Strategic Information Systems Planning for Higher Education in Uganda

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Abstract. Strategic Information Systems Planning (SISP) system is very crucial for service operations and competencies in Higher Education Institutions. Some studies show that SISP enhances competitiveness and improves operational efficiency. Currently, many Institutions of Higher Education all over the world are faced with a lot of significant problems that have hindered their implementation of useful programs such as strategic information systems that would promote quality teaching and learning. Strategic information systems planning is a very important part of the education sector since it aligns Information Technology with business structure, and this helps organizations to quickly reach their desired goals in the shortest time possible. This research aims at introducing the ASWOT analysis method to implement strategic information systems planning in Ugandan Higher Education. This paper benefits Ugandan university leaders and strategists by increasing the awareness and understanding of SISP and its implementation to promote Higher Education systems.

1. Introduction
Globally, Information Technology continues to be recognized due to the important roles it plays in strategizing businesses [1]. Strategic information systems planning (SISP) is the step by step alignment of the connection between Information technology and businesses to create alignment [2]. For almost 3 decades, the global importance of alignment has been one of the top information technology surveys. The term alignment fully addresses how business must be aligned with IT, and how IT must be aligned with the business and develop a competitive performance. Organizations can easily create value out of their IT assets by furnishing them in a way that supports business processes according to business strategy. Previous studies in the Information System field have showed an increased desire in exploiting data about alignment and the significance or benefits of aligning business with IT. This therefore provides valid evidence of encouraging results from the performance of businesses when aligned with IT [3].

Aligning the business strategy with key IT resources such as managerial skills, technical IT skills, and physical IT infrastructure components increases the performance of organizations. In addition to the above, effectively managing IT resources and supervising deployment using suitable structures helps to create alignment faster and allow business visions and resources to accommodate changes [4].

However, for any organization to excel using trending information technologies, the TOP management must ensure that its information systems are aligned with its development strategy [5]. SISP helps organizations to work effectively, increase the competitiveness of businesses, and creates new opportunities. Joining business strategy together with the business structure, IT strategy, and the IT structure leads to coalignment and thus high business performance. In the current digital business
life and in Higher Education, strategic information systems planning is an important factor that organizations must aim at achieving. However, SISP tends to be one of the major management issues facing businesses today [6]. The nature of Information Systems in today’s organizations has raised high pressure to adopt technology assets thus raising the need for SISP. SISP is, therefore, a crucial role facing Institutional information systems executives and Top organizational parties [7]. Uganda’s education institutions are still facing challenges concerning the implementation of SISP and this has hindered the excellency of Uganda’s institutions of higher education. Institutional leaders need to understand their strength and maintain them, weaknesses and lay strategies to fight them, opportunities and capture them, and finally threats to be secure. This paper therefore aims to provide a solution by introducing the SWOT analysis in Ugandan Higher Education and suggest SISP strategies that Uganda institutional leaders can follow to reach their success. This research will contribute to the growth and digitalization of Ugandan higher education institutions by helping Ugandan university leaders and strategists to have the awareness and understanding of SISP and its implementation thus promoting Higher Education systems.

2. Related Work

2.1. Information systems and IS strategy
Information systems do a very essential role in organizations. They help organization workers to carry out their daily activities. In the same manner, these programs help leaders to understand the daily activities performed within the company. In other words, organizations can watch their daily performance and be able to make proper decisions using information systems. Without a doubt, Information systems can be considered as strategic resources in organizations.

Within their performance, Information Systems have very important strategic functions they play towards the business success, of which include, helping organizations to increase the organizational competitive advantage, improving performance and productivity, developing new business opportunities, and raising new ways of managing organizations. However, Information Systems must follow an Information System (IS) strategy. An Information System strategy can be simply defined as a documented plan that states utilization measures of technology and Information Systems as part of an organization’s business strategy. The design of the IS strategy must support the general organization's business plan (ref). The IS strategy is useful in a way that it’s the one that provides a criterion upon which organizations will measure their convergences and divergences towards the main goals and objectives of the businesses. Although SISP greatly determines organizations’ rate of success, when poorly planned, it ruins the business. Quite many organizations usually forget that the successful implementation of SISP greatly depends on how the strategic plan is achieved.

