The tertiary debate

A case study analysis of factors considered when applying for university entry by traditional age school leavers in Brisbane

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Many interacting factors contribute to a student's choice of a university. This study takes a systems perspective of the choice and develops a Bayesian Network to represent and quantify these factors and their interactions. The systems model is illustrated through a small study of traditional school leavers in Australia, and highlights similarities and differences between universities' perceptions of student choices, students' perceptions of factors that they should consider and how students really make choices. The study shows the range of information that can be gained from this approach, including identification of important factors and scenario assessment.

Introduction

Although there has been international interest in the decision making process that traditional aged students undertake in their choice of university, most theoretical and conceptual approaches to modelling choice of university are based on the assumption that prospective students think rationally and make careful, objective analysis of available universities when making their choice. This study aims to reveal the relationship between the factors that make a university appealing to prospective students, those factors that are considered important by the universities themselves and those few factors that actually tip the scales in the final decision.

Due to an increase in competition and decline in resources supplied by the government, universities in many countries, including Australia, are under constant pressure to increase the number of applicants to their institution. Although in the past, student equity, engagement and the access to technology have been among the top priorities of tertiary education institutions, the recent flattening in student demand is now making obvious the increasingly crucial need of the organisation for a systematic model demonstrating proven and concrete factors that influence school leavers' choice of university.

Although studies have explored this process, most have failed to provide a conceptualised, mathematical model, or have not provided an appropriate scope of study. Chapman (1981), for instance, reports a systematic model to aid universities to develop more sophisticated marketing strategies by modifying their institutional descriptions and targeting of recruitment literature. Chapman's model is created on the basis that students' college choice is influenced by a set of student characteristics in combination with a series of external influences and the college's own fixed characteristics. Although effective, it is relatively open ended and so fails to provide a detailed guide to interested universities. In addition, the study itself does not move beyond the creation of this model and fails to report any kind of extended study to test the effectiveness or demonstrate the usage of the model.

A study by Beswick (1973) provides good insight into the external factors affecting a student's university choice. The study's survey revealed not only that course offerings tended to dominate the decision making process, but also that mothers were actually the most influential people

reported to affect the process. Apart from its age, a limitation of this study is that it only sampled students from three tertiary education institutions, making it potentially unrepresentative. Moreover, the focus was on the decision making process in terms of student support and guidance, rather than university marketing.

Catley (2004) measured the relative significance affecting prospective undergraduate students in their choice of university. The paper focuses on the course that students choose and the decision making process underlying this choice. The results were obtained from a questionnaire distributed to two universities' first year undergraduate law students and a focus group of approximately 20 of these students. Catley discovered that the most important factor was reputation, followed by position in league tables. These factors show a general interest in future success and employability, implying that the students who undertook this survey all applied to their university on the basis of the potential marketability of their qualifications. The study also showed that course-related factors were ranked above university factors or external influences. A limitation of this study is the potential bias arising from its pool of subjects (undergraduate law first-years in second semester in university), especially when considering the fact that they are enrolled in one of the hardest and most competitive courses in the US (Community College Transfer Students, 2012).

There appears to be only a handful of relevant studies undertaken in Australia. The survey conducted by Soutar and Turner (2002) of high school students, for example, included a list of eight factors and was based on a trade-off decision making process model. The study revealed that course suitability, academic reputation, job prospects and teaching quality were the four most important determinants. It also showed that there was only a small gap between the highest rating (15) and the lowest rating (7) attributes, which provides evidence as to why university choice is such a hard decision for most school leavers. The primary limitation of this study was its restricted consideration of a small number of factors. More recently, the studies by Jung (2013a, 2013b) have focused on whether students decide to enter university, based on variables related to motivation, cultural orientation and occupation. In a survey of 349 senior high school students drawn from three high schools in Sydney, Jung (2013b) found that variables related to allocentrism and idiocentrism were predictive of attitudes towards university entry and intention to enter university. Based on the same survey, Jung (2013b) reported that family influences negatively predicted amotivation with university entry that in turn positively predicted indecision. Other studies have focused on broadly similar topics. Calderon *et al.* (2000), for example, have discussed the relationship between subject choice and transition from school to university.

