Indexing as a Method of Ranking Higher Education Institutions

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This article discusses the ranking of higher education institutions (HEIs) and highlights some concerns with popular approaches used by THES and Shanghai Jiao Tong University. A Value-Added Index (VAI) is described as an alternative method to rank HEIs. The VAI draws on undergraduate educational parameters in the United States to demonstrate the indexing of HEIs. However, it is recognized that when HEIs specialize in research, outcomes at the postgraduate level would need to be analyzed in the light of a research mission. Nevertheless, adhering to the notion that HEIs must return something of value to their stakeholders, the VIA includes six elements as potential surrogates for efficiency and productivity in the context of measuring quality outcomes in higher education. Although the research model developed here is exploratory in nature, it nevertheless expands the current debate about the utility and purpose of ranking HEIs and links performance criteria to the missions of HEIs. This offers new insights into quality outcomes in global higher education. The VAI is especially relevant for HEIs in developing economies because the criteria used by the current ranking systems favour elite and well-established institutions, creating winners and losers. However, many of these 'losers' can also be highly efficient and effective HEIs when they are judged against their mission and purpose.

Introduction

Today, the managers of higher education institutions (HEIs) find themselves under scrutiny from their stakeholders in highly competitive environments. In these settings, experienced managers strive constantly to identify and implement practices that will ensure maximum outcomes derive from the consumption of institutional resources. Part of this process requires managers to sift through an expansive array data in their daily decision-making. In addition, meeting the expectations of their principal stakeholders is a strong motivation for managers to perform. However, since the mid-2000s, international ranking agencies like Times Higher Education/Thompson Reuters (THES) (Baty, 2009), the Academic Ranking of World Universities by Shanghai Jiao Tong University (SJTU) and the QS World University Rankings® (QS Quacquarelli Symonds Limited) have increasingly influenced decision-making in higher education (HE) at many levels.

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In these circumstances, the relevance of the current approach requires examination give the predisposition of HE managers to equate high rankings with a bolstered international reputation (Hazelkorn, 2009; Koivula & Rinne, 2008; OECD, 2007; Williams, 2005). However, the indicators of success in these rankings are very misleading (Hazelkorn, 2013) and in some cases, the numbers upon which managers make policy decision are "rickety" (Saisana et al., 2011). Amsler and Bolsmann (2012) suggest that at a deep level, the ranking systems move from being a mere set criteria that measure value and quality in higher education to an "exclusionary" practice with implicit political overtones.

While the influence of the ranking systems is pervasive, the systems provide valuable data for the HE sector. However, the focus of established systems like THES and SJTU shift attention away from several salient issues including internal organizational efficiency and productivity, which necessarily circumscribe judgments about quality and performance (Clegg et al., 2008). Ranking systems also subtly mask the degree of alignment between internal processes and strategic direction (AMA, 2007; HBR, 2006; HLC, 2009). The Council of Europe warns that "even the best constructed system is of little use, and can potentially be harmful, if it encourages institutions to chase after rankings rather than focus on their core mission".

The approach of this paper is to place efficiency and productivity as the important measures of quality outcomes in HE compared to measures used by THES, for example, which tend to highlight raw numbers that do not link explicitly to ideas about either efficiency or productivity. To refocus the attention of HE managers to issues of organizational efficiency and productivity, this paper uses an Input-Throughput-Output (ITO) framework to help determine the quality outcomes of HEIs. The ITO framework suggests that the efficient and productive consumption of finite resources delivers maximum stakeholder value. Efficiency requires HEIs to extract maximum value from useable resources whereas productivity generally involves all production factors. When HEI managers achieve these ends simultaneously, their institution become high performing organizations (AMA, 2007).

Quality Outcomes as the Goal of Higher Education Institutions

Achieving acceptable quality outcomes is a fundamental goal of all HEIs. To achieve these goals, a good fit between mission/goals and the system is necessary. The nexus between an institution's purpose and its design is critical for determining outcomes (Daft, 2009). In this context, an authentic decision for aspiring university students is choosing between HEIs that deliver high levels of efficiency and productivity from the inputs of intellectual, human, social, financial and physical resources and those that do not. The authentic goal for HE managers is to organize inputs and throughputs to achieve the desired outputs.

