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Knowledge assets of higher education institutions in Uganda: proposing a framework for assessing human, structural and relational knowledge assests

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In the current knowledge economy, it is becoming crucial that higher education institutions (HEI) are able to identify and measure their knowledge assets bases as a way to achieve a competitive edge in the market. The purpose of this paper is to assess the knowledge assets of HEI in Uganda by identifying and testing of the relative importance and ranking of the relevant knowledge assets indicators based on the categorization of human assets, structural assets and relational assets. The paper identifies the key indicators to constitute the dimensions of the adapted framework which is then applied with the help of a questionnaire using descriptive analysis to test the relative importance and ranking of the knowledge asset indicators identified in achieving higher education goals. The main dimensions of knowledge assets indicators in higher education in Uganda are also determined using an exploratory factor analysis. The results from the case study highlight key knowledge assets indicators; provide insights into the relative importance and ranking of the proposed indicators; and identify the main dimensions of knowledge assets of HEI in Uganda. By proposing and empirically testing a framework for analyzing the knowledge assets strength and weaknesses of HEI, the paper confirms the usefulness of the adapted framework and provides all the stakeholders with a direction for building a strong knowledge assets base so that prioritization of critical resources and performance measurements can be made to advance higher education goals.

Keywords: higher education; institutions; universities; knowledge assets; framework; Uganda

In today's ever-changing and increasingly competitive higher education sector where knowledge is considered as power, it is critical to identify and understand what are the knowledge-based value drivers affecting academic pursuits. We are living in an age in which

the information and communication technology (ICT) revolution has inundated knowledge users with more information than ever before, even as the higher education marketplace has become more complex. But simply having more information does not necessarily mean people have more knowledge. The society based on knowledge has the mission to engender knowledge, disseminate it through education and professional training, spread and put it into value in innovations and technological development. Even more important, investments in education and research, innovation and technological transfer ensure the development of the society economically through the roles that are played by higher education in general and universities in particular.

According to Miller and Shamsie (1996), knowledge has long been recognized as a valuable resource for organizational growth and sustained competitive advantage, especially for organizations competing in an uncertain environment. With the emergence of the knowledge-based economy where knowledge, competence and related intangibles are the key drivers of competitive advantage in achieving higher education goals, we are witnessing many changes in the nature of education, and the demands placed on HEI, so that they become storehouses of innovation where wellsprings of talents are nourished and sustained (Seleim and Ashour, 2004). In addition, many researchers agree that knowledge assets have significant importances for obtaining a competitive edge and for the capacity of HEI to create values (Stewart, 1997; Peltoniemi, 2006). Although over the last few decades, knowledge management and knowledge assets measurement and evaluation have mainly appeared in the context of the private companies, there are increasing interest from public organizations such as HEI to harness and enhance the effectiveness of knowledge resource management to achieve their main goals of production and dissemination of knowledge (Sanchez et al., 2006).

Leitner (2002) points out that as organizations which are mainly financed by public funding, HEI are confronted with an increased demand by the owners and citizens for transparency regarding the use of those funds. This call for public accountability requires the disclosure about the social and economic outcomes of higher education. Furthermore, HEI are constantly faced with new paradigms for knowledge production, often labeled as 'modus II of knowledge production', which are characterized by a stronger orientation towards applied research and the necessity for an interdisciplinary research approach (Gibbons, 1994). These imply the urge for HEI to harness the knowledge assets at its disposal and collaborate more frequently with other research institutions in both the private and public sector as well as through participation in international research networks. This development has been accelerated by the use of ICTs, which enable more intensive cooperation and also provide new techniques for knowledge access and use in a more efficient way.

In the current highly globalized world, competitive advantage and human resource development in higher education will not depend only on access to knowledge at the local,

institutional, national, regional and international levels, but also on the strength of the HEI own knowledge assets base through both the ability to generate and locate existing raw knowledge, and to convert the knowledge raw materials into something productive in innovative and creative ways. According to Malhotra (2003), every society owns or controls a number of knowledge assets and the measurement of the level of this stored knowledge as embodied in individuals, institutions and systems, as well as the potential to enhance existing knowledge assets and generate new knowledge is very useful and serve as a valuable diagnostic, awareness raising and advocacy tool, pinpoint shortfalls in available knowledge resources, and mobilize political support for remedial measures to be taken to address knowledge resource challenges in higher education.