This study aims to contribute to this literature by considering the factors associated with university choices made by traditional age students after they have applied but before they have enrolled in a university. Importantly, the study allows for the possibility that there is a population of students whose real reasons for choosing a university could differ from those factors they think should be important and hence should be considered by themselves and members of their graduating cohort.

The study focuses on results from a study of three Queensland universities, two student-based focus groups and a consequent survey Factors Related to a High School Graduates' Choice of University. The data are modelled using a complex systems approach via a Bayesian Network (BN), which is a graphical model of the researched relationship between a desired outcome and the interacting variables influencing this outcome, probabilistically quantified by resulting statistics and responses. In addition to inferences based on the individual BNs developed from the literature, focus groups and survey, comparisons are made between the three BNs in order to develop a more holistic understanding of this important issue.

Methods

The research methodology comprised three stages. In the first stage, a literature review was conducted to identify the factors that universities choose to highlight in advertising themselves to students. Due to the nature of the topic, the traditional literature sources, comprising journal articles and conference papers, were augmented by grey literature, in particular information collated from websites, pamphlets and booklets. Using a qualitative thematic analysis, this information was conceptualised as a network of interacting factors, and then quantified probabilistically as a Bayesian Network.

In the second stage, two focus groups were held with ten recently graduated high school students who had sought enrolment in university but had not yet been accepted. The members of the focus groups were recruited from a social networking site subscribed to by students across the city of Brisbane, the capital of the state of Queensland in Australia. The objective of the focus groups was to identify what students think are important factors to consider when deciding on a university. Each of the participants

Table 1. Results of Bayesian Network for universities' perception of student choices

Node	*Factor(s) most strongly associated with largest probability of a high level for the node*	*Factor(s) most strongly associated with largest probability of a low level for the node*
Programme	Quality Innovative range	Global perspective
Employability	Teaching staff Programmes	Ranks and acknowledgements
Reputation	History	International reputation
Social	Reputation	Popularity
Campus desirability	Social	Campus Sports
Suits student	Internationalism Personal attention	Societies
Student chooses this university	Employability	Suits student Campus desirability

was asked to write down five factors that they considered important for their cohort and themselves to keep in mind when choosing a university to apply to as their top preference. The responses were aggregated by the group as a conceptual network, and then quantified as a BN by popular vote based on ranked importance of the factors.

In the third stage, a questionnaire was sent out to a sample of 39 traditional age school graduates yet to be enrolled in university. The survey respondents were volunteers recruited through an online survey tool. No respondents were members of the focus groups. The questionnaire listed the set of factors obtained from the first two stages and each participant was asked to rate them on a scale of 1 to 5 (1 being 'Did not consider' and 5 being 'Deciding factor') and answer a small number of demographic questions. The information was then used to construct a final Bayesian Network and was quantified using the information provided by the survey recipients.

