

Use of Data in Higher Education: A Case Study

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Abstract

This paper discusses the interrelationship between quality assurance, institutional research and risk management in the context of higher education. These are three very common themes in the current higher education landscape. It is pointed out that although they originated from different perspectives, they are now converging to adopt similar methodologies. In particular, they share a common feature of increasingly using data to inform decision-making. A more data-driven approach is considered essential for identifying genuine issues that may prevent an institution from achieving its objectives, and important for enhancing transparency and consistency of the deliberation process leading to decision.

Using the TEQSA's risk assessment framework as a case study, this paper discusses some of the challenges and opportunities in developing a more data-driven approach to quality assurance. The TEQSA's risk assessment framework is selected because it is probably the first one developed to cover both public and private institutions, and also because TEQSA, as a regulator, has been empowered by legislation to impose conditions on publicly funded universities, including restricting or removing their self-accrediting power. Using publicly available information, the paper looks at the evolution of the framework, and highlights areas of learning that may be useful for developing a more data-driven approach to quality assurance.

Keywords: Quality indicator; Risk indicator; Quality assurance; Institutional research; Risk management; Data

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1. Introduction

“In God we trust; all others must bring data.” This is a famous quote commonly attributed to Dr. William Edwards Deming - a well-known statistician and expert in quality assurance. Dr. Deming is often dubbed as the father of modern time quality management, who pioneered the simple but important methodology of Plan-Do-Check-Act which still underpins many quality assurance frameworks nowadays. In early 1940s, he started introducing statistical quality control into industrial operations. Statistical quality control is generally about the applications of statistical tools such as sampling and descriptive statistics to process control. This approach was instrumental in transforming the quality culture in Japan, making “Made in Japan” a synonym for quality starting from late 1970s. The quote at the beginning of this paragraph is to capture his fundamental philosophy that data measurement and analysis are essential to attaining superior performance in every facet of business operations. Over the years, this philosophy has been extended to data-driven planning or evidence-based decision making in many different disciplines, including higher education.

There are three areas in higher education which particularly can involve a heavy use of data. They are institutional research (IR), quality assurance (QA) and risk management (RM). These three concepts originated from different perspectives for different purposes. In the past two decades, they are converging to share some very similar features to support evidence-based decision-making. Regulators and quality assurance agencies in higher education around the world are increasingly facing the challenge of applying limited resources in a highly dynamic and complex environment. There is no ‘one-size-fits-all’ and some mechanism is required to differentiate institutions at different levels of maturity so that the limited resources can be directed to where attentions are required. The shift to a stronger focus on institutional and student learning outcomes has reinforced the needs to develop metrics to measure performance at institution and programme levels, which has been a prime function of IR. In ISO 31000 Risk Management Standard, risk is defined as the effect of uncertainty on achieving objectives. Risk and maturity are actually the two sides of coin. A mature institution should be entrusted to operate with a higher degree of freedom, such as offering a learning programme without seeking prior approval from an accrediting agency.

This paper discusses the interrelationship between IR, QA and RM. Taking a risk assessment framework in higher education from Australia as a case study, this paper attempts to identify the major considerations in adopting a more data-driven approach

for decision-making in higher education. The case study is based on publicly available information and descriptions about the risk assessment framework.

2. The Golden Triangle: QA, IR and RM

The important relationship between QA and IR has been clearly articulated by Volkwein (2011). Volkwein (2011) identified IR as a “Golden Triangle” with the following three vertices:

- Institutional reporting and policy analysis
- Planning, enrollment and financial management
- Quality assurance, outcomes assessment, program review, effectiveness, accreditation

In late 1950s, the term IR was coined to broadly describe the activities that involve systematic use of data and research methods to inform decision making in educational institutions, in relation to improving institutional effectiveness and meeting regulatory requirements. There are two commonly accepted definitions of IR. Saupe (1990) defined IR as decision support - a set of activities supporting institutional planning, policy formation, and decision making. Fincher’s (1978) described IR as organisational intelligence. Terenzini (1993) further elaborated on this idea by describing three tiers of organisational intelligence.