There is growing criticism that the traditional balance sheet as we know does not take account of those intangible factors that largely determines higher education value and growth prospects. The 'unreported' assets are on average five to ten times those of the tangible assets. Furthermore several studies show that future growth is determined not by historical financial accounts but by factors such as management skills, innovation capability, brands and the collective know-how of the workforce (Badenhausen, 2002; Low and Kalafut, 2002; Sullivan, 2000). Consequently more organizations are starting to address the measurement and management of intangible assets within individual institutions, and it is within this context that the desire to assess empirically the knowledge assets of HEI in Uganda originates. To achieve this aim, the study used a review of existing theories and practical experiences to identify the key indicators to constitute the human, structural and relational assets of the adapted framework. The framework is then applied with the help of a questionnaire to test the relative importance and ranking of the knowledge asset elements identified, as well as identify the factors or latent phenomena that lie in the data so as to identify the key dimensions of knowledge assets of the HEI in Uganda to advance higher education goals. The paper begins with a review of relevant background concepts, followed by a description of the research methodology, and presentation and discussion of the results. Finally, a concluding remark and highlights of the areas for further research are made.

Background

Knowledge assets

In this paper, the terms 'knowledge assets', 'intellectual assets', intangible assets' and 'intellectual capital' are used interchangeably to denote a combination of intangibles and activities that allow an organization to transform a bundle of material, financial and human resources in a system capable of creating stakeholder's value and organizational innovation (European Commission, 2006). Green (2007) defines knowledge assets as knowledge-based resources, or manifestations of the existence of knowledge, owned or held by an organization,

whose value can be extracted and used to increase organizational effectiveness in accordance with its strategy. Boisot (1998) notes that knowledge assets are manifested in terms of technologies, competences and capabilities. Technology is defined here as a 'socio-physical systems configured so as to produce certain specific types of physical effects'; competences denote 'the organizational and technical skills involved in achieving a certain level of performance in the production of such effects'; and capability refers to the 'strategic skills in the application and integration of competences'. Knowledge assets thus include a set of intangible elements (resources, capabilities and competences) that drive the organizational performance and value creation (Bontis, 1998; Roos et al., 1997).

In contrast to physical assets that may have a limited life because of wear and tear, knowledge assets may in theory last forever. Given their open-ended value, there is no one-to-one correspondence between the effort required to create knowledge assets and the value of services they yield (Malhotra, 2003). The distinction between the terms data, information, and knowledge is useful in explaining the contrast between physical assets and knowledge assets. According to Malhotra (2003), in contrast to data that can be characterized as a property of things, knowledge is a property of agents predisposing them to act in particular circumstances. Information is that subset of the data residing in things that activates an agent through the perceptual or cognitive filters, and in contrast to information, knowledge cannot be directly observed. Its existence can only be inferred from the actions of agents. Hence, in contrast to the emphasis on tangible input-focused measures of physical assets, knowledge assets require understanding in terms of quality and content of performance outcomes.

Knowledge and competitive advantage

The nature and value of intangible assets within organizations as a source of competitive advantage, although is said to be extremely important, is not well understood (Swart, 2006), and are characterized by a large variety of views and interpretations (Wilkinson et al., 2009). Underlying the range of views and interpretations are the problems of the composition and measurement of a conceptual asset, not immediately embodied in physical form, which is intended to generate value. Because organizations require stock of knowledge-based assets to function, and the value created and extracted from knowledge generating activities such as education and research remains largely unmeasured, it is understood that organizations invest in intellectual assets to increase knowledge, reduce uncertainty, gain fast access to market advantages, and create scalability and network effects (European Commission, 2003). The realization of the importance of valuing and measuring knowledge assets have thus emerged with the recognition of the existence of a large stock of intangibles that cannot be quantified, and that may be more beneficial to production and growth than cash, fixed capital, and tangible assets (Sullivan, 2000).

