The competition for industry research funding

How satisfied are university commercial research clients?

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Constrained public funding for universities and the emphasis placed on university-industry interactions mean that universities are increasingly required to compete for industrial funds for research. This in turn means that universities need to develop a customer service culture in order to be competitive and attractive to industry. Many studies examine industry-university relationships, their importance and ways to improve interactions but publications examining customer service quality in the context of the provision of university research services or technology transfer services to industry are lacking. This article recommends a modified SERVQUAL (service quality survey instrument) approach and the survey results identify several opportunities for improved service delivery practice.

Introduction

There is a growing world-wide trend towards greater collaboration between academia and industry, an activity encouraged by governments as a means of enhancing competitiveness and innovation (Barnes, Pashby & Gibbons, 2002; Berman, 2008; Siegel, Waldman, Atwater & Link, 2003). For example, inter-institutional scientific collaborations in biotechnology are known to be the vehicle that drives industry forward (Oliver, 2004; Bagchi-Sen, Hall & Petryshyn, 2001) and innovation rates are higher amongst firms that exploit university resources (MacPherson, 2002). In addition, open innovation (where organisations exchange, collectively develop or trade innovation) is becomingly increasingly important (Cutler 2008) within the Australian innovation system, as it is in other countries (e.g. Chesbrough, 2006; Laursen & Slater, 2006). Further, the 2009-10 Commonwealth Budget announced the establishment of the Joint Research Engagement Programme. Although the details were not announced, it seems that an increasing emphasis will be placed on funding from non-traditional funding routes outside of the nationally competitive grants scheme. This will create an environment where universities will be encouraged to focus on enhancing contract research income. Through the programme, the Government will redirect $1.2 billion over four years (including $158.8 million in 2009 10, $323.9 million in 2010–11, $330.0 million in 2011–12 and $337.6 million in 2012–13) from the Institutional Grants Scheme (IGS). The Joint Research Engagement Program will use a revised allocation formula which removes competitive grant income as a driver of funding. The Government states that this change is intended to give greater emphasis to end user research by encouraging and supporting collaborative research activities between universities, industry and end users.

For the purposes of this article, 'commercial research' is the overarching term used for both contract research and consultancy projects where a third party is paying the university to undertake a certain

project and expects certain 'deliverables' in return. From industry's perspective, commercial research offers: access to expertise and equipment not readily available elsewhere; access to leading edge technologies and world-class experts; development of stronger relationships with universities (and future graduates); and an expansion of their own research capabilities via the development of a university/industry research team. Commercial research activities help universities: to establish and strengthen relationships with industry; to exchange technologies with the broader research community; to ensure staff maintain 'real world' skills; to offset maintenance costs of large items of equipment; and to generate research income.

Other than the benefits listed above, there is a further incentive for Australian universities to undertake the contract research component of commercial research. The Commonwealth Department of Education, Employment and Workplace Relations provides Institutional Grant Scheme (IGS) funding based on a performance index where the research income of each university is weighted at 60 per cent. The two primary mechanisms whereby universities obtain research income are grants and contract research. Consultancies do not contribute to the calculation of total research income. As stated above, it seems that the industry funded component of the IGS will be further emphasised following an announcement made in the in the 2009-10 Budget.

Most universities focus on chasing grants. However, the total funds available from federal or state government supported grants are capped per annum and universities apply for these funds competitively. There is no such cap on contract research income as this is market driven. Thus, contract research represents an opportunity for universities to increase total research income and as this is a market-driven mechanism, universities need to make themselves attractive to the market. They are expected to present themselves as service enterprises that cater to the research needs of their industrial customers in order to allow them to compete better internationally (Lederbogen & Trebbe, 2003).

In a knowledge-based economy, complex dynamics link universities to the market (Fisher & Atkinson-Grosjean, 2002). Research universities have tended to adopt an economic mission and become knowledge entrepreneurs (Fisher & Atkinson-Grosjean, 2002). As academic science feeds the market, so the market feeds science with new questions and funding to maintain the momentum (Fisher & Atkinson-Grosjean, 2002). In such a context, commercial research should be considered a service and the management of such services (e.g. through technology transfer units or commercial research management units) should be considered a service industry. Customers of such a service industry would include individuals, businesses, companies, government departments, not-for-profit organisations and other research institutions (together termed 'industry' for the purposes of this article).

