Assessment Indicators for Information Technology in Higher Education Institutions: A STOPE Approach

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Abstract: This study is concerned with the assessment of IT (Information Technology) in HE (Higher Education) institutions. It introduces an assessment approach, based on the main domains of the STOPE view: strategy, technology, organization, people and environment. Each of these five domains, is refined into basic issues with assessment guidelines, leading to useful assessment indicators. For illustrating the application of the approach to the assessment of real life case-studies, an illustrative example is presented. The work would help diagnosing IT strengths and weaknesses in HE institutions and it would also support developing recommendations for future development. In addition, the future use of the approach can create competition among HE institutions, with regards to IT, through ranking them using the suggested STOPE assessment indicators.

Key words: Information technology, higher education, assessment indicators, STOPE approach

INTRODUCTION

IT (Information Technology) is widely recognized by HE (Higher Education) institutions as an important mean for supporting their activities, including both: their primary activities concerned basically with teaching and research and their support activities concerned with administrative and academic services. This issue has been addressed by many publications; four of which are considered here, as examples. The chosen examples are associated with four different levels of considering IT in HE, including: the international level, the level of a group of countries, the national single country level and the level of a single HE institution.

EDUCAUSE, the international non-profit organization states its mission as advancing HE by promoting the intelligent use of IT (EDUCAUSE, 2006: http://www.educause.edu, April 2006). The CERI (Centre for Educational Research and Innovation) of the OECD (Organization of Economic Cooperation and Development) recognizes the importance of IT in HE and is concerned with the impact of IT on the future of universities (Atkins, 2005). The strategic plan for university education in Saudi Arabia has considered the future development of IT in HE as one of its main dimensions (KAI-RCS, 2006). The IT strategy of Indiana university, USA, has considered that IT is transforming the way universities do business and that this offers the potential of major innovation in the entire teaching, learning and research processes (McRobbie and Palmer, 2006).

Recognizing the importance of IT for the development of HE, universities are developing and improving their IT services continuously. They are also reporting the advancement of these services on their web sites, in addition to enabling various HE primary and support services to be performed

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through these web sites. Various studies, including those in (Atkins, 2005; Hawkins *et al.*, 2005), have investigated the current state and planned the future development of IT in HE institutions. The EDUCAUSE report (Hawkins *et al.*, 2005) has provided the most extensive study of the current state of IT in many HE institutions. It has given a wealth of information on 890 universities and other HE institutions. It provided various statistics on the availability of various IT systems and on the state of different IT related issues. However, the report did not consider developing an integrated approach, with indicators, for grouping and assessing IT issues individually and collectively and therefore, it did not establish a comprehensive assessment base that can support evaluations and comparisons of IT states in HE institutions.

This study aims at providing a comprehensive assessment approach, with integrated indicators, for the evaluation and comparison of IT states in HE institutions. The approach is based on the Bakry's STOPE view (Strategy, Technology, Organization, People and Environment) that has been previously used for the investigation of various IT systems and services, such as those in references (Bakry, 2004; Saleh *et al.*, 2007). The study shows how the approach can be used, by presenting an illustrative example. The work would help HE institutions diagnosing their IT strengths and weaknesses and developing plans for future development.

ASSESSMENT APPROACH

The assessment approach presented here is based on the STOPE view, which is illustrated in Fig. 1. The 5 domains of the view are identified in the following:

- The strategy domain is concerned with IT planning toward enhanced support to HE
- The technology domain is associated with the IT infrastructure and applications and academic and administrative services systems
- The organization domain is related to the structure and functions of IT management
- The people domain is concerned with the IT human skills and the IT users
- The environment domain is related with the rules and practices associated with technology, organization and people

Each of the above domains is refined into a number of issues. The refinement is based on the following three main principles:

- Assigning the IT in HE issues of previous studies, including those in (Atkins, 2005; Hawkins *et al.*, 2005), to the right STOPE domain associated with these issues
- Deriving and adding, to each STOPE domain, other related issues concerned with its concept and requirements
- Considered issues are defined is a way that make them measurable for assessment