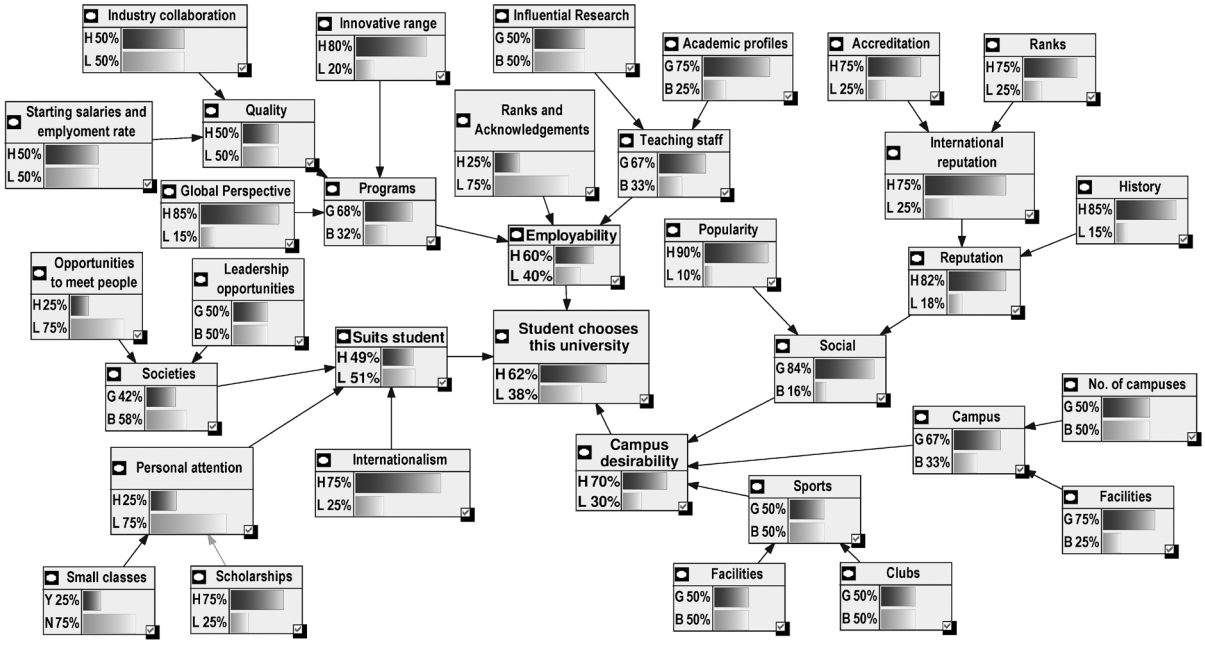

Figure 1. Overview of quantified Bayesian Network of factors promoted by universities to prospective traditional age students, based on available literature

Table 2. Results of Bayesian Network for students' perception of student choices

Node	*Factor(s) most strongly associated with largest probability of a high level for the node*	*Factor(s) most strongly associated with largest probability of a low level for the node*
Reputation	Industry people	Ranks
Quality of programme	Practical experience	Teaching
Valuable programmes	Quality of programmes	Global perspective Range of programmes
Employability	Valuable programmes	Reputation
Preferable course	OP (high school exit grade) Flexibility	
Student support	Industry people	Family Friends
Suits student	Preferred course	Financial aid availability Student support
Social liveability	Social life Family life	Friends
Liveability	Cost Social liveability Environment	
University location	Liveability	Industry
Location	Campus location University location	
Facilities	Academic	Eateries Sporting facilities
Clubs	Sporting	Academic Special interest
Social atmosphere	Societies	Social places Clubs
Campus desirability	Social atmosphere General aesthetics	Location Facilities
Student chooses this university	Employability	Campus desirability Suits student

Results

Universities' perception of student choices

The quantified Bayesian Network based on the available university documentation is shown in Figure 1. Table 1 provides a list of nodes in the BN and those factors that were most influential in determining the largest probability of having a high level, or alternatively a low level, for that node. For example, obtaining a high level for the Programme was most strongly influenced by quality and innovative range, whereas obtaining a low level for programme was dominated by global perspective. Based on this analysis, the overall probability of choosing the university under study was 0.62 (see Figure 1), and was influenced primarily by employability, whether or not the university suits the student and campus desirability (see Table 2). The interaction between these three factors was in turn influenced by the other factors in the model, as indicated by the arrows in Figure 1.

Students' perception of factors they should consider

The Bayesian Network based on the connections made by the students in the focus groups is shown in Figure 2. Table 2 shows the factors associated with high and low levels of the nodes in the BN, after quantification of the network based on the focus group responses. A high level for quality of the programme, for example, was most strongly influenced by practical experience. By design, the overall probability of choosing a university was influenced by the same three factors as for the BN based on