Interactions between universities and industry have long been a focus for researchers working on socio-economic development issues. However, as a direct result of the widespread recognition that university-industry links can assume a crucial role in promoting innovation capacity and the competitiveness of economic systems (Pires, Rodrigues & de Castro, 2002), there are very few studies of the customer service performance of the university industry or indeed the quality of customer service provided. The existing literature focuses on the pros and cons of university-industry partnerships, developing models to improve relationships, descriptions of innovation models, or case studies demonstrating effective interactions (e.g. Anderson, 2001; Berman, 2008; Chesbrough 2006; Riis, 2001; Siegel et al., 2003; Valentin, 2000; Bagchi-Sen et al., 2001) and neglects to quantify or evaluate actual customer service performance.

Studies that measure customer perceptions of service are lacking and many studies of industry-university interactions fail to consider the customer experience altogether (despite hypothesising on reasons why industry and universities may experience problems in interacting). However, research in service quality has been conducted in the higher education sector with respect to undergraduate students (Gibbs, 2004), the information technology service department (Smith, Smith & Clarke, 2007), virtual community websites (Kuo, 2003), libraries (Cook & Heath, 2001; Cullen, 2006) and individual faculties (Oldfield & Baron, 2000).

Within the higher education context, the expectations of customers are increasing and there is a greater emphasis placed on the quality of service (Smith et al., 2007). However, whereas goods can be measured and defined in terms of their physical attributes, intangible services (such as commercial research) cannot be measured so easily, so the concept of service quality is therefore often difficult to define for service industries (Gibbs, 2004; Oldfield & Baron, 2000). In such cases, customer evaluations of service quality are based on perceptions of the quality of service received, relative

to prior experiences (Gibbs, 2004) or expectations of what constitutes excellent service.

Study methodology

This study developed and used a modified SERVQUAL questionnaire (available at http://www.uow.edu.au/research/survey) to compare customer expectations and perceptions, following the methods of Zeithaml, Parasuraman & Berry (1990), Parasuraman, Berry & Zeithaml (1988; 1991) and Gibbs (2004). The standard SERVQUAL survey questions, presented in Zeithaml et al. (1990) and Parasuraman et al. (1988; 1991) were modified to suit the environment and circumstances of a customer accessing commercial research services within the university context. The SERVQUAL method was chosen as it is a generic instrument with good reliability and broad applicability (Parasuraman et al., 1991) and is a well-known and much-used instrument for measuring customer perceptions of service quality (Oldfield & Baron, 2000) both amongst individuals and organisations. It was also readily tailored to suit the particular situation of a commercial research unit.

Parasuraman et al., (1991) warn that although minor modifications in the wording of items to adapt them to a specific setting are appropriate, deletion of items could affect the integrity of the scale and cast doubt on whether the reduced scale fully captures service quality. However, in the context of a commercial research unit, it was required that some questions be removed because of their irrelevance. For example, the questions 'XYZ's employees are neat-appearing' and 'XYZ insists on error-free records' are not appropriate in the commercial research context. They may be appropriate in some situations, for example where the service is the delivery of a training course to senior managers and dress code would be important or where record-keeping was an important part of the deliverables to the client. However, these questions were not generally appropriate and so many customers would not be able to provide an informed response. In this situation, the risk that the integrity of the scale would have been jeopardised through removal of the questions was considered lower than the risk of including them and participants providing ill-informed responses. Conversely, some additional questions were included, such as 'staff at an excellent research provider will explain the processes in place for customers to access the research provider's services (e.g. contract requirements, internal approvals process, project costing)'. These additional questions were considered important factors for consideration by participants, based on routine feedback that the author received from customers.

The modified SERVQUAL questionnaire was sent out to all commercial research customers of the University of Wollongong who used the University's commercial research services during 2007 and for the first six months of 2008. The questionnaires were sent to the key project contact identified by each industry partner during contract negotiations and project scoping. These contacts had responsibility or approving delegation for the contractual and technical negotiations. In some cases they were technical staff or senior management and in other cases they were project management or legal staff. Clients were able to complete the questionnaire confidentially. The joint University of Wollongong and South Eastern Sydney and Illawarra Area Health Service Human Research Ethics Committee's approval was obtained for the project.

Table 1. Modified SERVQUAL dimensions used in this study.