To accomplish a good strategic plan, planners must follow a step by step procedure that ensures a balanced and fashionable alignment of organizational, business, and information strategies [8] . Furthermore, the responsible parties must determine the general role of using information systems and applying IT in an organization. Overall, SISP must be part of the general organizational plan. The steps involved in information systems strategic planning (SISP) are; (1) Create IS planning roles by auditing IS and getting guidance from organizational strategy, (2) Set IS objectives and principles, as this will help to determine the is architecture and IS organizational architecture, (3) Disseminate and plan IS actions, and Lastly, (4) Manage, resolve and review the IS strategy.

2.2. Strategic Information Systems Planning (SISP) and its benefits
Over the past years, SISP has proved to be one of the most important tools that can be used to successfully introduce and optimize technology in business. The success of any Information System is greatly connected with the strategic information systems plan. In the modern era of technology, organizations involve collaborative planning parties to take the responsibility of IT issues unlike in the ancient era of technology where the whole responsibility was always left to system professionals
alone. Among the involved parties, Top business managers, external stakeholders, business branch managers, systems professionals, and technology experts must be included for effective planning.

Using SISP in organizations is believed to be of very great importance toward the success of the business. The use of SISP in an organization bridges a close relationship between the system users and Information Technology professionals. This is because, with the existence of these systems, the two parties must come together and unite to make these systems function effectively by understanding the problems facing them to achieve organizational success. With strategic information systems planning, organizations can develop opportunities for information systems development. This can be done by ranking such systems through their working ways, and their effectiveness. SISP provides organizations with the capacity to reach their organizational goals using Information Systems. With effective SISP, companies can easily impact their strategies.

Aligning Information Technology with business effectively gives proper guidance to top managers about how the organization’s information systems must be developed. SISP maintains a proper usage of information systems resources in an organization. SISP can provide organizations with perfect ways of preparing for unexpected barriers by increasing the competency of companies. More so, using SISP in organizations ensures that new systems employed in organizations always meet the users’ expectations. It promotes proper communication and a good interface between new and old systems. SISP always ensures information systems infrastructure consistency with the organization’s strategic vision.

A good strategic plan to be employed in any organization must reach its goals. Employing a strong strategic information systems plan (SISP) is a significant part to be accomplished by any organization as it helps in identifying useful strategic applications and aligning organizations’ strategies with excellent information systems that help to reach their goals. SISP helps to bring business’ standards to the top.

2.3. The Role of IT in higher education

In today’s world, Information Technology has proved to be useful in many aspects of life including the education sector. Even though education centres have enforced the curriculum to include the acquisition of skills in using technology to produce, evaluate, exchange, and store information, educational systems all over the world continue to develop the digital competency of students [10]. Through the gamification concept, Information technology has played a big role in promoting education in the current error by introducing interesting technologies to make students motivated and interested in learning and therefore able to develop a clear understanding of the concepts being taught in class through participation. An example of such technologies is learning using Kahoot and quizzes [11], [12], [13].

As an application of IT in the education field, online learning is growing at a rapid rate today. Online learning platforms are very important in higher education systems in a way that they ease both the teaching and learning processes [14]. More so, the act of utilizing mobile technologies to attain skills and knowledge is referred to as mobile learning [15]. As the coverage of mobile networks increases today, mobile learning technologies have brought an increased positive effect in the education domain as students can access, communicate, and share information faster and easier. In nursing institutions, ICT skills are a very important part that needs to be acquired by the nurses in addition to nursing skills. This is because the health care system is increasingly becoming technology-dependent and thus rising the demand for nurses to get equipped with IT skills to apply in their working activities [16]. In addition to that, with the use of IT in Higher education systems, educators get an opportunity to improve learners’ performances and their teaching methods [17]. Therefore, much as SISP can be applied in businesses to see their success and high-profit production, it can also be implemented in other sectors like Education. Therefore, Institutions need proper information systems to manage their processes and manage their data. Unfortunately, SISP is still an underscore in Higher Education [18].
2.4. The Status of Ugandan Higher education

In developing countries, educational institutions are trying to adopt the IS strategy to help them in easing their teaching and learning activities as well as other institutional activities such as planning and management. Ugandan higher education has shown rapid growth since the year 2006 up to today. Uganda has about 56 Education Institutions in total, with 11 as public universities, 39 private universities, 3 military universities, and other 3-degree awarding institutions. Makerere University is the best university in Uganda and the oldest in East Africa [19].