The value assigned to an issue depends on its state and this state is measured out of a full scale of 100. The possible states of an issue are divided into levels starting with the state of non-availability of the issue, which is assigned the value of 0 and moving up to the full-availability of the issue, which is assigned the value of 100. States in between get a value greater than 0 and less than 100. The specific value here depends on the number of different incremental availability levels between non-availability and full-availability. In some other cases, where benchmarks of an issue can be defined, measured values are given relative to these benchmarks. These measuring schemes are illustrated below for each issue of every STOPE domain.
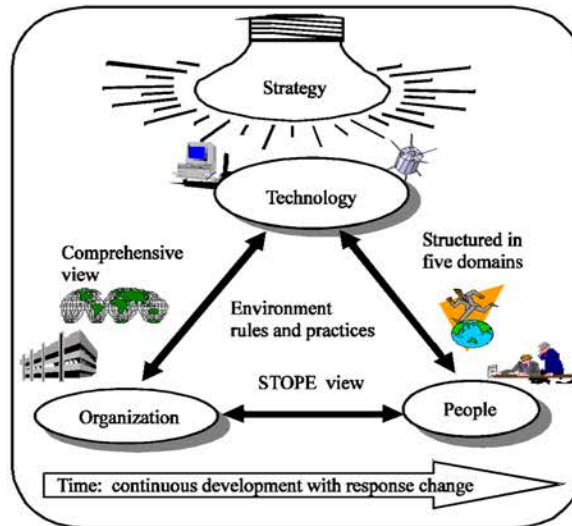
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Fig. 1: The STOPE view and its five domains; it provides a well-structured comprehensive understanding of the issues considered

The above principles may not lead to considering all possible issues, but they provide a comprehensive view, with essential issues taken into consideration. Future additional issues may be taken into account in the future. This is naturally inevitable, especially with the rapid development of IT and its HE applications and services.

The resulting issues associated with each domain are presented in the following. In addition, assessment guidelines are given, with values indicating the availability state of each issue, or the level of the issue relative to a benchmark.

Strategy Issues

Considering the refinement principles given above, the *strategy* domain is refined here into a number of issues. These issues are presented in Table 1, together with their suggested assessment guidelines and measuring values. Five main issues are considered here and these are given in the following:

- External support to IT in HE institutions that would drive the development of a strategy
- HE institution strategy that may emphasize the required future development of IT
- HE institution IT strategy that may exist, as a separate document from the institution strategy and that may be associated with various scopes and details
- IT strategy responsibility, where there may be a separate department concerned with the IT strategy
- User involvement, where IT users, including staff and students, may be involved in the development of the IT strategy of the institution

The Table 1 provides further details and suggests different assessment indication values to measure the state associated with each of the above issues.

Table 1: Issues of the strategy domain; with assessment guidelines

Issues	Assessment guidelines			
External support	Financial support	International organizations Government support	Level of satisfaction	0-100 (distributed)
	Professional support	International organizations. Local organizations.		
(HE) Institution strategy	IT in institution strategy	Institution strategy addresses IT; with separate IT strategy	Y/N	100
		No IT in institution strategy; separate IT strategy exists.	Y/N	67
		Institution strategy addresses IT; no separate IT strategy	Y/N	34
		No IT in institution strategy	Y/N	0
IT strategy	Content of IT strategy	Comprehensive	Y/N	100
		Almost comprehensive	Y/N	67
		Limited	Y/N	34
		None	Y/N	0
IT strategy responsibility	Existence of IT strategy department	Exists	Y/N	100
		No department, only function.	Y/N	50
		Does not exist	Y/N	0
IT strategy development	Involvement of IT users	All users including staff and students	Y/N	100
		Staff only: academic and administrative.	Y/N	67
		Academic staff only	Y/N	34
		None of the above	Y/N	0

Technology Issues

The technology issues are considered to be related to three main dimensions: IT infrastructure; IT basic information services systems and IT internet, web and other services. The issues concerned with the IT infrastructure dimension are presented in Table 2a and are given in the following:

- Internal fixed-point access or connectivity available in the academic departments, administration offices and residence halls
- Internal wireless access or connectivity through wireless LANs available in the common spaces of the HE institution
- External access or connectivity available through dial-up lines
- Internet connectivity and the available internet capacity
- Other connectivity, such as the connectivity and capacity, available to special high-speed networks

The issues concerned with the IT basic information services systems are presented in Table 2b and are given in the following:

- Administrative information systems that support the basic management functions of the HE institution
- Student information systems that deal with the management requirements associated with students
- Library information systems that are concerned with the management of the library activities

Table 2a: Issues of the technology domain: infrastructure; with assessment guidelines

Infrastructure	Assessment guidelines		
Internal (fixed) access	Academic departments	Access points that connect academic staff relative to their number.	Access level: 0-100
		Access points that connect students relative to their number	
	Administration offices	Access points that connect administrative staff relative to their number.	
	Residence halls	As above for residing academic staff.	
		As above for residing students	
		As above for residing administrative staff	
Wireless LANs	Availability	Availability of wireless LANs relative to available spaces of the HE institution.	WLAN Availability: 0-100
External access (dial-up)	Availability	All users including staff and students	Y/N 100
		Staff only: academic and administrative.	Y/N 67
		Academic staff only	Y/N 34
		None of the above	Y/N 0
Internet connectivity		Exists (25%)/Capacity (75%: relative to benchmark)	Capacity benchmark: 1 Gbps or more (Hawkins *et al.*, 2005)
		Does not exist	0
Other connectivity: special high-speed networks		Exists (25 %)/Capacity (75%: relative to benchmark)	Capacity benchmark: 1 Gbps or more (Hawkins *et al.*, 2005)
		Does not exist	0

- Course management systems that support the management of academic courses associated with different departments
- ERP (Enterprise Recourse Planning) that enables the integration of the above systems, with a common database for all (Bakry and Bakry, 2005)

The issues concerned with the Internet, web and other services are presented in Table 2 (c) and are given in the following:

- E-mail availability to academic staff, administrative staff and students
- Information available on the website of the HE institution
- Interfacing information services through the website
- E-learning services availability
- Availability of other *on-line* services
- Availability of instructional IT technology
- Availability of video conferencing
- Availability of grid computing capabilities and these are addressed in (Atkins, 2005) and reviewed in (Arafah *et al.*, 2007)

Further details on the above technology issues are given in Tables 2a-c. In addition, the Tables provide assessment guidelines and measures and suggest different assessment values to indicate the state associated with each issue. It should be noted here that the suggested indicators associated with the assessment of the capacity of the Internet connectivity and the capacity of the connectivity with special networks, are considered to be related to the information and benchmarks given by the EDUCAUSE report (Hawkins *et al.*, 2005). The report shows that the Internet capacity of over 11% of the research universities, considered by the report, is 1 Gbps or more. For the capacity associated with special networks, the ratio exceeds 22%.

Table 2b: Issues of the technology domain: basic information services systems; with assessment guidelines

Systems	Assessment guidelines			
Administrative information system	Availability	Modern/upgraded system	Y/N	100
		Old system	Y/N	50
		Not available	Y/N	0
Student information system	Availability	Modern/upgraded system	Y/N	100
		Old system	Y/N	50
		Not available	Y/N	0
Library information system	Availability	Modern/upgraded system	Y/N	100
		Old system	Y/N	50
		Not available	Y/N	0
Course management system	Availability	Modern/upgraded system	Y/N	100
		Old system	Y/N	50
		Not available	Y/N	0
Integration: ERP	Availability	Available	Y/N	100
		Under implementation	Y/N	50
		Not available	Y/N	0

Table 2c: Issues of the technology domain: Internet, web and additional services; with assessment guidelines