According to Gupta and McDaniel (2002), one central measure of organizational effectiveness is the creation and continuance of a measurable competitive advantage. Many broad initiatives such as efficiency, core competency advancement, actualization of customer-centric products and services, and limitation of the fixed costs of doing business can help to achieve a sustainable competitive advantage within the marketplace. Knowledge assets management is thus a targeted expertise designed to impact productivity and innovation in profound ways. It represents a new task that is changing the competitive landscape of contemporary business (Sarvary, 1999). Knowledge assets management may exploit supply-side or demand-side economies of scale (Ofek and Sarvary, 2001). In the former case, the role is to reduce the operating costs of the firm, while in the latter case its role is to create added value to customers by appreciably increasing product quality. Thus, the effective management of knowledge understandably has the capacity to deeply impact the way a firm does business from the minor details of daily operations to the broadest strategic decision-making processes.

Knowledge assets and higher education

Investment in human resources is at the heart of what all HEI aim to achieve and their contributions at local, national and international level are not new phenomena. Higher education is vital in an increasingly knowledge-driven society as both creators and consumers of knowledge. As creators of knowledge, higher education makes a significant contribution to the intangible assets – knowledge, skills and innovation – that have become a source of comparative advantage for thriving businesses across all sectors in national economies. Higher education also consume knowledge through demanding highly skilled work forces that join high and medium technology firms such as communication and computing services, research and development, financial services, business services and health services (Williams et al., 2008). However, the value of knowledge assets in higher education are rarely discussed when cost and effective performance are debated. According to Secundo et al., (2010), higher education systems are today immersed in an intense transformation process triggered by the need to make them more flexible, transparent, competitive and comparable. To face these challenges, they need to consciously manage the processes of creating their knowledge assets and recognize the value of intellectual capital to their continuing role in society (Rowley, 2000). Knowledge assets underpin core competencies of any organization thus playing a key strategic role and need to be measured (Marr et al., 2004).

Secundo et al., (2010) point out that there are a number of reasons why knowledge assets in higher education and research should represent a core aspect to investigate and measure. Firstly, knowledge assets can help to shift strategic focus of non-profit organizations towards intellectual resources and enhance their capability to adapt to the challenges posed by the non-profit environment since some of the theoretical roots of knowledge assets come from the core competence theory (Mouritsen et al., 2005). Secondly, knowledge assets are key value

driver for organizational competitiveness and performance improvement, but financial accounting and reporting practices generally fail to recognize these assets (Schiuma and Lerro, 2008). Thirdly, the ranking of educational and research organizations should be based more on consistent, objective and shared metrics so as to strengthen the links between HEI and companies on the basis of a common language. The entrenchment in traditional measurement paradigms represents, in this sense, a barrier to explore the most interesting reasons for measuring intangibles, i.e. learning (Sveiby, 2000). Fourthly, is the fact that measurement of knowledge assets could bring the 'ivory-tower philosophy' of HEI researches closer to real requirements of the public and industry, resulting into a more transparent assessment of performance (Fazlagic, 2005).

Theoretical framework

Several taxonomies of intangible assets have been suggested in management literature over the recent decades mainly from a business perspective (Sveiby, 1997; Nonaka et al., 2000; MERITUM, 2002; Marr et al., 2004. This study, however, used the classifications based on the social character of knowledge (Brown and Duguid, 1991), where knowledge assets are classified into three components namely human assets, structural assets, and relational assets as the key dimensions to assess the relative importance and ranking of knowledge assets indicators in HEI in Uganda because of its suitability and easy adaptability. Human assets refer to the collective capabilities derived from individuals in firms and includes know-how, capabilities, skills, experiences, and expertise of the human resources of the firm; structural assets refer to organizational competences which may include systems, networks, technology, routines, policies and culture; and relational assets refer to the networks that are developed by organizations with knowledge users, other customers, suppliers, partners and stakeholders.