Although Uganda is showing a sign of development of higher education by showing an increased number of institutions, most of them have not yet adopted the use of Information Systems and this has caused weaknesses in the teaching-learning and management processes. Therefore, there is a need for the NCHE which is a responsible body for managing all institutions of Higher education in Uganda to strengthen the use of Information Systems in Higher education as well as ensure that there is a strong strategic information system plan to align IT with the overall institutional strategies.

3. Methodology

3.1. The data of this research

This research was done by gathering SISP information about Higher education in Uganda. Later, a SWOT analysis was suggested to equip Ugandan higher education with a Strategic Information Systems Planning. According to the National Council of Higher Education in Uganda, Strategic Planning in higher education is based on core functions that include: (1) Developing, implementing and reviewing minimum standards and regulations for higher education, (2) Enhancing HEIs for better quality performance, (3) Strengthening institutional data management, documentation, and dissemination, (4) Strengthening research and innovation, (5) Improving resource mobilization at NCHE; and, (6) Strengthening the support functions ability to create an effective and efficient distribution of services. Therefore, a SWOT analysis can be a very good technique to promote SISP in the Ugandan Higher Education.

3.2. SWOT Analysis

Employing the SWOT analysis indicates that the National Council for Higher Education of Uganda has extensive strengths it can widen on and several opportunities it can exploit for SISP to be successful. Besides, it has several weaknesses that it must address and numerous threats to guard against. The internal environmental scan is presented in Table 1, while the external environmental scan is in Table 2.

3.3. Scan of the Internal Environmental

Table 1 presents the strengths and weaknesses of Uganda’s National Council of Higher Education, of which the weaknesses hinder the successful implementation of SISP. It also indicates suggested strategies to ensure that the strengths are maintained to avoid them turning into weaknesses. It also indicates suggested strategies to ensure that the NCHE intervenes on the weaknesses so that they can turn into its strengths. A good Strategic Plan should capture these strategies under respective pillars and strategic objectives as a commitment towards the success of implementing a strategic plan.

Table 1. Scan of the Internal Environment

| Current Institutional Strengths of Uganda's Higher Education | Strategic plan to maintain the strengths (SISP) |
|-------------------------------------------------------------|-----------------------------------------------|
| 1. NCHE has a legal mandate (legal law) to help it carry out tasks. | 1. Law should be continuously amended. |
| 2. A conducive working environment                             | 2. Maintenance of IT facilities and equipment. |
|                                                             | 3. Establish appropriate modalities of          |
3. Availability of space
4. Highly skilled Human Resource
5. Existence of internal policies and regulations
6. Corporate identity of NCHE

4. Existing ICT policies must be continuously reviewed and disseminated.
5. There must be increased visibility of SISP.

### Weaknesses of the Council currently

| Weaknesses                              | Strategies to create a chance for SISP |
|----------------------------------------|----------------------------------------|
| 1. Large Governing Council             | 1. Review the Council composition      |
| 2. Understaffing                       | 2. Recruit more ICT professional staff |
| 3. Inadequate funds to support ICT activities | 3. Generate more income-generating strategies |
| 4. Poor visibility of NCHE             | 4. Increase the visibility of ICT in the NCHE |
| 5. Inadequate standards on some aspects such as E-learning | 5. Develop an E-learning regulation strategy |
| 6. Semi-autonomous entity              | 6. Develop a robust functional Monitoring and Evaluation System for ICT services |
| 7. There is poor monitoring and evaluation of ICT in Ugandan Institutions | |

### 3.4. External Environmental Scan

Table 2 below shows the Opportunities and Threats as external factors that may impact the implementation of a strategic Information Systems plan both positively and negatively respectively. The NCHE must strategize on ensuring that the listed opportunities are tapped for the benefit of the implementation of this strategic plan. Strategies also must be laid to guard against the threats towards the successful implementation of this strategic plan. These will also be captured under the risk management process, through developing a risk management plan for a good Strategic Plan.