Dimension	*Description of Dimension*	*Questions*
Tangibles	Physical facilities, promotional material and Website.	1-4
Reliability	Fairness/appropriateness, transparency, and consistency.	5-9
Responsiveness	Delivering on promises within the promised Timeframe.	10-12
Assurance	Staff are competent and inspire confidence.	11-15
Empathy	Individualised attention.	15-18

The questionnaire enabled identification of the attributes that most contributed to customer satisfaction and comparison of customer expectations and perceptions across the five dimensions of tangibles, reliability, responsiveness, assurance and empathy (Table 1). These five dimensions are considered to be representative of the generic dimensions of service quality (Parasuraman et al. 1991). The questionnaire presented two sets of questions, each set comprising 18 questions in total and containing three to five questions from each of the dimensions in Table 1. The questions were paired, with the first set of questions worded to elicit responses in regard to client expectations (i.e. expectation score) of an 'excellent research provider', and the second set of questions designed to elicit perceptions (i.e. perception score) of the University of Wollongong specifically. Respondents were

invited to rank their perceptions and expectations on a seven-point scale, with 1 being 'strongly disagree' and 7 being 'strongly agree'. In addition, respondents were invited to allocate 100 points between the five dimensions according to how important the features of that dimension were to them (the more important a dimension was, the more points it was allocated). Each point allocation to a dimension was then divided by 100 to provide the 'importance score'.

Data analysis

The analytical approaches used in this study followed those of Zeithaml et al. (1990), Parasuraman et al. (1988; 1991) and Gibbs (2004). The mean expected scores and the mean perceived scores were compared for each question and each service dimension. This enabled identification of service performance across specific dimensions and within a dimension (i.e. the specific aspects affecting service performance within a dimension). The level of importance customers placed on each service dimension was determined from the importance score.

The SERVQUAL score was calculated by subtracting the expectation score from the perception score for each paired question in the questionnaire. The university's service performance was assessed for each dimension by averaging the individual SERVQUAL scores across all questions comprising a dimension (e.g. questions 1 to 4 for 'tangibles') and across all customer responses. A mean weighted SERVQUAL score was then calculated for each dimension by multiplying the unweighted SERVQUAL score by the importance score for the relevant dimension and averaging across all questions comprising a dimension and across all customer responses.

A negative SERVQUAL score indicated that customer expectations were not being met, a zero score indicated alignment of performance with expectations and a positive SERVQUAL score indicated that expected performance was being exceeded.

Results

The response rate was disappointing (only 19 responses were received from the 98 sent out, despite reminder notices). These comprised eight companies with >100 employees, four with 100 or fewer employees, three Government Departments, three international companies, and one customer from the 'other' category. While studies involving students tend to have much higher sample sizes (e.g. 314 students in Smith et al. 2007 and 42 students in Gibbs 2004), studies investigating industry perceptions of university research interactions tend to use much smaller sample sizes (e.g. 10 grant partners in Berman 2008).

So the sample size is consistent with (if not better than) other studies of industry-university interactions. Low response rates are possibly a result of staff not feeling they had the authority to respond to the survey on behalf of the organisation (particularly for Government partners), a lack of time available to complete the survey (particularly for small businesses) or a lack of perceived value in participating (perhaps feeling that the surveys would not lead to improvement).

Figure 1 shows the mean unweighted client expectation and perception questionnaire scores for each dimension. Figure 2 shows the same information for each questionnaire item. The one area where perceptions exceeded expectations was in relation to courteousness (question 14 of the questionnaire). In addition, the gap between expectations and perceptions was only slight in relation to individualised client attention (question 16).

In order to evaluate service quality more accurately, the mean importance scores were calculated (Figure 3). Reliability was the most important dimension, followed by responsiveness, while tangibles were the least important. Figure 4 shows the mean SERVQUAL score (both unadjusted and adjusted to consider the importance score) for each dimension. The negative values indicate a shortfall in customer service across all attributes.

Five clients expressed interest in participating in a more detailed telephone discussion about service quality. Responses are included in the discussion, where relevant.

Discussion: Application of the SERVQUAL instrument and Aspects of Service Quality Identified as Being Important

The purpose of the SERVQUAL protocol is to serve as a diagnostic methodology for uncovering broad areas of service quality shortfalls and strengths (Parasuraman et al. 1991). To this end, the modified SERVQUAL questionnaire developed in this study was able to identify aspects of service quality that were considered important by customers and uncovered several areas for service quality improvement.