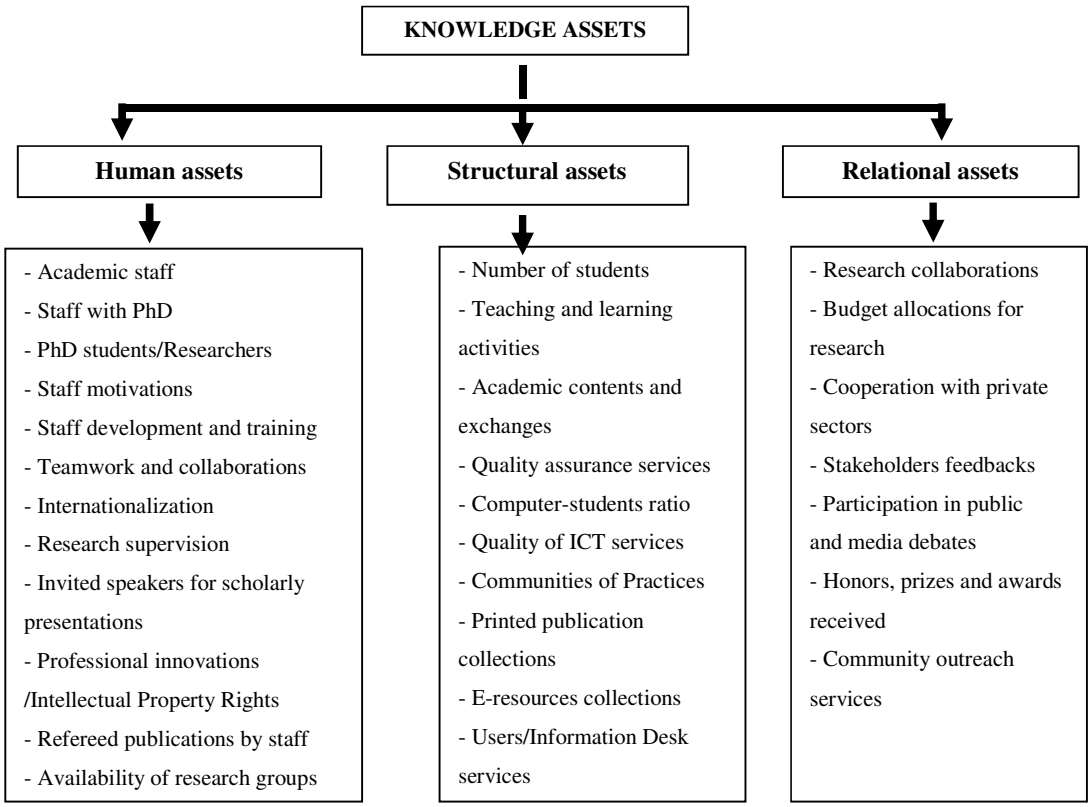
To achieve the aim of the study, a list of knowledge-based activities/services were generated covering the day-to-day information and knowledge production and use of higher education institution's members using the set of guidelines and indicators proposed by Stewart (1997), Renzl (2006) and Sanchez et al (2006) to derive each of the indicators of the human, structural and relationship asset. Figure 1 shows a descriptive framework for the identified indicators of the key dimensions of the adapted framework.

Methodology

The study was undertaken in two phases. The first phase involved reviews of relevant literature to get an overview of the current knowledge assets research situation, identification of relevant theories and concepts to form the basis for the theoretical framework and

generating the component indicators of the key dimensions to be used in the study. The second phase of the study was then carried out with the help of investigative questionnaire using a case study in higher education in Uganda to gather the relevant data. According to Benbasat et al (1987), the case study approach is appropriate for researching areas where there have been few previous studies; and was widely used to generate theories, find indicators of intellectual performance and diversify the context of knowledge assets measurement when the field of intellectual capital measurement emerged in the 1990's (Marr and Chatzel, 2004), reinforcing its suitability for the current research which involves assessing the knowledge assets of HEI in Uganda, where there has been no prior work in the area. The questionnaire tested the relative importance and ranking of the proposed knowledge assets indicators and consisted of 12 indicators for human assets, 10 indicators for structural assets and 7 indicators for relational assets. Each item of the questionnaire is scored on a scale ranging from 1 (not important) to 5 (very important). Finally, an exploratory factor analysis was carried out so that the factors or latent phenomena that lie in the data about knowledge assets indicators can be identified.