Importantly, research from the business field suggests that when the mission and goals of an organization align with its structures, practices and strategies, the result is superior financial performance (AMA, 2007). However, for a HEI, a society's return on its investment in HE cannot be determined alone on commercial grounds - universities are not "firms" (Winston, 1997). The return to society also derives from a HEI's contribution to socialization, the public good, morality, life-long learning, psychological well-being and the nurturing of both national and global citizens. There are also many non-pecuniary benefits, which derive from the outputs of HE (Bowen, 1977; Breneman, 2001; Will, 2005). In this light, a comparative ranking of HEIs is a complex undertaking.

Background to the Rankings Phenomenon

Significant debate continues concerning the legitimacy of the measures and weightings individual ranking systems use. Data gathered according to six broad factors in THES' perceptual approach determines a HEI's place in the ranking table. These self-proclaimed measures and weightings include peer review (40%), employers' assessment (10%), student-faculty ratio (20%), citations per faculty member (20%), international faculty (5%) and international students (5%). SJTU's initial ranking in 2003 accompanied a push by the Chinese government to establish world class HEIs by benchmarking top Chinese universities against four groups of US research HEIs. The rationale that "top" research HEIs were simultaneously "world class" facilitated ranking superior HEIs against "ordinary" research universities (Liu 2009). The developers at SJTU played a numbers game, relying heavily on the number of citations/awards received (90%) by a HEI and its size (10%) as indicators of quality on a global scale. The overriding logic was that the quantity of natural sciences publications and prestigious awards made an entire institution high on quality.

By 2011, numerous articles discussed and dissected the various systems that rank HEIs internationally. The utility of ranking systems like THES and SJTU are prominent in the current debate (Altbach, 2004, 2006; Charon & Waunters, 2007; Dill & Soo, 2005; Hazelkorn, 2005, 2007, 2008, 2009, 2013; Kalvemark, 2007; Lui, 2009; Liu & Cheng, 2005; Marginson, 2004, 2008, 2009a; Marginson & van der Wende, 2007; OECD, 2007; Steiner, 2006; Tulkens, 2007; SIPTU, 2007; Stella & Woodhouse, 2006; Williams, 2005, 2008). Table 1 summarizes the economic, political, methodological and/or philosophical vantage points of these critiques.

Table 1. Criticisms of the Ranking Systems

Perspective	Criticisms
Economic	Liberalized trade in HE created new benchmarks
	Most HEIs are not-for-profit organizations and "sell goods and services but not like commercial firms"
	Differentiation among HEIs is difficult because of the "awkward realities of the costs, prices, subsidies and hierarchy"
	Rankings systems:
	* make limited comparisons
	* neglect issues concerning productivity and efficiency
	* make it difficult to determine return to society
	See, for example, Altbach, 2004; General Agreement on Trade and Services; Raines and Leathers, 2003; Salerno, 2004; Teixeira et al., 2004; Winston, 1997, 1998
Political	Rankings mitigate collaborative efforts like the Bologna Process
	HE is a national not an international interest
	HE environments are politically unique and politically charged and this influences judgments about quality
	See, for example, Bourdieu, 1996; Marginson, 2008, 2009a; OECD, 2007; Steering Committee for Higher Education and Research of the Council of Europe, 2009; Vilsack and Baldacci, 2006
Methodological	Peer review processes are flawed
	Weightings are ultimately arbitrary
	Rankings systems:
	* produce anomalies

	* favour English language oriented HEIs * weight quantity over quality * neglect issues of diversity * measures economic not HE strengths See, for example, Crabbe, 2009; Kalvemark, 2007; Marginson, 2007; Steiner, 2006; Stella and Woodhouse, 2006; Tulkens, 2007; Wozónicki, 2009
Philosophical	Rankings promote "knowledge factories" with the potential for a new Taylorism in HE to emerge Ranking systems cannot account for or measure accurately because: * intangible HE products cannot be measured * there are numerous legitimate goals and purposes of HEIs See, for example, Allen, 1988; Coady, 2000; Marginson and van der Wende, 2007; SIPTU, 2007; Will, 2005