**Table 2. External Environment Scan**

| Opportunities Available                                                                 | Strategies to support SISP                                      |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| 1. There is the availability of funding from donors                                    | 1. Increase visibility – branding                               |
| 2. Introduced technology – MIS                                                          | 2. Automate all process in Higher education and at NCHE         |
| 3. Collaborative agencies                                                               | 3. NCHE must request for more funds from Gov’t and other agencies to support ICT in higher education. |
| 4. The political wing supports Higher Education                                         | 4. NCHE to be autonomous with a VOTE                             |
| 5. Uganda is a hub of Higher Education in the region                                    | 5. Become a leading Influence in regional higher education regulation |
| 6. Some trained ICT professionals in Uganda can manage IS systems                      |                                                                 |

| Existing Threats against SISP                                                         | Strategies against Threats                                     |
|----------------------------------------------------------------------------------------|----------------------------------------------------------------|
| 1. Overlapping mandate with the Act                                                    | 7. Establish Leaders of Universities to jointly handle issues  |
| 2. The attitude of international students                                               | 8. Put in place policies – establish                           |
| 3. Social-Political interference                                                        |                                                                 |
4. Weak and conflicting laws of Institutional leaders  
5. Profit-minded Institutions which are hard to regulate and can’t support SISP  
6. Embezzlement of ICT funds in higher education  
9. Disseminate ICT information widely the whole education systems  
10. Encourage entrepreneurship in HEIs  
11. Develop and implement regulation policies

3.5. Implementation of SISP objectives for higher education in Uganda

To implement a good Strategic information Systems Plan, the national council of higher education in Uganda needs to reach six strategic objectives of the Strategic Plan i.e; (1) Developing, implementing and reviewing minimum standards and regulations for higher education, (2) Enhancing HEIs for better quality performance, (3) Strengthening institutional data management, documentation, and dissemination, (4) Strengthening research and innovation, (5) Improving resource mobilization at NCHE; and, (6) Strengthening the support functions ability to create an effective and efficient distribution of services.

These strategic objectives can be implemented using the following strategic actions, each objective has a way through which it can easily be implemented. For the Ugandan NCHE to achieve all the above strategic objectives, it needs to implement some actions on its Institutions of Higher Education. The objectives and how they can be implemented are summarized in table 3.

Table 3. SISP objectives and their implementation for Ugandan HEIs

| Objective | Implementation / Strategic Actions |
|-----------|-----------------------------------|
| 1. Develop, implement and review minimum standards and regulations for higher education | - Develop Minimum Standards  
- Implement the Developed Minimum Standards  
- Review Expired Minimum Standards  
- Implement ICT skills in Uganda’s Higher Education Qualifications Framework.  
- Develop, implement and review Institutional Regulations |
| 2. Promote Higher Educational Institutions for better quality performance using ICT activities | - Strengthen the ability of Human Resource of HEIs in quality and digital assurance compliance |
| 3. Strengthen the management of Institutional data and documentation | - Develop capacity for Data Management  
- Employ corresponding ISs  
- Streamline the process and expand the scope of documentation and dissemination  
- Develop internal capacity for research and support to innovation  
- Operationalize the Research Policy |
| 4. Strengthen Research and Innovation | |

Table 3. SISP objectives and their implementation for Ugandan HEIs
5. Improve resource mobilization for ICT at NCHE
   • Get more funding from Government to support ICT in Institutions
   • Lobby for a separate vote from Government
   • Increase compliance of the students’ contribution

6. Strengthen the Capacity of support functions to facilitate effective and efficient delivery of trending technologies and services provided by NCHE
   • Strengthening the legal support function and Internal Audit functions
   • Strengthening Administration & HR Function
   • Strengthening NCHE Visibility and Collaborations