Figure 1: Adapted framework for assessing knowledge assets in higher education



Sample and measures

The sampled population for the study was got from 3 public universities and 2 private ones making a total of 5 universities out of the current 28 licensed universities in Uganda. Academic staffs were chosen as the population for the study because of their roles in imparting knowledge to achieve higher education goals using a homogenous sampling approach. A total of 600 questionnaires were distributed with 200 questionnaires being given to Makerere University as the largest public university in Uganda with the other remaining universities getting 100 questionnaires each. Out of the 600 questionnaires that were distributed, 149 were recovered showing a response rate of 24.8% of the population that was chosen. Table 1 gives a summary of the profile of the respondents of the effective questionnaires.

Table 1: Profile of respondents

Profile Characteristics	No. of Respondents	Percentage Responds	Cummulative Percent
University			
Makerere University	45	30.2	30.2
Kyambogo University	31	20.8	51.0
Kampala International University	28	18.8	69.8
Gulu University	21	14.1	83.9
Uganda Christian University	24	16.1	100.0
Sex			
Male	83	55.7	55.7
Female	66	44.3	100.0
Age			
20-29 years	55	36.9	36.9
30-39 years	70	47.0	83.9
40-49 years	22	14.8	98.7
50-59 years	2	1.3	100.0
Qualifications			
PhD	46	30.9	30.9
Master	60	40.3	71.1
Bachelor	43	28.9	100.0

Data analysis

Data analysis for this study included the use of descriptive statistics and exploratory factor analysis using the SPSS statistical software package. Descriptive analysis involves the transformation of raw data into a form that will make them easy to understand and interpret using a precise statistical summary to characterize observations and variables. In this study, the analysis was used to describe the profiles of respondents and determine relative importance and rankings of the identified knowledge asset indicators. Factor analysis on the

other hand was used to determine interrelationships among the knowledge asset indicators that were tested to identify the factors or latent phenomena that lie in the data and their common underlying characteristics. To carry out factor analysis, the correlations matrix of all knowledge asset indicators were computed, factors were then extracted, and the factors were then rotated to create a more understandable factor structure for interpretation (George and Mallery, 2001).

Results and discussion

Relative importance and ranking of knowledge assets indicators

The results from the study yielded evidence that provide valuable insights into the importance, ranking and categorization of knowledge assets indicators of HEI in Uganda.

As can be seen from Table 2, overall, among the main components of knowledge assets in HEI, human assets scored highest with an overall mean rating of 4.07, followed by relational assets at 4.04 and structural assets at 4.02, which indicate that not much differences exist in the level of importance that are attached to the knowledge assets components with the mean range being only 0.05. The results also indicate that among all the identified knowledge assets indicators, printed publication collections under structural assets had the highest mean rating of 4.76; followed by number of academic staff and number of staff with PhD under human assets at 4.66 and 4.65 respectively; and then teaching and learning activities under structural assets at 4.64. The high ranking for printed publication collections at 4.76 when compared to the lower rating for e-resources collections could be a reflection of the heavy reliance on printed publication which forms the bulk of HEI knowledge resource collections as well as the challenges that are faced when accessing online-based knowledge resources. UNESCO (2009), identifies the followings as weaknesses relating to application and use of ICT facilities and services which adversely affect the use of the technology for higher education knowledge management activities in developing countries like Uganda: poor infrastructure; few computers (a low ratio of computers to staff/research students); and the high cost of connectivity which makes high-speed internet service unavailable.