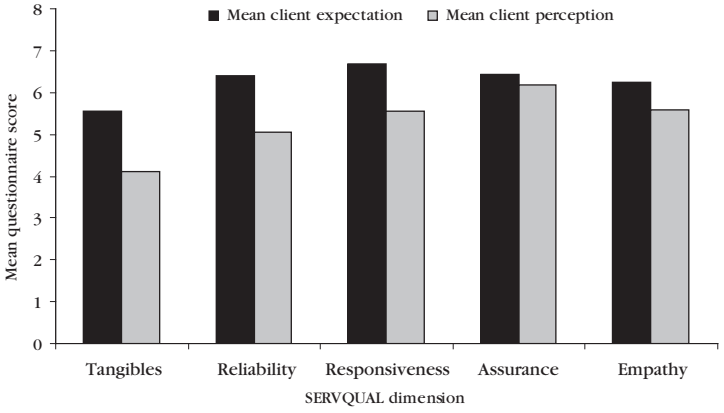

Figure 1. Mean un-weighted client/customer expectation and perception questionnaire scores for each SERVQUAL dimension.

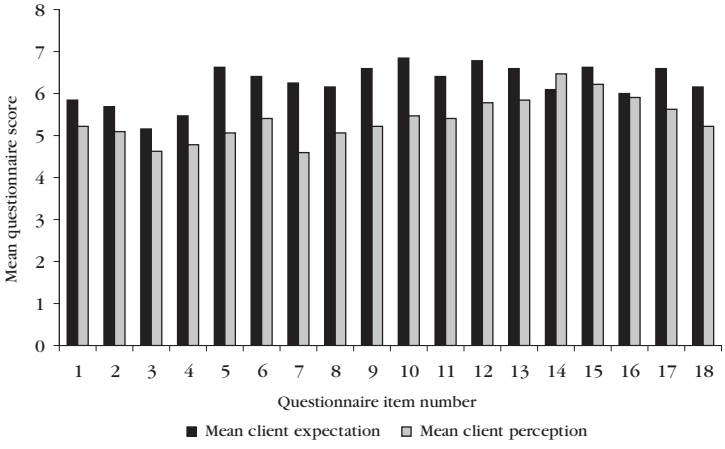

Figure 2. Mean client/customer expectations and mean client/customer perceptions by un-weighted questionnaire item number.

For example, strong performance was shown in courteousness and individualised service but an opportunity to improve performance was identified in the dimensions of responsiveness and reliability. Responses to individual questions within these dimensions then indicated that the specific areas for improvement included developing a mutual understanding of the scope of a project; developing a streamlined access process; developing a transparent access process; developing fair IP terms and developing strategies to meet agreed project timeframes. These findings are not surprising and occur elsewhere in the literature. They are also commonly recurring themes of informal feedback received by the author.

Siegel, Waldman, Atwater & Link (2004) found that with virtual unanimity, scientists and firms assert that universities are too bureaucratic and inflexible. The follow-up telephone conversations with customers supported the literature in that customers were frustrated by the bureaucratic process and length of time involved in contract negotiations. One customer stated 'it took more time to do the legals than the time taken to do the tests and the tests weren't quick'. However, it seems that the issue is the length of time involved not the contractual terms themselves as respondents were happy with the flexibility in negotiations. Comments included 'they were not major problems and were negotiated amicably and professionally but the time it took meant that we were legally insecure for a long period of time and the project had already completed before the contract was in place'. Proving that timely service provision was important, the same client said they 'now go elsewhere' for similar services despite being happy with the technical outcomes of the interaction.

This is an important lesson for universities to learn. Sometimes, the risk of losing a client because of lengthy contract negotiations is more significant than the risk involved in performing the services themselves. In such cases, universities might consider focusing less on the legal aspects of the contract and more on the relationship aspects of the interaction. Of course, risks need to be balanced and sometimes protracted contractual negotiations will be important in order to reduce legal or commercial risks. Also, it is not always true that the university is the source of delays as sometimes contracts are held up within the industry partner's own bureaucratic processes. Universities tend to try to use their own contract templates, rather than the customer's. This speeds up the negotiation process as the university lawyers and contract negotiators are familiar with the standard terms and can review changes quickly. Some universities in the USA even impose a levy or higher charge-out rate for projects where the customer's contract is used.

