

A digital sustainability approach for effective knowledge and information management in education specific non-profit organizations: culture Intelligent IS Solutions

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Abstract. Information and knowledge management plays a crucial role in the sustainable development of educational organizations with significant impacts on academic communities' behavioral patterns. Leveraging digital technologies into academic processes have been considered as a promising way for effective management of information and knowledge. However, superficial or ungrounded adoption of information systems without consideration of the academic and information culture of a given organization may result in ineffective or useless operations that will subsequently burden staff with irrelevant actions. In this regard, this paper aims to provide an approach for sustainable growth of educational organizations with culturally savvy Information System solutions in information and knowledge management challenges. By this approach, enhanced value systems and a better cycle of information\knowledge among the academic community are intended to be achieved. Stakeholder analysis, objective sampling, and literature review were applied for data collection procedures, which provided ultimate identification of information and academic culture patterns and factors on information and knowledge management. By these patterns and factors, we found effective Information System (IS) solutions that match well with generic features of academic and information cultures in Uzbekistan such as data-driven systems, decision support systems, and discourse analysis. Finally, we have drawn implications for educational institutions to manage information effectively and develop a healthy organizational information environment. Additionally, future research directions will be identified in the digital sustainability domain of effective information and knowledge environment.

1 Introduction

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Information and knowledge management have often been defined as interdependent concepts since we use the information to engage in knowledge-focused activities. IS-enabled innovations for successful knowledge and information management have also facilitated the intertwining of those concepts with high mobility and sharing. However, the main lack of this interrelationship is fake content and difficulty of capturing real-world contexts, especially relevant to academic life. This idea has also been evidenced by the work of [1]. Comparative study of people's behavior and talk has been suggested as instructive ways for effective research of IS problems in the information environment. Another main issue of IS use is lack of technological thought that fits with the academic and information culture of Higher Education organizations, resulting in old-fashioned knowledge or paused knowledge improvement and lack of information infrastructure. This research is devoted to finding IS solutions that suit well the situations of Uzbek academic institutions by analyzing real-life context and relevant literature. Previous research based on IS use in education sectors [2, 3] has been conducted for IS design and evaluation studies that informed our theoretical bases. [2] analyzed social media use factors at organizational levels that related to the effectiveness of Nonprofit educational organizations while [3] describes and analyzes different aspects of academic information system management at higher education, especially planning and quality of Academic Information System. Another relevant study is the research work of [4] in which the role of academic culture in knowledge management in the Higher Education system was studied and necessary implications were generated such as the key factors of improved organizational culture in knowledge management.

However, to the best of our knowledge, only a few researches have been conducted to investigate how technological applications can bridge culture with management in a way that information and knowledge can be effectively managed. Inspired by a lack of research bases, our study aims to bridge this gap by finding culturally responsive IS solutions for Higher Education organizations. We look at academic culture, information culture, and management of different HE organizations so that we can identify common value systems and behavior patterns of academic communities that serve for technological design.

Following this section, section two outlines the literature review and objective sampling procedures. Stakeholder analysis is also needed to identify the needs of relevant people who feel the direct impact of this research. Section three presents the proposed research approach and its direct implications. Section four explains overall and specific observations and results.

2 Materials and methods

These research studies employ literature review, exploration, and stakeholder analysis methods to collect data from local higher education institutions (more than ten universities mostly in Tashkent). While building datasets, information and academic cultures were explored and influencers (such as academic managers, deans, guilds, deans and etc.) were interviewed. The literature review approach was used to analyze the discourse of local communities and to find patterns and trends in their scholastic behaviors and values. Additionally, this method is used for IS solutions review. All data collection methods continued until theoretical grounds were reached and factors (and implicit aspects) of information and knowledge management of local universities were identified. We structured data collection procedures with regard to the main components of the information environment and knowledge creator culture as shown in the following criteria Table (see Table 1).

Table 1.Components table of information and knowledge cultures.

Categories of culture	Subcategories of culture
Information environment components	Information strategy, information policies, information behavior and culture information staff, information architecture and information processes
Knowledge creation culture	Knowledge oriented missions, management support, individual independence and freedom of action, open and creative contexts, trust system of scientific community.

The ideas of [4, 5] were adopted by the criteria table. Using qualitative information derived from stakeholder analysis and objective sampling, data were analyzed by using qualitative data analysis and encoding manual preparation.

Regarding the experimental procedures, the exploration approach was applied for different universities from three fields of specialization: Economics, Engineering, and Pedagogy. Since those three fields are mostly being emphasized by governmental support and regulations in Uzbekistan. Simultaneously, stakeholders were interviewed with reference to their information environment and knowledge infrastructure. By analyzing local journals and written documents of those institutions, we seek to encounter data or implicit patterns and values so that the findings will clarify problems that will be examined and considered for IS solutions.

Another main aspect of this experiment is the analysis of foreign literature relevant to information technologies that were conducted after locally collected data analysis. This approach for data argumentation tries to find scientifically grounded information systems, thereby generating potentially different digital solutions of local information and knowledge management problems. As the result of this literature review approach, a pool of 5 key articles [6 – 11] was formed for the backup plan on solving those problems. Strictly conforming to the main components of information and knowledge management on identifying patterns/factors was considered as success criteria for our research objectives.