Four salient propositions emerge from the literature cited above concerning ranking systems for HEIs:

(1)   Managers believe generally that high rankings bolster the international reputation of their HEI (Hazelkorn, 2007; OECD, 2007) and will, therefore, be inclined to pursue ranking stars

(2)   Ranking systems downplay mission and goals, making it difficult to estimate the quality returns on a society's investment in its HEIs

(3)   Society determine what should be returned by HEIs to their stakeholders

(4)   "Market competitive games", like rankings, reduce the capacity of a HEI to discharge its mission and achieve its goals (Kalvemark, 2007).

In the light of these propositions, any ranking of HEIs should account for the alignment between internal processes and strategic direction, which necessarily draws attention to issues of efficiency and productivity. This inexorable link between organizational purpose and structural design is significant in determining quality outcomes (Daft, 2009).

Organizational Purpose and the Ranking Systems

The global HE playing field is quite uneven as Marginson (2009a) points out. Even within one country, HEIs operate under different missions and underlying principles. However, the rankings game unintentionally paints a picture of ubiquitous HE competition among all HEIs, when, in fact, there are numerous levels of competition within and across the sector (for example, competition within the band of Research 1 universities and competition within the band of 4-year colleges in the US).

In this environment, HE decision-makers increasingly use international ranking data to make decisions but it is also important for HEI managers to recognize that in many environments, like the changed economic, social and political landscapes of Eastern Europe, local solutions are required (Koivula & Rinne, 2008; Wozónicki, 2009). Furthermore, even though the notion of a global HE market is problematic, the very idea of a market legitimates universal rankings (Teixeira et al., 2004; Winston, 1999, 2000).

Missions and goals are fundamental to organizational purpose and design for HEIs (Meek, 2005). In this context, three key points emerge from the literature:

(1)   HE and HEIs operate with goals that are highly divergent (Allen, 1988; Teixeira et al. 2004)

(2)   The very nature of HE and HEIs is continually debated and highly contested (Jowett & Rothwell, 1988)

(3)   Governments constantly reassess their financing of HE and HEIs against the "purposes society wishes higher education to fulfil" (Teixeira et al., 2004).

Resonating in the points above are ideas concerning the nature of HE and its institutions. HEIs function to meet societal needs. In this process, particular mission and goals guide HEIs. However, missions and goals are disparate with the HE sectors of most countries replete with unique missions and context-specific goals bounded by a particular legal, political and social infrastructure.

Complexity of this magnitude make is exceedingly difficult to compare HE sectors and institutions on a global scale. Table 2 summarizes the missions, goals and contexts of particular HEIs to demonstrate that organizational purpose is a wide-ranging and highly contextual concept.

Table 2. Examples of the Diverse Range of Organizational Purpose for HEIs

Institution and/or legal framework	Purpose
Irish HEIs, (*Irish Universities Act*, 1997, Article 12)	Compels Irish HEIs to preserve and promulgate the Irish language, promote Ireland's cultures, facilitate lifelong learning and achieve gender balance and equality (SIPTU, 2007)
James Cook University Act, (revised 1997), Australia	North Queensland based James Cook University functions under the mandate, which include paying attention to "subjects of special importance to the people of the tropics"
University of the South Pacific, Fiji	The university exists to serve the needs of South Pacific communities
Irkutsk State Technical University, Eastern Siberia, Russia	The institution serves local constituents but casts a wider net to attract students from "across the world"
Harvard University, US	Sticks closely to its original Charter of 1650, which "advances the education of American youth"
Rutgers University, the State University of New Jersey, US	The mission is state-centric, "providing for the instructional needs of New Jersey's citizens" and "aiding the economy and the state's businesses and industries"
Ankara University, Turkey	The overarching objectives of the university focus on local outcomes and contexts, with the aim to "create scientific research and implement improvement projects by taking the primary needs of the country and the society into consideration"

While context-specific missions and goals drive the development of HEIs, pursuing any agenda in HE might simultaneously fulfil global and parochial needs - think globally, act

locally and the like. Nevertheless, variations in missions and the unique establishment contexts of most HEIs suggest that absolute numerical measures alone fail to approximate the relationships between an institution in one country and one in another, let alone between HEIs within one country. In this interpretation, ranking HEIs against one another on a universal scale appears fruitless (Wozónicki, 2009).