Since then, many higher education institutions (HEIs), particularly in the United States and Australia, have set up offices dedicated to IR. A similar trend has been observed in Southeast Asia recently. One driver behind this trend is an increasing call for transparency and accountability of HEIs which often receive public funding in one form or another. The era of ivory tower mode of operation has long gone and these institutions have to answer questions related to “value for money”. Private HEIs, even though they do not receive public funding, are often required to meet certain regulatory requirements from the perspectives of quality assurance and customer protection. As a result, they are not exempted from such scrutiny. Another driver is the increased complexity of operations within HEIs. Many HEIs now have research offices, international engagement offices, quality assurance offices, facilities management offices and this list can go on and on. Ensuring that these units work effectively together to achieve the overall institutional objectives requires careful planning and monitoring of progress.

On the other hand, early QA activities were often associated with a peer review process. This is based on the belief that academic performance can be best judged by

those who possess the knowledge and experience related to what an institution is doing to ensure that some commonly accepted standards are met. Increasingly, the validity and reliability of peer review is being challenged, when QA is moving from a friendly collegial reflection exercise to a decision-making process having implications on funding and survival of an institution. While this is happening, the higher education sector around the world is experiencing significant changes since the last two decades. Some of the key drivers behind these changes include the massification of higher education, higher mobility of students, adoption of the outcome-based approach and proliferation of new technologies for delivery. Within this complex environment, it is therefore important to develop a systematic approach to QA in order to ensure that accreditation decisions are robust, fair and transparent.

As can be seen above, QA and IR originated from two very different perspectives. However, they are now converging towards each other. Initially, IR had a strong focus on data collection and analysis, while early QA depended more on professional judgment. As the theories and practices in the two areas become more mature, they both find themselves addressing the same ultimate question – how does an HEI know that it is progressing effectively towards its institutional objectives? To this end, Terenzini (1993) conceptualised the three tiers of organisational intelligence. It is interesting to note that Volkwein (2011) created an approach for measuring maturity of an institution in performing IR based on these tiers. A key observation from Volkwein is that a mature IR office is often involved in evaluation and assessment tasks like student outcomes research and assessment of student general education skills. It is not uncommon to find these tasks performed by QA offices as well, supporting the view that the division between QA and IR is blurring.

Following the definition in the ISO 31000 Risk Management Standard, risk management can be described as identification, assessment, and prioritisation of risks which bring uncertainty to an institution in meeting its objectives. This is actually asking the same question posed by IR, but in the opposite way. Instead of asking how do you know that you are achieving the objectives, RM focuses on what may prevent you from achieving the objectives. It is therefore not surprising that both QA and IR have resorted to RM. Traditionally, RM is more an internal process focusing on financial and operational risks, typically looked after by administrators. On the other hand, maintaining of academic standard is the responsibility of academic leaders. There are perceptions that a ‘divide’ exists between administrators and academics, as pointed out by Conway (2012). Following the definition of RM in ISO 31000, the biggest risk that can bring uncertainty to an institution in meeting its objectives, in fact, is failing to uphold a high standard of academic excellence. As result, in addition

to financial and operational risks, the RM activities of an institution now often cover academic risks. Adopting the notion of “fit for purpose” for quality, QA agencies often assess an institution against its own objectives. Therefore, the institution has to provide evidence that it is managing the performance (and risks) effectively to meet its objectives. In this sense, QA can be considered as a driver strengthening collaboration between IR and RM.

From the perspective of QA agencies, RM has a second meaning. In England and Australia, the risk-based approach has been identified as the tool to differentiate institutions at different levels of maturity, so that the intensity of regulatory intervention can be adjusted. Adopting a risk-based approach does not necessarily mean that different standards are set for different institutions, but more in the sense that the evidence requirements for different institutions may be different. Such kind of nuancing power is particularly important in the regulatory regime where massification has encouraged new comers to the arena. For example, in April 2014, the Australian Government published a review report on the demand-driven funding system. The report included 19 findings and 17 recommendations, including extending the demand driven system to diplomas, advanced diplomas and associate degrees, and to private universities and non-university higher education providers such as TAFEs. No doubt this invited significant concerns about the quality of the providers who might be able to join the system. The natural answer to these concerns was that the Tertiary Education Quality and Standards Agency (TEQSA), the national regulator of higher education in Australia, is the gatekeeping of entry into the system. By legislation, TEQSA is required to reflect the principle of risk in taking regulatory action. Therefore, TEQSA is often described as a risk-based regulator. A risk-based approach is often supported by a set of metrics, or performance/risk indicators, to inform the intensity of intervention. In the United Kingdom, the Higher Education Funding Council for England (HEFCE) has announced its plan to adopt a more risk-based approach to quality assurance, underpinned by the following three principles:

- a universal system for all higher education (HE) providers which continues to promote teaching enhancement
- a robust and rigorous approach which enables HEFCE to carry out its statutory duty to secure the assessment of quality in HE providers that have access to public funding
- an approach which enables students to continue to play a prominent role in assessing their academic experience.

The first principle essentially is referring to the notion of *enhancement* in quality

assurance, while the second principle is referring to the notion of *compliance* in quality assurance. Combining enhancement and compliance is a natural response to a sector which is becoming more diversified. Therefore, it is quite understandable that both TEQSA and HEFCE have identified RM as the way forward.

TEQSA's risk assessment framework is probably the most advanced one of this nature in higher education. According to TEQSA, its risk assessment framework was informed by ISO 31000 and adapted for TEQSA's context. The first version was released in 2012 and the second version was released in 2014, after two year of implementation. As a case study, this framework provides an opportunity to look at some of the challenges and considerations of developing a more data-driven approach to QA.

It should be noted that ISO 31000 is primarily designed as a framework for implementation within an organisation. TEQSA's risk assessment framework, however, operates within a regulatory regime in which the dynamics is very different and there is a general reluctance to a full disclosure of risks.

3. TEQSA's Risk Assessment Framework

Unlike Australian Universities Quality Agency (AUQA), the predecessor of TEQSA, TEQSA performs regulatory functions on all providers offering higher education programmes, covering both the public and private sectors. Many of these providers were previously regulated by state-based regulators. On 29 January 2012, TEQSA assumed its regulatory power over higher education providers against a national set of quality standards known as the Threshold Standards. All providers must meet these standards in order to enter and remain within Australia's higher education system. The establishment of TEQSA as a government agency was closely related to the action to abolish caps on student numbers for bachelor's degrees in 2012. There were natural concerns about the impacts on quality because of uncapping and TEQSA was described as a regulator with 'teeth'. In the most serious situation, TEQSA may restrict or remove the self-accrediting power of providers, including universities. This power is explicitly stated in the TEQSA Act as "*TEQSA may impose other conditions on a registered higher education provider's registration*" and a list of examples is given which includes "*restricting or removing the provider's authority to self-accredit one or more courses of study*"

The first version of TEQSA's risk assessment framework, released in February 2012, has 46 indicators. A complete list of the indicators can be found in Appendix.

Scrutinising the list, it is possible to make some key observations which are

summarised below:

- It is a very long list. There are 46 indicators.
- There is a combination of quantitative, qualitative and trend indicators. A quantitative indicator is one that can be computed from data elements. For example, student to teaching staff ratio is a quantitative indicator. In contrast, a qualitative indicator is one that cannot be computed from data elements. An example of quality indicator from the list is “weak academic quality assurance program / culture” for which qualitative information must be assessed in order to form a view. A trend indicator is one that follows change, usually on a year-to-year basis. “Reduced credit rating/breach bank covenants” is an example of trend indicator from the list.
- These indicators require a large amount of data or information. A quantitative indicator usually requires at least three to four data elements to compute. On the other hands, assessing a qualitative indicator usually requires reading pages and pages of documents. More about data requirements will be explained later in this paper.
- Some of the indicators require judgmental decision. For example, the qualitative indicator “weak academic governance structure” is not an indicator that can be computed from data elements because it is impossible to derive a formula to compute the ‘strength’ of an academic governance structure. A judgment about an academic governance structure can only be formed after reviewing the effectiveness of its operation.
- There is an emphasis on academic risks. In the business world, risk assessment is mainly focusing on operational and financial risks. For higher education providers, failing to maintain a high standard of academic excellence is a substantial risk. Indicators 36-39 have been specifically denoted as measuring academic risks.
- Not all indicators are applicable to all providers. For example, some indicators were designed to measure research outcomes, but not all providers are required to conduct research.