Systems	Assessment guidelines			
E-mail	Availability	All users including staff and students	Y/N	100
		Staff only: academic and administrative.	Y/N	67
		Academic staff only	Y/N	34
		None of the above	Y/N	0
Web portal information	Level of richness	High	Y/N	100
		Average	Y/N	67
		Low	Y/N	34
		Not available	Y/N	0
Web portal integration with services systems	Availability	Fully integrated with services systems	Y/N	100
		Partly integrated	Y/N	67
		Not integrated	Y/N	34
		Not available	Y/N	0
E-learning	Availability	Widely available	Y/N	100
		Partly available	Y/N	50
		Not available	Y/N	0
Other on-line services	Availability	Widely available	Y/N	100
		Partly available	Y/N	50
		Not available	Y/N	0
Instructional technology	Availability	Widely available	Y/N	100
		Partly available	Y/N	50
		Not available	Y/N	0
Video conferencing	Availability	Widely available	Y/N	100
		Partly available	Y/N	50
		Not available	Y/N	0
Grid computing	Availability	Available	Y/N	100
		Under implementation	Y/N	50
		Not available	Y/N	0

Organization Issues

The organization issues are presented in Table 3 and are given in the following:

- IT management structure of the HE institutions, that is the existence of an IT centre with IT distributed units running and supporting the IT services
- The specialized IT departments available in the IT centre
- The position of the CIO (Chief Information Offices) in the HE institution which may be high, when the CIO is a Vice President of the institution, or it may be of lower level
- The influence of the CIO that is the possible membership of the CIO in the top administrative council

Table 3: Issues of the organization domain; with assessment guidelines

Issues	Assessment guidelines			
IT management structure	Centralized/distributed	Centralized with distributed units	Y/N	100
		Centralized; no distributed units.	Y/N	67
		Distributed; no central management	Y/N	34
IT departments	Specialized departments	Number of specialized IT departments: relative to benchmark	Benchmark: 12 or more (Hawkins *et al.*, 2005).	
CIO position	Management level	Vice president: VP	Y/N	100
		Reporting to VP	Y/N	67
		Lower management level	Y/N	34
CIO influence	Member of the top university council	Member	Y/N	100
		Not member	Y/N	0

Table 3 gives further details and provides assessment guidelines and measures and it also suggests different assessment indicators to measure the state associated with each issue. For the IT specialized departments, the values of the measure is considered to be related to the 12 specialized departments considered by the EDUCAUSE report (Hawkins *et al.*, 2005).

People Issues

The people issues are presented in Table 4 and are given in the following:

- The qualifications of the IT staff that is the level of technical knowledge enjoyed by the IT staff, this contributes to the technical support that can be provided to the IT services by the IT staff
- The skills of the IT users that is the level of technical skills enjoyed by the users, this contributes to the proper use of the IT services
- The IT staff relative to the IT users in the IT centre, the IT distributed units and the total, this contributes to the availability of IT support to the IT users in the HE institution

Further details are given in Table 4. For the issue of IT staff relative to IT users, the measure used by EDUCAUSE (Hawkins *et al.*, 2005) is also used here that is the number of students per one IT staff both in the IT centre and in the distributed units. The indication values considered are also related to the statistics given by EDUCAUSE (Hawkins *et al.*, 2005).

Environment Issues

The environment issues are concerned with the rules and practices associated with three domains of technology, organization and people. The issues concerned with the technology domain are presented in Table 5a and are given in the following:

- How legacy systems are used, if they are still in use
- What about the availability of the practice of in-house development, this of course indicates experience
- Replacement life cycle for PCS (Personal Computers), this shows being kept up to date and
- Help desk hours of availability, this shows the practice of providing support to IT users

The issues concerned with the rules and practices associated with the organization domain are presented in Table 5b and are given in the following:

- The practice of using internal SLAs (Service level Agreements) between the IT centre and the distributed IT units on the one hand and the academic departments and administrative offices of the HE institution, this of course provides well organized practice between the internal parties concerned

