semantic portals. Semantic portals must contain as complete information as possible on the entire structure, goals, and objectives of the institution of higher learning, and access to this entire information environment must be available to everyone. This will help enable the institution of higher learning to operate as a single organism, when strategic directives from higher up no longer ring hollow and are no longer just lofty rhetoric to accommodate fashion (as is oftentimes perceived within the milieu, which has to absorb them and put them to actual use in daily work) but are known now to each link at the level of their conceptual value.

A highly informatized educational organization can easily optimize just about any of its business processes, which can help further speed up the circulation of information and enhance decision-making by those in charge of the institution.

As has already been mentioned above, each institution of higher learning is distinguished by a set of distinct characteristics, which makes it hard to put together a fully automated decision-making system that could be used by different institutions of higher learning without having to tweak it some more. Considering quite a hefty price-tag attached to most off-the shelf software packages available today and taking into account the need to further customize them to the needs of specific institutions, a great many institutions of higher learning opt to develop automated management systems entirely or partially on their own.

Many large institutions of higher learning run automation and/or informatization departments of their own, which could be set the objective of implementing the above algorithms. However, before starting work on putting a system in place, it may help to pin down a set of objectives that need to be achieved and make determination on how that will be funded.

5. Conclusion

Based on the findings from this study, the author has drawn the following conclusions:

1. Putting in place an automated management system and other interlinked systems in institutions of higher learning and scientific organizations is quite a complex task, with much of the decision-making having to do with creativity. With each specific institution of higher learning or scientific organization, depending on the existing structure and practice of decision-making, it may help to employ custom system models that match the institution's distinct characteristics and enable assessing the efficacy of strategic decisions and selecting the most optimum one.
2. In large institutions of higher learning and scientific organizations, the use of full-featured automated systems helps boost significantly the effectiveness and timeliness of execution of managerial decisions, while helping minimize labor costs and those associated with material resources, as well as take some of the effort out of performing the control functions for those in charge of the institution.
3. Depending on available resources and objectives set, it

may help for institutions of higher learning and scientific organizations to come up with an integrated hardware-and-software solution on automating the system of managing and organizing the information educational environment (including an electronic library).

4. Despite the exciting prospects offered by automated management systems, a concern may be the high costs associated with their implementation. Each specific institution of higher learning must assess for itself the economic advisability of implementing an automated management system. Special consideration may need to be given to the system's functionality through the lens of the cost-to-expected result ratio.

References

[1] A.K. Abashidze, A.M. Solntsev, A.E. Koneva, D.A. Gugunskiy, N.A. Grigorieva, Current issues of application of Hague Child Protection Convention of 1996 on National level. Mediterranean Journal of Social Sciences, 6(4), 2015, pp. 289–298.

[2] S.L. Atanasyan, S.G. Grigor'ev, V.V. Grinshkun, Kontseptual'nye osnovy formirovaniya informatsionnoi obrazovatel'noi sredy pedagogicheskogo VUZa [Conceptual foundations of the formation of the information educational environment in a pedagogical college]. Materialy mezhdunarodnoi nauchnoi konferentsii "Informatsionnye tekhnologii i telekommunikatsii v obrazovanii i nauke" (IT&T ES'2007) [Proceedings of Information Technology and Telecommunications in Education and Science (IT&T ES'2007): International Scientific Conference]. Moscow: EGRI, 2007

[3] A.A. Kharin, Upravlenie razvitiem resursnogo obespecheniya nauchno-innovatsionnoi deyatel'nosti vuza [Managing the development of resource support for a college's research/innovation activity] (Extended abstract of unpublished candidate's thesis). State University of Management, Moscow, 2006.

[4] V.P. Kovalevskii, Razvitie universitetskogo kompleksa kak faktor povysheniya innovatsionnogo i obrazovatel'nogo potentsiala regiona [The development of a university complex as a factor for boosts in a region's innovation and educational potential], 2010. http://www.orenport.ru/docs/174/mat_conf/html/Plenarnie.pdf

[5] V.V. Kryukov, K.I. Shakhgel'dyan, Informatsionnye tekhnologii v upravlenii vuzom [The use of information technology in managing a college]. Universitetskoe upravlenie: Praktika i Analiz, 2, 2005, pp. 85–94.

[6] Pis'mo Minobrazovaniya RF ot 09.11.2001 g. № 17-55-99in/17-11. O rekomendatsiyakh po sozdaniyu universitetskikh kompleksov [Letter of the Ministry of Education of the Russian Federation No. 17-55-99in/17-11. On Recommendations on the Creation of University Complexes. November 9, 2001]. http://www.consultant.ru/document/cons_doc_LAW_99060/

[7] Postanovlenie Pravitel'stva Rossiiskoi Federatsii ot 17 sentyabrya 2001 № 676. Ob universitetskikh kompleksakh [Resolution of the Government of the Russian Federation No. 676. On University Complexes. September 17, 2001]. http://pravo.gov.ru/proxy/ips/?docbody=&nd=102072698&rdk=1