As business enterprise models increasingly penetrate HE and influence the thinking of HEI managers (Kogan & Ivar, 2007), rankings appear as a quick fix and according to the current rules, indicators of quantity per se deliver more accolades compared to indicators of either efficiency or productivity (Breneman, 2003). Given that HEIs develop according to specific criteria chosen by stakeholders to serve their needs, universal measures of quality seem improbable in a highly diverse HE sector. Against such suppositions, a general systems model helps depicts how HEIs operates in their unique environment.

Criteria for Ranking Effectiveness and Productivity of HEIs

While all HEIs necessarily negotiate the cyclical nature of their particular economy, HEIs that develop and align organizational strategies with mission and goals mitigate risk. However, ranking systems are inclined to skim across the roles of mission, goals and societal expectations even though these elements are essential to judging the quality of organizational outcomes in HE (Meek, 2005). Research in the business world suggests that a HEI will outperform its genuine rivals in the field if its strategies and mission are closely aligned (HBR, 2006; Ulrich & Brockbank, 2005).

In this context, efficiency and productivity are the pillars of sustainable outcomes rather than impressive numbers based on raw data related to scholarly and research outputs, normally judged by peers. However, such judgments reveal little of the level of efficiency within a HEI. In effect, the numbers game is mute concerning efficiency and productivity when the baselines are inputs and throughputs. For example, a HEI that produces significant publications in the humanities might also be the sector's most inefficient consumer of resources.

To illustrate anomalies in the current approaches to ranking HEIs, using data concerning efficiency and productivity cast different shadows on the debate about quality in HE. The illustration below uses National Center for Education Statistics (NCES) data because the US Congress mandates it - therefore, the NCES provide a reliable set of "indicators on the status and condition of (US) education" (NCES, 2009). For consistency, the examples in this paper include only US institutions ranked by SJTU.

The depiction of HEIs in the ITO framework requires the identification and analysis of the salient mission-specific outputs that result from consuming inputs and applying throughputs. However, demonstrating particular incongruities in the current ranking approaches requires consistent parameters. In the case of the US, some comparable elements serve as surrogates of efficiency and productivity, which facilitates judgments along comparable elements. This approach produces results that are more reliable (Massaro, 2008). Notwithstanding the variations in the mission and goals of individual HEIs, the ultimate societal expectation is for any HEI to take in citizens (or constituents in specialized HEIs like religious or military colleges) and produce the optimum outcomes, measured by graduate numbers. By analyzing tangible comparable elements, one can look across institutional types and even across countries.

Any ranking system requires assumptions be made about the critical elements used to measure quality. To stimulate debate about ranking HEIs, an indexing approach to ranking US institutions uses proxies that imply superiority in selected categories. However, criteria can be country-specific. For example, while endowments provide a criterion for "public respect" for ranking HEIs in the US, in Australia, where the endowment culture is immature, publically available data about a student's first choice might approximate a similar criterion, at least for metropolitan Australian HEIs. Categories that link closely with outcomes for society are important value-added elements. Hence, the Value-Added Index (VAI) described in this paper uses a stratified sample of US HEIs and publicly available data to illustrate the importance of these elements.

Surrogates for Efficiency, Productivity and Output

The VAI uses five elements of HE undergraduate education in the US and considers the role of an additional element of endowment, which remains problematic in US higher education (Miller & Munson, 2009). In the ITO framework, these indices provide insights into the important contributions of efficiency and productivity to superior performance (Bowen, 1977; Breneman, 2001). While these elements feature in other ranking systems, these systems also fail to make the explicit link to either efficiency or productivity.