Table 4: Issues of the people domain; with assessment guidelines

Issues	Assessment guidelines				
IT staff	Have qualifications suitable	All IT staff		Y/N	100
	for their IT functions	Most IT staff		Y/N	67
		Some IT staff		Y/N	34
		None		Y/N	0
IT users	Have skills suitable for	All IT users		Y/N	100
	their IT use	Most IT users		Y/N	67
		Some IT users		Y/N	34
		None		Y/N	0
IT staff: central	No. of students per IT	Using benchmarks	100 or less	Y/N	100
support	(central) staff	(Hawkins *et al.*, 2005).	Over 100 to 200	Y/N	75
			Over 200 to 300	Y/N	50
			Over 300 to 500	Y/N	25
			Over 500	Y/N	0
IT staff: distributed	No. of students per IT	Using benchmarks	150 or less	Y/N	100
support	(distributed) staff	(Hawkins *et al.*, 2005).	Over 150 to 300	Y/N	75
			Over 300 to 450	Y/N	50
			Over 450 to 750	Y/N	25
			Over 750	Y/N	0
Total IT staff	Number of students per	Using benchmarks	60 or less	Y/N	100
(dependent on	IT (distributed) staff	(Hawkins *et al.*, 2005).	Over 60 to 120	Y/N	75
the above)			Over 120 to 180	Y/N	50
			Over 180 to 300	Y/N	25
			Over 300	Y/N	0

Table 5a: Issues of the environment domain with examples: technology practices; with assessment guidelines

Issues	Assessment guidelines			
Legacy systems	Use/Enhancement	Not in-use	Y/N	100
		Enhanced, including web integration	Y/N	75
		Partly enhanced	Y/N	50
		Used without enhancement	Y/N	25
In-house development	Availability	Large scale.	Y/N	100
		Medium scale	Y/N	67
		Limited scale	Y/N	34
		None	Y/N	0
PC replacement	Cycle	Three years or less	Y/N	100
		Over three and up to four years	Y/N	75
		Over four and up to five years	Y/N	50
		Over five years	Y/N	25
Help desk	Availability per week	Full availability: 168 h week^{-1} (24×7)	Y/N	100
		Available: 120 h week^{-1} (24×5) plus	Y/N	80
		Available: 56 h week^{-1} (8×7) plus	Y/N	60
		Available: 40 h week^{-1} (8×5) plus	Y/N	40
		Available: less than the above	Y/N	20
		Not available	Y/N	0

Table 5b: Issues of the environment domain with examples: organization practices; with assessment guidelines

Issues	Assessment guidelines			
Internal SLA	Use	Used	Y/N	100
		Partly used	Y/N	50
		Not used	Y/N	0
External SLA	Use	Used	Y/N	100
		Partly used	Y/N	50
		Not used	Y/N	0
Management standards	Use	Used	Y/N	100
		Partly used	Y/N	50
		Not used	Y/N	0

Table 5c: Issues of the environment domain with examples: people practices; with assessment guidelines

Issues	Assessment guidelines			
Internal	Internal part-time employment	IT academic staff AND students	Y/N	100
cooperation		IT academic staff OR students	Y/N	50
		None	Y/N	0
External	External consultancy/Share of experience	Widely used cooperation	Y/N	100
		Partly used	Y/N	50
		Not used	Y/N	0
IT staff	Salary scales	Special salary scale for IT staff: rules	Y/N	100
incentives		Allowances: per case or per task	Y/N	50
		None	Y/N	0
IT users	Staff use allowances	Widely available: rules	Y/N	100
(staff) incentives		Limited availability: per case	Y/N	50
		None	Y/N	0
Training	Availability	IT staff AND IT users; with incentives	Y/N	100
		IT staff AND IT users; no incentives	Y/N	67
		IT staff OR IT users; with incentives	Y/N	67
		IT staff OR IT users; no incentives		34
		None	Y/N	0

- The practice of using external SLAs between the IT centre and external parties for enhanced IT services
- The use of IT management standards such as COBIT (Bakry and Alfantookh, 2006), ITIL (OGC, 2005) and ISO 17799 (Saleh *et al.*, 2007), this of course contributes to the quality of the IT services