4. Discussion
Institutions of higher education need to involve information technology in their daily activities. However, institutional leaders need to plan, develop and implement IS strategies to enhance strategic use of information systems. This paper applied a SWOT analysis on strategic information systems planning (SISP) within the institutions of higher education in Uganda. The institutional strengths of Uganda’s higher education were exploited first and a strategic plan to maintain the strengths was suggested in the first part of table 1. As seen in the second part of table 1, the weaknesses of the national council of higher education (NCHE) as well as the leaders of Ugandan higher institutions were also exploited and after understanding them, suggestions to create a chance for SISP involvement were suggested. Table 2 shows the opportunities available in the Ugandan Institutions of higher education which could be exploited and clearly suggests strategies that can be laid to support SISP.

As seen in the second part of table 2, the threats that may hinder the development of SISP in Ugandan institutions of higher education are explained and possible strategies clearly suggested by the authors as Institutions need to understand the existing changes within the institutional environments in order to be able to manage their institutional information systems strategically. Lastly, table 3 suggests that the national council of higher education in Uganda needs to reach six strategic objectives in order to implement a good strategic information systems plan (SISP) and shows how these objectives can be implemented by institutional leaders to promote SISP success in Ugandan Institutions. Since information systems concentrate on the existing structures through promoting infrastructure of Organizations and their general strategy, authors hope that when these suggestions are implemented in Ugandan Institutions of higher education, strategic information systems planning can provide Institutions with the capacity to reach their desired goals.

5. Conclusion and future work
In conclusion, Institutions of Higher Education must use appropriate strategies based on the existing business plans of the Institution. Using a SWOT approach in the structure helps to measure the effectiveness of Information Systems effectiveness, efficiency plus user appreciation. Institutions of Higher Education can objectively align their Information systems strategies to avoid the problems facing them by increasing competitiveness. However, Institutional heads need to take heed of the importance of Strategic Information Systems Planning because failure to align IT with the overall Institutional strategy may not only lead to a big waste of expensive information systems resources but also lost Institutional opportunities. It is important for the stake holders and policy makers to take seriously the implementation of the suggested six SISP objectives, each one of them according to the suggested strategic actions. The authors of the study faced a challenge of limited information in previous studies about this topic therefore in the future work, authors greatly encourage and hope that this study can be used as a basis for interested researchers to carry out related studies in the field of SISP in promoting higher education or other closely related studies. Future studies can compare SISP
activities with other academic Institutions in other countries because this study only concentrated on Uganda’s institutions. Furthermore, a deeper analysis of how these Institutions can maintain SISP and gain competitive advantage is also needed.