Student-faculty ratio

A low student-faculty ratio (SFR) in undergraduate education is traditionally indicative of engendering quality outcomes in teaching and learning (Berrell, 1998). Even the most cursory search of Google for the phrase "low student ratio" indicates that low SFRs are positive attributes. Therefore, SFRs feature prominently in advertising by HEIs concerning their quality. While concerns are raised about the relationship of SFR to productivity (Middaugh, 2001), low SFRs are generally considered to be a surrogate of a better quality of teaching and increased time individual faculty have to service the intellectual needs of their students (Lowry & Owens, 2001; Qiu, 2008; Top Universities, 2010). Vincent-Lancrin (2008) also suggests that low SFRs reduce the "budgetary pressure on public expenditure'. In addition, "depending on its magnitude, it may result in an improvement in learning or working conditions - and thus may have a positive impact on the quality of higher education".

First year intake and graduation rates

While resources constrain the outputs of some HEIs, freshmen or first year intake and overall graduation rates provide strong indications of the extent to which a HEI meets the ultimate societal expectation (that is, accept citizens and produce optimum returns to society, measured by graduate numbers). Increasing the number of HE graduates is a priority for many governments and the efficiency and productivity of HEIs, related to student numbers, are essential to achieving priorities of this type. In Australia, for example, the government aims to increase HE participation rates so that "by 2025, 40 per cent of all 25 to 34 year olds will hold a qualification at bachelor level or above ... the achievement of this ambition will produce around 217,000 additional graduates by 2025" (DEEWR, 2009).

While questions arise about whether all graduates are of similar quality, the work of various accreditation bodies that monitor HE in most countries, helps assure that graduates meet the minimum standards required to participate successfully in society. Many HE programs hold professional accreditation (for example, Certified Practicing Accountant accreditation) while

faculties, colleges and institutions may carry the stamp of collegiate accreditations like the Association to Advance Collegiate School of Business (AACSB, 2011). In Australia, the Australian Universities Accreditation Agency (AUQA) and the newly created national regulator, the Tertiary Education Quality and Standards Agency (TEQSA) managed periodic audits of Australia's HEIs to assess the quality of their academic activities, standards of performance and educational outcomes.

Retention rates and undergraduate numbers

The year one to year two retention rate is an important proxy because efficiency requires consuming finite resources for maximum output. Most students tend to drop out in the earlier years of HE and retention rates are generally included as key performance indicators by accrediting bodies - high retention rates bolster the credibility of HEIs (Berger & Lyon, 2005). However, while many factors contribute to attrition and individual countries calculate the rate using different criteria (Van Stolk et al., 2007), one thing is constant - the financial costs of attrition are considerable because valuable resource are consumed for nil output. Put simply, the more people retained in the system, the greater the potential returns for society and greater levels of efficiency for HEIs.

In Australia, for example, retention is a significant issue because the economic cost of students dropping out of university degree programs is around $1.4 billion each year (Hare, 2010). At some universities, the attrition rates are alarming. Reports from government departments since the early 2000s (for example, DEST, 2004; DEEWR, 2009) implicitly highlight the negative impact attrition rates in Australian HE have on achieving the goals set for economic development.

Arguing the case for the cardinal importance of undergraduate education per se in the suite of HE activities, especially in a socialization context, seems a case of stating the obvious. Undergraduate education as the basis for lifelong education is well-recognized (Candy et al., 1994). Other benefits include social and economic benefits for both graduates and communities, accompanied by increased productivity, prosperity and competitiveness (Hill et al., 2005). Moreover, all sections of society, from professional educators and career politicians readily acknowledged the primary importance of undergraduate education and the role of universities in creating the future (see Hall & Rowell, 2008; Coombs, 2010).

The issue of endowment

It is a challenging issue determining how endowments contribute to quality in higher education. The links between endowments, efficiency and productivity are imprecise. Nevertheless, HEI endowments might be interpreted as one measure of public respect for HEIs in the US. Just as market capitalization reflects the perceived financial strength of a public company, endowments may quantify the public's respect for a HEI. In such a relationship, the public would be unlikely to support inefficient or unproductive HEIs in the longer term.