The issues concerned with the rules and practices associated with the people domain are presented in Table 5c and are given in the following:

- The practice concerned with internal cooperation that is having students and IT academic staff employed on part-time or per task basis
- The practice concerned with external cooperation that is seeking advise and sharing experience with external parties
- The rules associated with IT staff incentives such as having a separate higher salary scale for IT staff
- The rules concerned with IT users incentives, namely academic staff and administrative staff users, in order to support the use and consequently the benefits of IT services
- The practices concerned with providing training to both IT staff and IT users

The assessment issues considered above reach a total of 44, that is: 5 for the strategy domain; 18 for the technology domain; 4 for the organization domain; another 5 for the people domain and 12 for the environment domain. Guidelines, with suggested indicators, for the assessment of every issue are given. Each domain can be assessed individually according to its own issues and all the domains can then be assessed collectively to provide an overall assessment indicator. This is illustrated in the following example that would help future practical assessments of IT in HE institutions.

AN ILLUSTRATIVE EXAMPLE

Collectively, Table 1-5 can be viewed as reference sheets that can be used to assess IT in HE institutions. The following illustrative example provides the results that may be obtained from the assessment of one HE institution. Each of the assessment Tables has a corresponding Table below

giving the assessment results of the assumed HE institution. In addition the Table 1-5 providing the assessment results give graphical representations of these results in the form of radar graphs, where each branch of the graph representing a specific issue. In addition, collective assessment results are also presented in other Tables with indicators and graphs.

The Tables providing the results and their graphical representations are identified in the following.

- Table 6 presents the results concerned with the strategy domain
- Table 7a-d give the results concerned with the IT infrastructure, basic information services system, Internet, web and additional systems and the overall technology domain based on these divisions
- Table 8 presents the results concerned with the organization domain
- Table 9 shows the results concerned with the people domain
- Table 10a-d give the results concerned with the environment including the rules and practices concerned with technology, organization and people, in addition to the overall environment domain based on these divisions
- Table 11 provides the overall STOPE assessment results, with the overall assessment indicator

It should be noted here that no weights have been given at any assessment levels; that is no different, or relative weights are given to the issues of any domain, the divisions of a domain (technology and environment), or even to the domains themselves at the overall STOPE level. Of course users of the approach can choose their own weighing scheme and perform their assessment accordingly.

Table 6: Assessment of the strategy domain: an illustrative example

Issues		Grade (%)	GRAPH/Indicator
External support	Financial support: Gov. Professional support: local	50	
Institution strategy	No IT in institution strategy; separate IT strategy exists	67	
IT strategy	Almost comprehensive	67	
IT strategy responsibility	No strategy department; only function	50	
Users involvement	Academic staff, but not students or other staff	34	Strategy indicator: 53.6

Table 7a: Assessment of the technology domain (infrastructure): an illustrative example

Infrastructure		Grade (%)	GRAPH/Indicator
Internal (fixed access)		70	
Wireless LANs		50	
External access	Academic staff only	34	
Internet connectivity	Exists; with capacity of 100 Mbps (Ref 1 Gbps)	60	
Other connectivity	Exists; with capacity of 330 Mbps (Ref 1 Gbps)	50	Technology (infrastructure) indicator: 52.8

Table 7b: Assessment of the technology domain (basic information services systems): an illustrative example

Information systems		Grade (%)	GRAPH/Indicator
Administrative	Modern systems	100	
Students	Modern systems	100	
Library	Modern systems	100	
Course management	Not available	0	Technology (basic information services systems) indicator: 70
ERP	Under implementation	50	

Table 7c: Assessment of the technology domain (Internet, web and additional services): an illustrative example

Technology/systems		Grade (%)	GRAPH/Indicator
E-Mail	Academic staff only	34	
Web portal information	Richness: low	34	
Web portal integration with services	Partly integrated	67	
E-Learning	Not available	0	
Other on-line services	Partly available	50	
Instructional technology	Partly available	50	
Grid computing	Not available	0	
Video conferencing	Not available	0	Technology (Internet, web and additional services) indicator: 29.38