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References
[1] G. F. G. Teixeira and O. Canciglieri Junior, “How to make strategic planning for corporate sustainability?,” J. Clean. Prod., vol. 230, pp. 1421–1431, 2019, doi: 10.1016/j.jclepro.2019.05.063.
[2] S. Maharaj and I. Brown, “The impact of shared domain knowledge on strategic information systems planning and alignment,” SA J. Inf. Manag., vol. 17, no. 1, pp. 1–12, 2015, doi: 10.4102/sajim.v17i1.608.
[3] D. Globocnik, R. Faullant, and Z. Parastuty, “Bridging strategic planning and business model management – A formal control framework to manage business model portfolios and dynamics,” Eur. Manag. J., vol. 38, no. 2, pp. 231–243, 2020, doi: 10.1016/j.emj.2019.08.005.
[4] D. Ojha, P. C. Patel, and S. V. Sridharan, “Dynamic strategic planning and firm competitive performance: A conceptualization and an empirical test,” Int. J. Prod. Econ., vol. 222, no. September, p. 107509, 2020, doi: 10.1016/j.ijpe.2019.09.030.
[5] A. A. Altameem, A. I. Aldrees, and N. A. Alsaeed, “Strategic information systems planning (SISP),” Lect. Notes Eng. Comput. Sci., vol. 1, pp. 168–170, 2014, doi: 10.4018/jsds.2010040102.
[6] D. Uzarski and M. E. Broome, “A Leadership Framework for Implementation of an Organization’s Strategic Plan,” J. Prof. Nurs., vol. 35, no. 1, pp. 12–17, 2019, doi: 10.1016/j.profnurs.2018.09.007.
[7] D. R. Hermanson, J. G. Tompkins, R. Veliyath, and Z. (Shelly) Ye, “Strategic planning committees on U.S. public company boards: Axiomatic or paradoxical?,” Long Range Plann., no. April 2018, p. 101967, 2020, doi: 10.1016/j.lrp.2020.101967.
[8] A. Posch and C. Garaus, “Boon or curse? A contingent view on the relationship between strategic planning and organizational ambidexterity,” Long Range Plann., no. March, p. 101878, 2020, doi: 10.1016/j.lrp.2019.03.004.
[9] D. Globocnik, R. Faullant, and Z. Parastuty, “Bridging strategic planning and business model management – A formal control framework to manage business model portfolios and dynamics,” Eur. Manag. J., 2019, doi: 10.1016/j.emj.2019.08.005.
[10] J. Gil-Flores, J. Rodríguez-Santero, and J. J. Torres-Gordillo, “Factors that explain the use of ICT in secondary-education classrooms: The role of teacher characteristics and school infrastructure,” Comput. Human Behav., vol. 68, pp. 441–449, 2017, doi: 10.1016/j.chb.2016.11.057.
[11] D. Orhan Gökşün and G. Gürsoy, “Comparing success and engagement in gamified learning experiences via Kahoot and Quizizz,” Comput. Educ., vol. 135, no. February, pp. 15–29, 2019, doi: 10.1016/j.compedu.2019.02.015.
[12] A. I. Wang and R. Tahir, “The effect of using Kahoot! for learning – A literature review,” Comput. Educ., vol. 149, p. 103818, 2020, doi: 10.1016/j.compedu.2020.103818.
[13] M. Urh, G. Vukovic, E. Jereb, and R. Pintar, “The Model for Introduction of Gamification into E-learning in Higher Education,” Procedia - Soc. Behav. Sci., vol. 197, no. February, pp. 388–397, 2015, doi: 10.1016/j.sbspro.2015.07.154.
[14] A. H. Aldholay, Z. Abdullah, T. Ramayah, O. Isaac, and A. M. Mutahar, “Online learning usage and performance among students within public universities in Yemen,” Int. J. Serv. Stand.,
vol. 12, no. 2, pp. 163–179, 2018, doi: 10.1504/IJSS.2018.091842.

[15] H. Hamidi and A. Chavoshi, “Analysis of the essential factors for the adoption of mobile learning in higher education: A case study of students of the University of Technology,” *Telematics and Informatics*, vol. 35, no. 4, Elsevier, pp. 1053–1070, 2018.

[16] A. Harerimana and N. G. Mtshali, “Types of ICT applications used and the skills’ level of nursing students in higher education: A cross-sectional survey,” *Int. J. Africa Nurs. Sci.*, vol. 11, no. July, p. 100163, 2019, doi: 10.1016/j.ijans.2019.100163.

[17] V. Nikolić, D. Petković, N. Denić, M. Milovančević, and S. Gavrilović, “Appraisal and review of e-learning and ICT systems in teaching process,” *Phys. A Stat. Mech. its Appl.*, vol. 513, pp. 456–464, 2019, doi: 10.1016/j.physa.2018.09.003.

[18] F. A. Goni, A. G. Chofreh, M. Mukhtar, S. Sahran, S. A. Shukor, and J. J. Klemeš, “Strategic alignment between sustainability and information systems: A case analysis in Malaysian public Higher Education Institutions,” *J. Clean. Prod.*, vol. 168, pp. 263–270, 2017, doi: 10.1016/j.jclepro.2017.09.021.

[19] Wikipedia, “List of universities in Uganda,” *Wikipedia*, 2019. https://en.wikipedia.org/wiki/List_of_universities_in_Uganda (accessed May 15, 2020).