The relative importance and ranking of the human assets component as well as those for the number of academic staff, staff with PhD, staff development and training, and staff motivation demonstrate the relative importance of human assets component of knowledge assets in advancing higher education goals. According to UNESCO (1998), within the higher education context, the organizations biggest asset is its human resources or staff. Bowen and Schuster (1986) further point out that the excellence of higher education is a function of the people it is able to enlist and retain on its faculties, while Zucker et al., (1998) argue that

knowledge that are required for scientific discovery and innovation - a role played by universities and other higher institution of learning - is embodied in a few specific individual. These results further confirm the importance that is attached to human assets and related indicators in achieving higher educational goals.

Table 2: Relative importance and ranking of knowledge assets indicators

Knowledge Assets	Relative Importance (Mean)	Ranking	Std Deviation
Human assets (mean = 4.07)			
1. Number of academic staff	4.66	1	0.612
2. Number of staff with PhD	4.65	2	0.773
3. Staff development and training	4.59	3	0.856
4. Staff motivation	4.56	4	0.977
5. Professional innovations	4.46	5	0.786
6. Refereed publications by staff	4.44	6	0.963
7. Research supervisions	4.32	7	1.030
8. Researchers per group	4.08	8	0.802
9. Teamwork/collaborations	4.05	9	1.009
10. Internationalizations	3.36	10	1.010
11. Number of postgraduate students	3.30	11	1.164
12. Invited speakers for scholarly presentations	2.34	12	0.916
Relational assets (mean = 4.04)			
1. Stakeholders' feedback	4.41	1	0.975
2. Budget allocations for research	4.37	2	1.045
3. Cooperation with private sectors	4.18	3	0.933
4. Participation in public and media debates	3.94	4	0.927
5. Honors, prizes and awards received	3.93	5	0.931
6. Community outreach services	3.85	6	0.820
7. Research collaborations	3.57	7	1.095
Structural assets (mean = 4.02)			
1. Printed publications collections	4.76	1	0.602
2. Teaching and learning activities	4.64	2	0.651
3. Academic contents and exchanges	4.47	3	0.769
4. Quality of ICT services	4.45	4	0.978
5. Quality assurance services	4.45	4	0.836
5. E-resource collections	3.91	5	1.032
6. Communities of Practices	3.89	6	1.004
7. Users/Information desk services	3.71	7	0.883
8. Students computer ratios	3.00	8	1.082
9. Total number of students	2.92	9	0.986

The small range in the differences in the mean ratings for the knowledge assets components as well as the low standard deviation figures demonstrate the robustness of the collected data, as well as the usefulness of proper organizational structure, good incentives, and management in building the knowledge assets bases of HEI. This is mainly because although knowledge assets are grounded in the experience and expertise of individuals in HEI, these institutions need to put in place the structural, social and resource allocation structure that are necessary for transforming knowledge into competencies. How these competencies and knowledge assets are configured and deployed determines higher education outcomes and success as the competitive advantage of HEI in today's knowledge economy stems not from market positions, but from difficult to replicate knowledge assets and the manner in which they are deployed (Teece, 1998). According to Geng et al., (2005), knowledge management in higher education should be seen as the art of increasing value from selected knowledge assets mainly composed of two major knowledge domains, namely; scholarly knowledge and operational knowledge. One way how scholarly knowledge becomes explicit is its dissemination through teaching, research documentation, publications and other activities leading to continuous improvement of staff competencies.

With regards to each individual knowledge assets component, under human assets, the number of academic staff was rated and ranked highest at 4.66 followed by number of staff with PhD, staff development and training, and staff motivation at 4.65, 4.59, and 4.56 respectively implying that staff competences, satisfaction and training may have positive influence on structural assets and relationship assets. Invited speakers for scholarly presentations was rated and ranked lowest at 2.34 under human assets. Under relational assets, stakeholders' feedback was rated and ranked highest at 4.41, followed by budget allocation for research and cooperation with the private sector at 4.37 and 4.18 respectively; while research collaborations was rated and ranked lowest at 3.57. Stakeholders' and knowledge users' feedback can be used as references for knowledge assets improvement thus encouraging the development of competence with their demands. Stakeholders' feedback is therefore of vital strategic significance because the kind of students and staff that an institution of higher learning attracts determines both the quality and quantity of its intangible knowledge assets. Finally, under structural assets, printed publications was rated and ranked highest at 4.76 followed by teaching and learning activities, academic contents and exchanges, and quality of ICT services at 4.64, 4.47 and 4.45 respectively because of the core roles they play in delivering academic services and learning activities in higher education; while total number of students was rated and ranked lowest at 2.92.