Table 7d: Assessment of the technology domain: an illustrative example

Issues	Grade (%)	GRAPH/Indicator
Technology infrastructure	52.80	
Basic information services systems	70.00	
Internet, web and additional services	29.38	
		Technology indicator: 50.73

Table 8: Assessment of the organization domain: an illustrative example

Organization issues		Grade (%)	GRAPH/Indicator
Management structure	Centralized with distributed units	100	
IT departments	Eight departments	67	
CIO position	Reporting to VP	67	
CIO influence	Not a member of the council	0	Organization indicator: 58.5

Table 9: Assessment of the people domain: an illustrative example

Technology/systems		Grade (%)	GRAPH/Indicator
IT staff	Mostly qualified	67	
IT students	Mostly skilled	67	
Central support	One IT staff per 250 students	50	
Distributed support	One IT staff per 500 students	25	People indicator: 52.25

Table 10a: Assessment of the environment domain (technology related issues): an illustrative example

Technology issues		Grade (%)	GRAPH/Indicator
Legacy systems	Enhances and used	75	
In-house development	Limited scale	34	
PC replacement	Four to five years	50	
Help-desk	40 h weekly	40	Environment (technology practices) indicator: 49.75

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Table 10b: Assessment of the environment domain (organization related issues): an illustrative example

Organization issues		Grade (%)	GRAPH/Indicator
Internal SLA	Not used	0	
External SLA	Partly used	50	
Management standards	Not used	0	

Environment (technology practices) indicator: 16.66

Table 10c: Assessment of the environment domain (people related issues): an illustrative example

People issues		Grade (%)	GRAPH/Indicator
Internal cooperation	Students employed	50	
External cooperation	Partly used	50	
IT staff incentives	Allowances per case	50	
IT users incentives	Limited availability	50	
Training	IT staff; no incentives	34	Environment (technology practices) indicator: 46.8

Table 10d: Assessment of the environment domain: an illustrative example

Issues	Grade (%)	GRAPH/Indicator
Technology related issues	49.75	
Organization related issues	16.66	
People related issues	46.80	

Environment indicator: 37.74

Table 11: STOPE level assessment: an illustrative example

Issues	Grade (%)	GRAPH/Indicator
Strategy domain	53.60	
Technology domain	50.73	
Organization domain	58.50	
People domain	52.25	
Environment domain	37.74	Overall assessment indicator: 50.56

DISCUSSION

The work presented in this study has given an approach, based on Bakry's STOPE framework, for the assessment of the IT state in HE institutions and has also provided an illustrative example that shows how the approach can be used and how its results can be presented. The assessment approach looks into 44 issues associated with the STOPE domains. The issues considered have been partly taken from previous studies and partly derived from experience. The approach enables every issue to be assessed depending on its state, or its status relative to some benchmarks.

Through assessing the 44 issues in an organized manner, according to STOPE, the work helps diagnosing IT strengths and weaknesses in HE institutions. It also support developing recommendations on the required future development. In addition, the future use of the approach can create competition among HE institutions, with regards to IT, through ranking them using the suggested STOPE assessment indicators. Such ranking can be made at different levels, including: the issue level, the sub-domain level (for technology and the environment), the domain level and the overall STOPE level that gives a single comprehensive indicator representing the state of IT in a HE institution.

The work is distinguished for providing a comprehensive and structured view of the state of IT in HE institutions that covers the spectrum of strategy, technology, organization, people and environment. Although this view covers 44 interesting spots, the work does not claim to be totally exclusive. Readers are welcomed to use their experience to add or modify some issues and come up with an improved assessment base. They are also welcomed to evaluate the issues according to some weighing scheme that gives their views of the relative importance of the different issues. In addition, it should be noted that the fast development of IT and its applications and services, coupled with the desire of HE institutions to use these tools for the development and improvement of their activities, would lead to the consideration of additional issues in the future. The work presented here can be used as the backbone for these developments and improvements.

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