Given the above observations, it is probably not surprising that the release of the risk assessment framework by TEQSA in 2012 was met with criticisms. Two main criticisms are:

1. The risk assessment framework adopted a clean slate approach, ignoring the history and maturity of HEIs.

2. The risk assessment framework, with 46 risk indicators, requires a large amount of data to feed.

Since then the framework has gone through some iterations of refinement, both in terms of the nature and number of risk indicators and the corresponding data requirements. The current version of TEQSA's risk assessment framework was released in March 2014 (TEQSA 2014), which has 12 risk indicators, two of them being composite indicators. These are the 12 risk indicators:

1. Cohorts completed
2. Student load
3. Attrition rate
4. Progress rate
5. Completions (by Undergraduate / Postgraduate Coursework and Higher Degree by Research, as applicable)
6. Graduate Satisfaction (by Undergraduate / Postgraduate Coursework and Higher Degree by Research, as applicable)
7. Graduate destinations
8. Senior academic leaders
9. Student to staff ratio (SSR)
10. Academic staff on casual work contracts
11. Financial viability
12. Financial sustainability

Comparing with the original framework, some key observations are summarised below:

- There is a significant reduction from 46 to 12 risk indicators.
- The indicators have been significantly simplified and objectively defined. In the original framework, there are indicators such as “lack of transparency in reporting systems for teaching occurring on a significant scale in non-mainstream campuses” which cannot be objectively defined. Questions like “how much transparency is required?” and “what is a significant scale?” have rendered these indicators open to interpretation. In fact, indicators like these are usually related to a number of confounding issues, making interpretation difficult, if not possible.

- There is a less dependence on qualitative indicators. Almost all the indicators are directly computable from data elements, except the financial viability and sustainability indicators which call for judgment from financial expert.
- The data supporting these indicators apparently is more readily available. These indicators are computable from student, staff and financial data. In comparison, the indicator “high backlog maintenance” in the original framework requires information that is not commonly collected from a provider.

These 12 indicators cover a range of input, output and outcome indicators. Such a design apparently is to facilitate prevention of failure, rather than detection of confirmed failure. Each indicator is described by a formula, an example calculation, the data elements required, and the data source. The two composite indicators are financial indicators. Each of them has five components. This design reflects the complexity of financial assessments. Another feature of TEQSA’s risk assessment is the emphasis on trend analysis.

It is stated in the framework that the 12 risk indicators are intended to support holistic evaluation of overall risk to students and financial position. Although risk thresholds are assigned to each indicator, they are kept confidential. One reason provided by TEQSA for maintaining the confidentiality of the risk thresholds is that qualitative contextual and control information can significantly alter a risk rating. This reasoning actually highlighted one important consideration in the application of data in supporting decision making. While data does not tell lies, data is blind. It is up to the user to ensure that data is correctly interpreted. Data is to support decision making, not to dictate decision making.

3. The Data Requirements

TEQSA’s risk assessment process makes use of a range of data primarily collected from the Department of Education and Training, and from the HEIs themselves. The 2015 Provider Information Request specifies the following data requirements:

- Student data

There are 32 data elements in the student collection covering all domestic, international, onshore and offshore students. The student data is characterised by a student identifier, associating with course level as well as unit level information, focusing on EFTSL which is an equivalent full-time student load for a year.

- Staff data

There are 11 data elements in the staff collection covering staff data at unit record

level for all academic full-time and fractional full-time staff employed in 2015. The data elements relate to the type of employment, duties, salary and full-time equivalent (FTE) academic staff workload for the delivery of award(s) from a provider.

- Staff data: third party

This section is for providers that operate consortium models and therefore have the option to submit aggregated third party. Given there are different consortium models, TEQSA allows more flexibility in the reporting of this category of staff data.

- Audited financial statements

It is specified that the audited financial statements for the most recent year should be provided for the consolidated group and, where separately available, the registered higher education provider.

- Financial management report

It is specified that the financial management report is to include 78 financial data elements sourced from an institution's most recent audited financial statements. The data elements have these three headings: Income statements, Balance sheet and Cash flow.