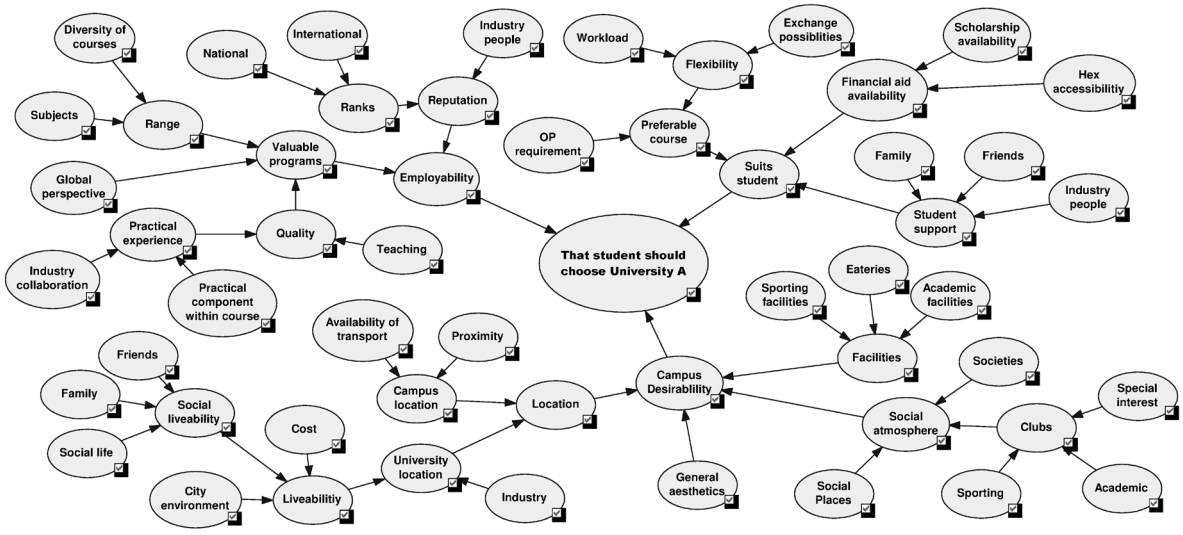

Figure 2. Bayesian Network derived from the focus groups.

universities' perceptions, but the different weighting of the factors in the network result in different interactions and impacts based on students' perceptions.

How students really make choices

The BN based on the survey responses is shown in Figure 3. The results of the quantified BN are displayed in Table 3. For some nodes such as quality of programme and student support, there was strong correspondence between students' perceptions of factors they should consider and how they reportedly really make choices. For most nodes, however, these two perceptions differed. Students apparently understand, for example, that a dominant factor in rating a university as having a low reputation is a low

Table 3. Results of Bayesian Network for how students really make choices

Node	*Factor(s) most strongly associated with largest probability of a high level for the node*	*Factor(s) most strongly associated with largest probability of a low level for the node*
Reputation	Critical reputation	Popular
Quality of programmes	Practical experience	Teaching
Employability	Reputation	Range of programmes Quality of programmes
Course suitability	Preferred course	Flexibility OP (school exit score) requirement
Student support	Industry people	Friends Family
Suits student	Course suitability	Financial aid availability Student support
Facilities	Academic facilities	Sporting facilities Access to technology
Campus desirability	University location	Social atmosphere General aesthetics Facilities
Student chooses this university	Suits student	Employability Campus desirability