However, the relationship between endowment and productivity are tenuous at best. For example, Adams and Clemmons (2006) identify a positive relationship between endowment and research productivity in some large universities while Miller and Munson (2009) raise the view that endowments and the current funding model in the US provide little encouragement for HEI to improve either efficiency of productivity. In describing the HE productivity, Merisotis (2009) suggests that common inputs in HEIs are the "time and effort" of employees,

buildings, equipment and "assets", which include endowments. In this view, a HEI might tap endowments for productivity gains. In the above context, the VAI analyzes the element of endowment.

Endowments, like alumni data, while valuable, provide long-established institutions with significant advantages in any ranking table. Whereas the significant relationship networks of established HEIs deliver considerable financial resources, new and emerging HEIs fare quite differently in these areas. HEIs in the US that meet their mission and achieve success with students but fail to solicit information and/or donations from their graduates and the community tend to rank lower than those that do. Invariably, newer HEIs score below the established ones on alumni data points. Using only the Top 20 US HEIs (see in Table 5) to illustrate the VAI reduces effects of this type.

The Value Added Index Method

Some people shy away from engaging with complex statistical methodologies despite their validity and reliability, especially when interpreting the numbers game often requires sage-like explanations concerning why one HEI rates above another on a particular ranking category. In this study, the use of a straightforward, replicable and readily understood indexing method addresses this concern. For indexing, each of the five surrogates and the element of endowment in undergraduate education require making purposeful assumptions. For example, the largest endowment and the lowest SFR received a maximum rating of 100 on the indexing system. Scaling of this type permits the comparison and combination of categories, regardless of whether the data are nominal, ordinal or scaled. With each category converted to a 100-point scale, a simple calculation of overall averages produced the VAI, which allows for the measurement and indexation of all HEIs, based on the comparable elements identified.

Dividing the range of the values for a particular category by the number of points determined the indexing increments. To explain this calculation, the SFR illustrates the process. In Table 3, the element of SFR has values ranging from 7-1 to 30-1, which results in 24 distinct SFR values. These are distributed between 100 and 50 starting with 100. When distributed equally, an equivalence table for 'SFR to VAI' is created, where the interval is two units for each value on the VAI. Following this methodology, other elements were converted.

Table 3. Indexing for Student/Faculty Ratio

S-F ratio	Index (VAI)	S-F ratio	Index (VAI)
7	**100**	19	**76**
8	**98**	20	**74**
9	**96**	21	**72**
10	**94**	22	**70**
11	**92**	23	**68**
12	**90**	24	**66**
13	**88**	25	**64**
14	**86**	26	**62**
15	**84**	27	**60**
16	**82**	28	**58**
17	**80**	29	**56**
18	**78**	30	**54**

In Tables 4 and 5, the VAI calculated for each of the elements arrives at the overall VAI for two separate samples of US institutions. The overall VAI lists the institutions in decreasing order. In Table 4, a stratified sample of 19 US institutions from the bands within SJTU Top 500 illustrates the differences between the processes of indexing and ranking HEIs. One US institution known to the authors but unranked by SJTU demonstrates how an unranked regional, yet well-respected US institution has the capacity to compete with HEIs that are far more prestigious, when an ITO approach drives the analysis. In Table 5, the Top 20 US institutions (SJTU, 2008) are used to identify additional differences using the VAI.