Key components of knowledge assets in higher education

To determine the categorization of knowledge assets indicators in higher education, an exploratory factor analysis was carried out in order to determine the factors or latent phenomena that lie in the data about the knowledge assets that were identified by the

institutions. To achieve this, a measure of the sampling adequacy for knowledge assets indicators used in collecting the data was carried out using a Kaiser-Meyer-Olkin (KMO) sampling adequacy. The results indicate that the sampling adequacy is 0.758 (75.8%) which is above 0.6 implying that factor analysis is appropriate for the exploratory study. Table 3 shows the result of the Bartlett's Test of Sphericity which indicates that the test is highly significant as it is less than 0.005 (p = 0.000).

Table 3: KMO and Bartlett's test

Kaiser-Meyer-Olkin index of sampling adequacy		0.758
Bartlett's Test of Sphericity	Approximate Chi-Square	1975.919
	df	406
	Significance	0.000

Table 4 shows that the total cumulative variance explained by the factor analysis is 65.095%. From the rotated component matrix, using Varimax with Kaiser Normalization, the analysis extracted 8 factors as having eigen values of greater than one out of the 29 indicators that were tested, and these have been identified as key components of knowledge assets that are necessary for advancing the goals of HEI in Uganda.

Table 4: Knowledge assets components in higher education

Component	**Eigen values**	**% of variance**
1. Quality of academic staff	4.429	15.272
2. Research and development	4.226	14.573
3. Library and information services	2.697	9.299
4. Teamwork and collaborations	2.139	7.374
5. Public-private partnerships	1.426	4.918
6. Teaching and learning activities	1.415	4.878
7. Quality of ICT services	1.282	4.420
8. Quality assurance services	1.265	4.361
Total of variance explained		**65.095**

(i) Quality of academic staff: This refers to the ability of academic staff to consistently meet academic services and learning needs and expectations of students, and developing the full potential of the knowledge assets resources used in the process (Feigenbaum, 1991). This component classified under human assets explains 15% of the total knowledge assets in HEI. Indicators constituting this component include

number of academic staff, number of staff with PhD, number of research students, staff development and training, and staff motivations.

(ii) Research and development: This refers to the creation of new knowledge and/or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings thus generating new knowledge that are central for sustainable development. Research and development classified under human assets was the second component extracted and explains another 15% of the total knowledge assets in HEI and indicators here include research supervision, professional innovations, resources allocation (budget) for research, invited speakers for scholarly presentations, honors, prizes or awards received, and availability of research groups.

(iii) Library and information services: Library and information services in institutions of higher learning play the central role in facilitating dissemination and creation of new knowledge. In today's high-tech learning environment, library and information services as a learning resource is taking up increasingly more academic space and time in the life of a learner. This component classified under structural assets explains 9% of the knowledge assets in HEI and the indicators include refereed publication by staff, academic contents and exchanges, number of printed publications collection, number of e-resources collections, and user/information desk services.

(iv) Teamwork and collaborations: HEI across the globe are increasingly using teams and collaborations to deliver academic services and learning activities and much of these activities are accomplished through the use of knowledge management tools and technologies to support their communication and collaborative efforts. This component classified under human assets explains 7% of the knowledge assets in HEI and the specific indicators include teamwork/collaborations, Communities of Practices, and internationalizations, research collaborations.

(v) Public-private partnerships: These refer to the cooperative ventures formed between HEI and the private sectors by amalgamating the resource capacity and expertise of each sector so as to provide a stronger base for delivering academic services and learning activities in a more efficient and effective manner. This component classified under relational assets explains 5% of the knowledge assets in HEI and the specific indicators include cooperation with private sectors, participation in public and media debates and community outreach services.