To map the intersections between information and knowledge management, we employed a digital sustainability approach which is defined as the deployment of digital technologies for creating, using, or translating electronic source data. Since academic institutions rely on information and communication technologies to achieve public visibility and information sharing, finding IS solutions with consideration of culture that has direct influence in information use and knowledge creation can significantly develop information ecology and knowledge infrastructure.

Our solution-building researchers analyzed local and foreign literature and classified data in tabulated descriptions that will be shown in the results section. The classification was built upon a problem/solution framework in which identified patterns and values of Information management (IM) and Knowledge Management (KM) and relevant IS solutions enhancing them to become sustainable and culturally supported are described. The resulting information technology opportunities exhibit the following methods for effective management.

Natural language processing and network analysis methods of [6] have shown us how discourse analysis of different fields (in the example of policy and science) can be used against sustainable development goals (including education) interdependencies. Next, soft - computing based education and research systems by [7] provided implications about system design techniques and pedagogical practices. The work of [8, 9, 12] has also provided us with fundamental insights about rhetorical structure theory that is widely used for describing the organization discourse of written documents and explained digital application/algorithm based on this framework.

The most important part of this research is to understand the technology–culture linkage and the effects of technology adoption in the developmental paths and pursuing trajectories of information and academic cultures. In this regard, three important points of [13] about advancing our understanding of interactions between technology and culture (determinism, internalism, and contextualism) were chosen as guiding frameworks to interpret our findings from data analysis procedures. This framework of perspectives helped us to find appropriate technological contributions in better information and knowledge management to reach cultural convergence among different cultures of information and academics around many local universities. We could simply separate technology adoption into two components: artifactual (machines, gadgets, instruments and etc.) and axiological (value systems, culture, and worldviews). We accept appropriate adoption of technology as the successful encoding of values and belief of innovation and change and acceptable pattern of behaviors in information and knowledge management.

3 Results and discussion

While we were analyzing data derived from different data collection methods (objective sampling, literature review, and stakeholder analysis) as mentioned previously, which sought to determine the cultural patterns and behaviors of academic and information culture on management processes in higher education systems. We could identify general behavioral patterns and factors using qualitative data analysis and encoding manual preparation. The results were tabulated in descriptive style as shown on the following page (see Table 2).

Table 2. Proposed IS solutions, cultural Behaviors and facts of Uzbeks Higher Education Institutions.

Fields of specialization and chosed Universities	Appropriate IS solutions for IM/KM according to university academic and information cultures	The most important general cultural facts and behavioral patterns based on data analysis and cultural components
Economics (Tashkent state university of Economics, Samarkand branch of TSUE, University of World Economy and Diplomacy)	Dara driven systems for capturing ever-changing cases of market and trade Decision support systems built upon authentic datasets Social media oriented information ecosystem (such as telegram, Facebook) Machine learning based applications for managing unpredictability and uncertainty of knowledge and information researches.	The main strategies and behaviors of local economics education in terms of information sharing and knowledge building are directed to cultivating competitive and export oriented Entrepreneurial mindsets, strengthening intellectual potential and increasing knowledge economy
Engineering (Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, Namangan Institute of Engineering and technology, Andijan Machine-Building Institute, Tashkent State Technical university)	VR technology integration into educational processes Design thinking oriented technologies (like canva.com, e-labs, electronic design models of engineering artifacts etc.)	Developing appropriate academic environment for cultivating STEAM workforce and developing hard sciences are the main knowledge building and information sharing strategies while positive productive attitudes of academic and information culture at medium level can be related to high regulatory standards and well developed innovation and competition spirits and attitudes
Pedagogy (Tashkent State Pedagogical University, Tashkent State University of World Languages, Tashkent State University of Oriental Studies)	Intelligent tutoring systems (like automated scientific discourse and language tools) Data driven technologies (such as corpus based applications and data driven analytical instrument) to reach multidisciplinary and authentic content teaching and effective knowledge building	Communicative teaching methods and multimodal presentation are the main information processes; Using Multidisciplinary approaches for high level of pedagogical output is regarded as the main knowledge oriented missions;

It should be noted that IS solutions in the second column are recommended for fostering technology–culture linkage in their information and knowledge management to enhance both their value systems and information/knowledge improvement. These IS solutions along with documented evidence from data collection methods are culturally well suited with digital sustainability of effective information and knowledge management that must be achieved.

4 Conclusion

The findings and discussion mentioned above suggest that the increased efficiency of every higher education organization specialized in economics, engineering, and pedagogy should be both the product of intelligent IS solutions and cultural considerations that are suggested in this research study. Through investment in culturally responsive IS research, universities can increase the efficiency of information and knowledge management. Digital sustainability of Information and Knowledge management means that academics should stop superficial adoption of technology without consideration of cultural trajectories of their academic affiliations. Finally, future research directions of digital sustainability need to be considered into innovative cultural ways of information and knowledge management domain since successful management needs managers to keep up-to-date with recent advances and culture such as Artificial Intelligent, big-data-driven systems, and machine learning-based management.

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