Table 4: Stratified Sample of Top 500 US Institutions on SJTU

SJTU Rank	HEI	1st year intake	endow-08 ($K)	S-F ratio	% U/G	% retain Y1-Y2	total grad rate %	VAI
21	Michigan-Ann Arbor	6405	7,571,904	12: 1	63.4	96	88	**91**
58	Florida	8384	1,250,603	20:1	67.3	95	82	**88**
17	Wisconsin-Madison	7317	1,735,456	22:1	73.5	94	81	**87**
152-200	Delaware	3953	1,340,145	17:1	83.2	91	73	**87**
1	Harvard	2539	36,556,284	7:1	38.3	97	98	**86**
303-401	Clemson	3517	421,299	15:1	80.3	91	79	**85**
83	Boston	4449	1,144,996	15: 1	58.3	91	80	**84**
152-200	Florida State	6796	570,730	25: 1	77.2	89	70	**84**
402-503	Boston College	2459	1,630,626	14:1	66.8	95	91	**84**
152-200	Miami	2468	736,239	11:1	68.0	90	77	**83**
402-503	Northeastern	4216	657,866	19:1	71.7	93	70	**83**
101-151	Iowa	4605	935,453	16:1	71.4	83	66	**83**
201-302	LSU	4960	633,616	21:1	81.2	85	61	**83**
303-401	Oklahoma	4161	1,154,794	17:1	74.4	83	62	**83**
303-401	Central Florida	9273	114,990	30:1	85.7	86	63	**82**
303-401	St. Louis	2608	879,908	15:1	69.5	83	74	**82**
303-401	New Hampshire Durham	2792	307,054	18:1	81.8	89	71	**82**
42	Vanderbilt	1640	3,524,338	9:1	54.9	97	89	**81**

NR	Middlebury	611	885,389	9:1	100.0	95	93	**81**
201-302	GWU	2552	1,256,433	14:1	42.2	91	81	**80**

Table 5. Top 20 US Institutions on SJTU

SJTU Rank	HEI	1st year intake	endow 08 ($K)	S-F ratio	% U/G	% retain Y1-Y2	total grad rate %	VAI
21	Michigan-Ann Arbor	6405	7,571,904	12:1	63.4	96	88	**91**
12	Cornell	3445	5,385,482	11:1	68.3	96	93	**89**
13	California-LA	6554	1,054,119	18:1	69.4	97	89	**88**
16	Washington-Seattle	6961	2,262,149	17:1	74.1	92	77	**88**
26	Illinois-Urbana Champaign	7600	1,459,967	19:1	72.6	94	82	**88**
3	California-Berkeley	6225	871,698	20:1	71.1	97	90	**87**
17	Wisconsin-Madison	7317	1,735,456	22:1	73.5	94	81	**87**
1	Harvard	2539	36,556,284	7:1	38.3	97	98	**86**
15	Pennsylvania	2956	6,233,281	15:1	49.2	98	95	**86**
14	California-San Diego	5504	353,074	24:1	81.8	94	85	**85**
28	Minnesota-Twin Cities	7199	2,750,770	19:1	63.7	88	66	**85**
8	Princeton	1218	16,349,329	5:1	66.5	98	96	**82**
29	Washington-St Louis	1740	5,350,470	8:1	52.4	97	94	**82**
2	Stanford	1628	17,200,000	5:1	36.6	98	94	**81**
7	Columbia	1865	7,146,806	6:1	32.3	99	93	**81**
11	Yale	1319	22,869,700	6:1	51.8	99	97	**81**
5	MIT	1035	10,068,800	8:1	40.3	98	94	**78**
9	Chicago	1250	6,632,311	11:1	34.0	98	92	**77**
6	Cal Tech	228	1,891,523	6:1	43.3	98	88	**74**
20	Johns Hopkins	884	2,524,575	11:1	18.1	92	89	**72**

Ranking system aim to establish credible information and provides insight into institutional effectiveness and quality outcomes. Similarly, given the commodity-like outputs of high profile researchers, the lure for HEIs to buy-in prestige and recognition, increases the price of their product without increasing the returns to society through retention and/or graduation rates.

Notwithstanding arguments concerning the contested relationship between teaching and research in emerging and established HEIs (Berrell, 1998), buying-in scholarly prestige does not translate directly into quality education for students. The ability to rank faculty on outputs without considering throughputs related directly to teaching provides a mechanism to "game" a HEI's ranking (Goodall, 2010). However, this is not to suggest that data about alumni, popular support, academic output and size (capacity) are not important.