- Student survey data

For providers not participating the national Australian Graduate Survey (AGS) via Graduate Careers Australia, they are required to submit 18 data elements relating to graduate satisfaction and destinations.

As explained at the beginning of this session, TEQSA collects data from various data sources. Not all providers are required to submit all the above data to TEQSA. There are different reporting requirements already in place depending on the nature of a provider. Generally, a provider is required to submit the data only if not already reporting under other requirements.

The above is not intended to be an exhaustive description of what data can be used to construct quality indicators in higher education. TEQSA's data collection is used as an example because it is probably the most developed data collection covering both public and private sectors. In addition, the data collection has gone through cycles of refinement since its first inception in 2012. Therefore, it is probably a good representation of what data a typical HEI can provide. The data collection specifies a minimum of 139 data elements, which would require a non-trivial amount of effort to collect and compile. The ability of an HEI to accurately meet the data requirements

probably is already a good test of the maturity of its management functions.

4. The Learning

Studying the evolution of TEQSA's risk assessment framework, there are a few points that warrant full consideration when developing a data-driven approach for regulatory or quality assurance purposes.

The most important consideration is to keep the number of indicators to a reasonable and manageable quantity. Any system that employs more than 15 indicators should be fully evaluated from a practical point of view. When identifying what indicators to include, consideration should also be given to what indicators are commonly used by institutions. For the best results, the indicators should serve both internal self-evaluation and external review at the same time, to minimise burden on institutions and to ensure that the indicators paint a true picture about an institution.

Devil is always in the detail. The second main consideration is about data definition and readiness. Even a seemingly straightforward measure such as staff-student-ratio can generate a whole range of discussions about definition of full-time/part-time staff/student numbers, different engagement arrangements with staff or non-staff members, and the difference between onshore and offshore students, just to name a few. When the number of indicators increases, this kind of discussion increases exponentially because the issues are often interrelated. As a result, the credibility and validity of such frameworks can be easily undermined by data definitions which are too open for interpretation, or developed with assumptions that are not valid in different contexts. There is no point in constructing an indicator that does not have the data to support its calculation. In general, data collection has a purpose and cost. It cannot be assumed that, even if data is indeed available, it can be used for a different purpose. There are legal and technical considerations in trying to make use of the readily available data. If, however, HEIs are requested to collection new data for a particular purpose, the cost and burden on the institutions must be fully assessed. For example, in early 2013, TEQSA announced a survey to collect data and information about third-party arrangements that Australian higher education providers are involved in, either locally or with offshore partners. The survey was met with severe criticisms about the breadth and depth of questions in the survey. This can be illustrated by an open statement made by Universities Australia in June 2013 (Universities Australia 2013) that *“TEQSA should not, however, interrogate legitimate activities simply like to ‘fish’ for extensive amounts of information from all providers in the absence of reasonable cause. An example of where this has recently occurred is*

in relation to the third party provider quality assurance survey.”

It is also important to recognise that not all indicators would be applicable to everyone. Institutions should be given the flexibility to choose from a suite of indicators depending on their positioning and mission. In addition, these indicators are often correlated. It may be possible to develop a hierarchy of indicators, such that an observation from one indicator may trigger the application of another indicator. In this way, a much stronger nuancing power can be built into the system, instead of forcing each institution to pass through every single test and therefore defeating the purpose of adopting a risk-based approach in the first place.

Conceptual and philosophical debates about what is quality and what is quality of education will never end. The best approach to address this kind of controversy probably is to highlight that the message indicators are indicators, they are not definitions of quality. Indicators are primarily to draw attention from within educational institutions for self-improvement, to see how they are performing against their own objectives. Indicators can also serve to enhance the transparency of the provisions from an educational institution. Students have the right to know more about educational institutions in order to make an informed decision, which is going to have a long lasting impact on their future.

Data easily lends itself to comparison, construction of league tables, and ranking. The views towards league tables and ranking are quite diverse in the high education sector, probably depends on where an educational institution locates within a table. Nonetheless, league table and ranking are here to stay, whether we like it or not, and they are being compiled by organisations who have chosen to serve the interests of their readers. Therefore, this should not be considered as a deterrent in a decision about adopting performance indicators as measures of quality. However, from a regulatory and QA perspective, it is important that such decisions are not in any way influenced by such rankings, or appear to support or facilitate the compilation of such rankings. In this regard, confidentiality is a major concern.