Often the delay in contract negotiations is a result of negotiating intellectual property (IP) ownership and access rights. Elsewhere, industry representatives have stated that negotiating research contracts with universities is becoming more difficult and time-

consuming because universities are becoming so aggressive in protecting their intellectual property (Bhattacharjee 2006). This is a result of Australian universities placing an increased focus on commercialisation of IP and therefore being less inclined to encumber their IP or give it away on non-commercial terms. Amongst industry, it is still a common misconception that universities are wholly funded by Government and this creates an expectation that universities should make their IP available on non-commercial terms. There is also the industry perspective that if the research is being fully-funded by industry, industry should own the IP. However, the terms themselves may not be such an issue as the time taken to negotiate them. For example, Berman (2008) found that IP terms may pose significant challenges for both universities and their industry partners; however this is not so much because of the conflict over ownership but rather due to the paperwork and slow pace of bureaucracy involved in such negotiations.

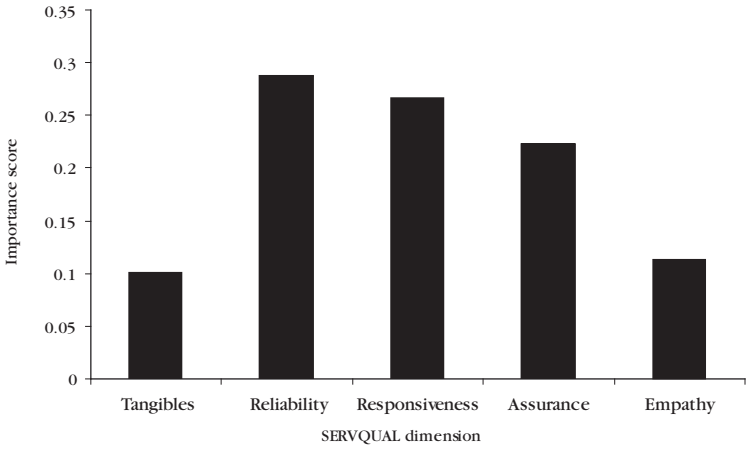

Figure 3. Mean importance score for each dimension.

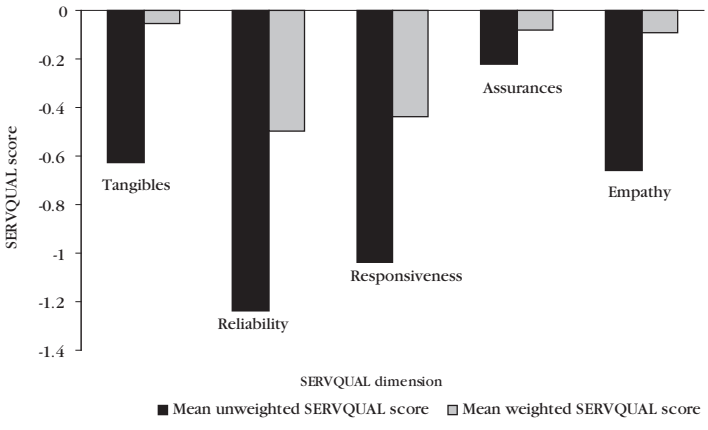

Figure 4. Mean weighted and unweighted SERVQUAL score for each dimension.

Unfortunately, the sample size in this study was not large enough to analyse the data by category of customer. However, Santoro and Chakrabarti (2002) have found that size matters with respect to the types of relationships firms have with university research centres and the types of technology initiatives firms pursue. They found that smaller firms tend to use technical consultation and research for immediate problem solving whereas larger firms tend to engage in non-core technology development to enhance long-term innovation. This finding was supported by Fukugawa (2005) who found that large firms are more likely to perform joint research and smaller ones consultancies. On this basis, it seems that the opportunity to develop longer-term customer focus initiatives exists more with larger firms than smaller firms simply because the interactions are likely to be more longer term via research than consulting. However, consulting projects are a good way to establish trust with an industry partner and may lead to larger research contracts being offered in the future.