By providing a broader set of parameters, which are comparable between all types of institutions and coupling these data with substantial data related to throughputs, especially those that engender high performance are steps to holistic and realistic snapshots of quality among HEIs. To provide further discussion on how rankings do not correlate readily to widely accepted indicators of a quality teaching environment, a correlation study between the VAI elements and the SJTU overall ranking was executed. The data in Table 6 indicate that no significant correlations existed.

Table 6. Correlations between the VAI Elements and the SJTU Overall Rankings

		SJTU Rank	1st year intake	Endow 08 ($K)	% retain Y1-Y2	% U/G	S-F ratio numeric	Total grade rate
SJTU Rank	Pearson	1	-.081	-.346[*]	-.383[*]	.277	.213	-.389[*]
	Sig. (2-tailed)		.648	.045	.026	.113	.227	.023
	N	34	34	34	34	34	34	34
1st year intake	Pearson	-.081	1	.017	-.040	-	.761[**]	-.201
	Sig. (2-tailed)	.648		.914	.797	.540	.000	.192
	N	34	44	44	44	44	44	44
Endow 08 ($K)	Pearson	-.346[*]	.017	1	.327[*]	-	-.305[*]	.360[*]
	Sig. (2-tailed)	.045	.914		.030	.008	.044	.016
	N	34	44	44	44	44	44	44
% retain Y1-Y2	Pearson	-.383[*]	-.040	.327[*]	1	-	-.434[**]	.913[**]
	Sig. (2-tailed)	.026	.797	.030		.019	.003	.000
	N	34	44	44	44	44	44	44
% U/G	Pearson	.277	-.095	-.393[**]	-.353[*]	1	.203	-.317[*]
	Sig. (2-tailed)	.113	.540	.008	.019		.187	.036
	N	34	44	44	44	44	44	44
S-F ratio (numeric)	Pearson	.213	.761[**]	-.305[*]	-.434[**]	.203	1	-.570[**]
	Sig. (2-tailed)	.227	.000	.044	.003	.187		.000
	N	34	44	44	44	44	44	44
Total grad rate %	Pearson	-.389[*]	-.201	.360[*]	.913[**]	-	-.570[**]	1
	Sig. (2-tailed)	.023	.192	.016	.000	.036	.000	
	N	34	44	44	44	44	44	44

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed).

Future Research Directions

In may be argued that developing a weighted average of some kind may also be appropriate for further research in this field to provide more differentiation between the types of HEIs. In addition, future research might involve extending the elements of the VAI into graduate HE to offer additional insights into effectiveness and efficiency. Depending on the institutional type and country, researchers could examine the mission-specific elements and associated mandates to determine what outcomes are important for a particular society and index HEIs accordingly. With such data at hand, extended work could develop broader country-specific frameworks using comparable data to identify those institutions that utilize resources efficiently and productively to meet their mission and goals. Additional research is also required to test the relationship between endowment size and productivity, especially among HEIs in the Top 50, which characteristically possess large endowments.

Conclusions

Comparing VAI data and data produced by the proxy assumptions of the SJTU reveals anomalies in ranking HEIs both within and across borders. However, a global society bent on determining whom or what holds the No. 1 position necessitates that HEIs be active players in the process. Nevertheless, it is imperative that judgments about the quality of HEIs include contextual factors and the uniqueness of their mission and goals. The expected returns to society are another crucial element in the process. A pragmatic and alternative strategy for quality improvement is for HEIs to focus on efficiency and productivity rather than chase elusive ranking stars.

Although descriptions like "world class" and "internationally ranked" increasingly shape the jargon on HE, these labels have neither substance nor meaning for the majority of the students currently enrolled in HE across the globe. To this end, HE consumers should be concerned more with quality outcomes gained through the efficient and productive consumption of resources than the proximity of a ranking system, which yields neither future gains in neither employment nor productivity for society. However, with sound and transparent techniques, HEIs can demonstrate to stakeholders that they consume their resources efficiently, manage throughputs productively and achieve their particular missions to deliver quality outcomes to the societies they serve.

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