Finally, it is important that those responsible for implementing and interpreting the indicators are well trained. A recent event in England candidly exemplifies this challenge. HEFCE earlier this year published a report (HEFCE 2015) on degree outcomes with one of the key findings as “*state school graduates tend to have higher degree outcomes than independent school graduates with the same prior educational attainment*”. This finding is challenged by the Centre for Education and Employment Research, University of Buckingham, that the conclusion should be the other way round. This has been widely publicised by newspapers on 4 November 2015. Incidents of this nature can significantly undermine the creditability of an indicator

system. Before drawing any conclusion, there should be ample opportunities for the relevant parties to examine the arguments, not only on the data and analytics, but also to separate correlation from causal relationship.

5. Conclusion

Using data to support decision-making is now the gold standard in organisational management. This capability is also a good reflection of the maturity of an organisation. It is only logical to conclude that this is also applicable to evaluation of higher education provisions, regardless of the on-going philosophical debates about what quality education is and is not.

TEQSA's experience of developing and implementing a risk assessment framework has provided many practical insights into the use of data in higher education, beyond the much hyped publicity around big data and analytics nowadays. Ultimately technologies are tools only, we, as homo sapiens, are the decision makers. We have to go from data-driven, to knowledge-driven, and ultimately to wisdom-driven.

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student outcomes and demonstrating institutional effectiveness. National Institute for Learning Outcomes Assessment. Retrieved November 2015, from <http://www.learningoutcomesassessment.org/documents/Volkwein.pdf>.

Appendix: Risk Indicators of TEQSA's Risk Assessment Framework (2012)

1. Has conditions or shortened registration
2. Has history or significant breach of standards
3. Has history of breach of conditions
4. Fewer than five complete cohorts graduated
5. Directors/officers with convictions/proceedings pending
6. Overseas body corporate
7. Significant decline in student load overall
8. Major year-on-year drop in commencing students or applications in first six months
9. Low/negative revenue growth
10. Low operating profit margin
11. Low/declining revenue per student
12. Capital program is risky because very low or very high
13. Low net tangible asset value in Australia
14. Reduced credit rating/breach bank covenants
15. High proportion of ageing or deteriorating building stock
16. Weak academic governance structure
17. Weak corporate governance structure/processes
18. Weak risk management plan/processes
19. Rejection/compliance issues with professional accreditation in last two years
20. Significant reliance on third parties to deliver courses domestically
21. Delivery of courses offshore
22. Declining two-year average publications (only applicable to provider categories requiring research)
23. Declining two-year average research income (only applicable to provider categories requiring research)
24. Low completion rate Higher Degree Research (HDR) (full-time 5-year) (only applicable to providers offering HDR)

25. Serious breaches of research ethics (only applicable to provider categories requiring research)
26. Lack of transparency in reporting systems for teaching occurring on a significant scale in non-mainstream campuses
27. Weak academic quality assurance program / culture
28. History of activation of tuition assistance
29. Significant reliance on academic staff employed under casual work contracts
30. Low number of senior academic leaders per broad field of education
31. High / increasing student to teaching staff ratio
32. Low ratio of qualified staff, especially in Post Graduate (PG) environments
33. High / volatile international student profile
34. Academic/market risk: Declining academic admission standard / inadequate academic requirements in admissions policy
35. Significantly high student growth overall
36. Academic risk: Very high or rapidly increasing student attrition rates
37. Academic risk: Very low / very high or rapidly changing student progress rates
38. Academic risk: Very low or rapidly declining student unit satisfaction levels
39. Academic risk: Very low or rapidly declining graduate course satisfaction
40. Outcome risk: Very low or rapidly declining graduate employment or further study rates
41. Significant number of serious, substantiated student complaints
42. Inadequate floor space per student, appropriate to discipline(s)
43. Low / declining total information resources (e.g. library) and expenditure per student
44. Low / declining lab places per student in Science, Technology, Engineering and Mathematics (STEM) disciplines
45. Poor Occupational Health and Safety (OH&S) record
46. High backlog maintenance