Meeting agreed timeframes, in terms of delivering the research/consulting services, was another area of concern for customers. Again, this finding is supported in the literature. For example, Berman (2008) had one industry representative say that despite specified timelines, six months turned into three years. In our case, one customer stated 'it is an issue of over-promising and under-delivering, we have our own clients who we make promises to and if the university can't deliver in the timeframe they promise then we let our own clients down'. In addition, it seems that customers would like the commercial research unit to manage liaison between the researcher and the customers better. One customer stated 'the researcher is heads down bottom up and we are heads down bottom up, so we need someone else to remind us to communicate and to ensure that small issues are resolved as small issues and not escalated into big issues'. This implies an ongoing customer liaison role for commercial research units and suggests that researchers require mentoring and reminding to establish clear processes for communica-

tion and managing expectations. The same customer went on to say that 'being clear on what is expected and how it is communicated, touching base to ensure that there is a reality check' are very important.

There is little in the literature on the effect of the physical environment in organisations, such as universities, where customer interactions and encounters with physical surroundings are not a major component in the service offer (Oldfield & Baron 2000). The results of this study show that the tangible aspects of service delivery (e.g. equipment and facilities, questions 1 and 2) were not considered highly important. Follow-up telephone conversations also demonstrated that the tangibles service dimension was not important to the commercial research customers. For example, one client stated 'I didn't feel that the facilities or promotional material was as important as the people being of high calibre and quality'. Although it may not be a factor in evaluating service quality, tangible attributes are likely to be considered in the initial phases when an industry partner decided whether or not to engage with a university. The promotional material may also indirectly contribute to the customers perceived performance in terms of transparency (e.g. via Customer Service Charters or guides to accessing university resources).

Implications for the university sector

Shifts to a market orientation can lead to changes in the most fundamental assumptions about the mission and purpose of higher education institutions (Anderson, 2001). Universities have tended to adopt a market approach to student recruitment but the general focus on competitive grant funding (where there is no clear client) as the primary means to fund research has meant that they have not adopted a similar culture in their research provision. Universities tend to pursue objectives such as teaching students for undergraduate and postgraduate qualifications, increasing knowledge through research and disseminating new knowledge through publications (Valentin, 2000). They don't tend to focus on customer service to industry clients.

However, excellent service pays off because it creates advocates and repeat customers. Excellent service is exactly what universities require in order to compete for industry clients and to increase total research income.

In addition, public investment in Australian universities does not look as though it will dramatically increase. The capped public support and increasing private interest in commercial research via universities (e.g. via widespread adoption of the open innovation model) provides a unique opportunity for the sector to increase research income via contract research. Yet, this challenge (or opportunity) does not seem to have been taken up adequately by the Australian higher education sector or individual universities in terms of their commercial research activities. It is hoped that this study will provide a step in extending the published literature regarding customer service quality in university technology transfer and commercial research units.

The instrument created for this study can be used to quantify customer service quality and identifies areas of customer service that are considered important by industry. (Specifically these areas include the development of a mutual understanding of the scope of a project; a streamlined and transparent access process; fair IP terms and strategies to meet agreed project timeframes). Since universities are competing for commercial research funding, it only stands to reason that they should seek to understand and address what it is that their customers require in order to perceive the research service as being of high quality. This will then lead to repeat business, improved reputation and diversification of research interaction (e.g. from consulting to contract research to Australian Research Council Linkage applications).

Recommendations

Several recommendations can be made for the conduct of future studies:

- While an examination of SERVQUAL scores can be useful, additional insight can be gained by tracking the levels of expectations and perceptions through repeated administration of SERVQUAL (e.g. once every six months) (Zeithaml et al., 1990). Thus regular surveys are recommended.
- Sample sizes should be increased to allow more structured analyses (e.g. to investigate differences in perception between small and large companies) and more sophisticated statistics (e.g. factor analysis).
- Internal staff should be included in the surveys to determine differences between internal and external client perceptions of service quality (not performed here as we did not want to over-survey our internal clients who already participate in regular surveys), and

- Future studies should investigate further the specific aspects of responsiveness and reliability that can lead to improved service perceptions.

The following recommendations are made to commercial research administrators:

- Develop promotional material and communication strategies to improve process transparency.
- Engage with industry at an early stage to ensure that project scope is mutually understood.
- Focus on preparing and negotiating contracts in a timely fashion. Acknowledgement that this is an important aspect of service quality for customers may assist universities to streamline internal processes.
- Coach academic staff so they understand the importance of timely provision of services, the management of client expectations and regular communications; and
- Develop customer-focused initiatives and regular surveys to identify opportunities for service improvement and perceived performance.

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