(vi) Teaching and learning activities: These refer to the imparting of new ideas and knowledge by encouraging students to use active techniques (experiments, real-world problem solving) to create more knowledge and then to reflect on and talk about what

they are doing and how their understanding is changing. This component classified under structural assets explains 5% of the knowledge assets in HEI and the specific indicators include total number of students, teaching and learning activities.

(vii) Quality of ICT services: These refer to the framework for optimizing the delivery of cost-effective ICT services in knowledge services through best practices leading to better higher education quality and users satisfaction. This component classified under structural asset explains 4% of the knowledge assets in HEI and the specific indicators include number of students per computer and satisfaction with ICT services.

(viii) Quality assurance services: These refer to the planned and systematic review process of an institution or program to determine whether or not acceptable standards of education, scholarship and infrastructure are being met, maintained and enhanced. This component classified under structural assets explains 4% of the knowledge assets in HEI and included quality assurance services and stakeholders' feedback.

Conclusions and future directions

In the current highly globalized knowledge economy, competitive advantage and human resource development in higher education will depend not only on access to knowledge at the local, institutional, national, regional and international levels, but also on the strength of the HEI's own knowledge asset bases through both the ability to generate and locate existing raw knowledge; and to convert the knowledge raw materials into something productive in innovative and creative ways. The case study presented in this paper assessed empirically the knowledge assets of HEI in Uganda by identifying relevant knowledge assets indicators to constitute the elements of each dimension of the adapted framework. The identified indicators were then tested using case studies of HEI in Uganda to determine their relative importance and ranking in advancing higher education goals. Finally, an exploratory factor analysis was undertaken to determine the different dimensions of HEI knowledge assets.

The evidence from this study points out to the similarities between the knowledge assets indicators of the different HEI in Uganda even if there may be variations in the details and types of knowledge assets, and highlights the rankings of each knowledge assets components and indicators. In addition, the results suggest that the balance between human assets, structural assets and relational assets is critical in achieving higher education goals. This is evidenced from the relative importance and ranking that is attached to each knowledge assets components as well as in the ways they transform and impact on one another. Finally, the findings demonstrate the usefulness of proper organizational structure, good incentives, and management in building the knowledge assets bases of HEI. This is mainly because although

knowledge assets are grounded in the experience and expertise of individuals in HEI, these institutions need to put in place the structural, social and resource allocation structure that are necessary for transforming knowledge into competencies. How these competencies and knowledge assets are configured and deployed determines higher education outcomes and success as the competitive advantage of HEI in today's knowledge economy stems not from market positions, but from difficult to replicate knowledge assets and the manner in which they are deployed.

Although the study has limitation in that it was a case study designed specifically for the HEI in Uganda and thus the results cannot be generalized to other sectors or geographical regions, it has implications for both research and practice. Firstly, in a world where HEI are faced with how to share the limited resources available, this study contributes to both theory and practice by proposing a framework for analyzing the knowledge assets strength and weaknesses so that prioritization of critical resources and performance measurements can be made. The framework should thus serve as a valuable measurement, diagnostic, awareness-raising and advocacy tool that can be used in pinpointing shortfalls in available knowledge resources in higher education, and mobilizing financial and other relevant support for remedial actions to be taken to address them. Secondly, the study also creates a tentative framework for assessing knowledge assets in HEI by giving a broader understanding of the unique indicators that constitute knowledge assets in higher education. Finally, the exploratory and confirmatory factor analysis has affirmed the existence of the different components of organizational knowledge assets especially with respect to those intangible factors that could be considered to be of the most relevance in order to advance higher education goals. To broaden the perspective of the study given that it is among the first discussions on assessing knowledge assets in HEI in Uganda, further researches are proposed firstly, to study empirically the relationships among knowledge asset indicators and their effects on strategic choices and performance of HEI; secondly, further research is needed to determine the relationships between available knowledge assets and innovation capabilities; and finally, further research is required to examine the influence of ICT on knowledge assets and organizational learning in achieving higher education goals.

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