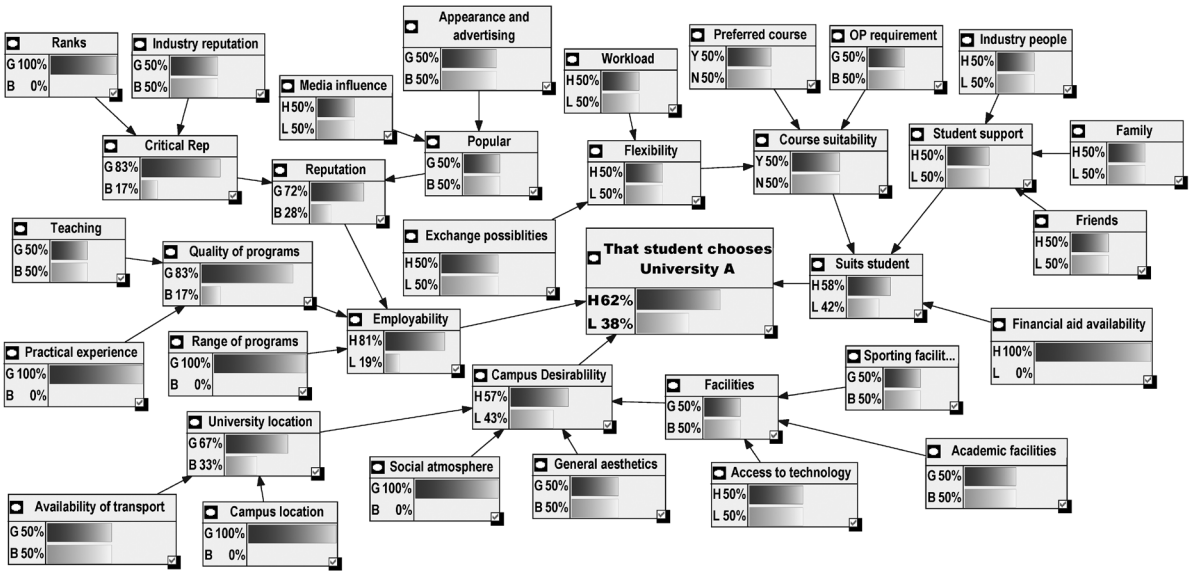

Figure 3. Bayesian Network based on survey

Table 4. Results of scenario analyses as part of model interrogation

Node	*Survey %*	*Scenario 1*	*Scenario 2*	*Scenario 3*
Ranks	High 56	High	Low	Low
Industry reputation	Low 50	Low	High	Low
Media influence	Low 32	Low	Low	High
Appearance	High 59	High	Low	High
Workload	Low 42	Low	High	High
Exchange	High 53	High	Low	Low
OP requirement	High 62	High	High	Low
Preferred course	High 78	High	High	Low
Family	High 51	High	High	Low
Friends	Low 38	High	Low	High
Industry support	Low 34	Low	High	Low
Financial aid availability	Low 45	Low	High	Low
Sporting facilities	Low 40	Low	Low	High
Academic facilities	High 73	High	High	Low
Access to technology	High 58	Low	High	High
Social atmosphere	Low 48	High	Low	High
General aesthetics	High 59	High	Low	High
Campus location	High 68	High	Low	High
Availability of transport	High 69	Low	High	Low
Teaching	Low 32	High	High	Low
Practical experience	High 64	Low	High	Low
Range	High 68	Low	Low	High
P (student chooses university is high)	**56%**	**53%**	**57%**	**40%**

rating, but based on how their choices are actually made, a low reputation is dominated by the university having low popularity. Similarly, overall university choice is most strongly influenced by employability based on students' perceptions of factors they should consider, but the strong influence in how they really make the choice is an overall sense of whether the university suits the student.

Model interrogation

Three scenarios involving three separate model universities were used to test the Bayesian Network from phase three. Table 4 shows the outside nodes that were defined using results from the survey and can be seen as the base probability to be compared to the three scenarios. Scenario 1 represents a typical student who values education, but also factors convenience, as well as social and cultural aspects, into their decision. Scenario 2 represents a very academically driven student who is very driven to find employment soon after graduating their degree, and who values practical teaching and employability far above any social or locational factors. Scenario 3 represents a student who is attracted to the social and cultural value of a school, rather than any immediate potential employability.

Comparison of major factors

The major factors identified in each of the three BNs were represented as pie charts (Figure 4). It is apparent that although the focus groups demonstrate different priorities than those of the universities, the factors relating to the students' actual choices, as shown through the survey, are much closer to the values expressed by the universities. Across three charts, the most influential factor proved to be that of reputation. Within the focus group responses, reputation occupied half of the employability percentage area, 7 per cent of the suits student category, and 12 per cent of the campus desirability. Within the pie chart representing survey results, reputation takes up 11 per cent of employability, and 11 per cent of suits student. Therefore, it is critical for a university to understand how to improve its reputation through appealing to the two separate avenues of reputation: critical and popular.

Discussion

This study aimed to contribute to research into the factors that influence a school leaver's choice of university. Importantly, it provided insights into the differences between the factors that universities advertise, those that students think are important and those that students actually use to make their decisions.

Based on the study results, the major factors contributing to a traditional age school leaver's choice of university are campus desirability, student suitability and employability. Among these, the Bayesian Network representing the results from the focus group demonstrated that students considered employability as the factor which should be most influential. The network derived from the survey showed that student suitability, followed by campus desirability were the most influential.

The network related to how the tertiary education institutions advertise themselves, showed that universities in Australia appear to put the most weight on employability, then campus desirability. Nevertheless, the most significant factor relating to how well university advertising measures up to student desires is reputation: if the institution's reputation is high, the advertising featured on the university's website is considerably more likely to match up to the students' own decision making process. This

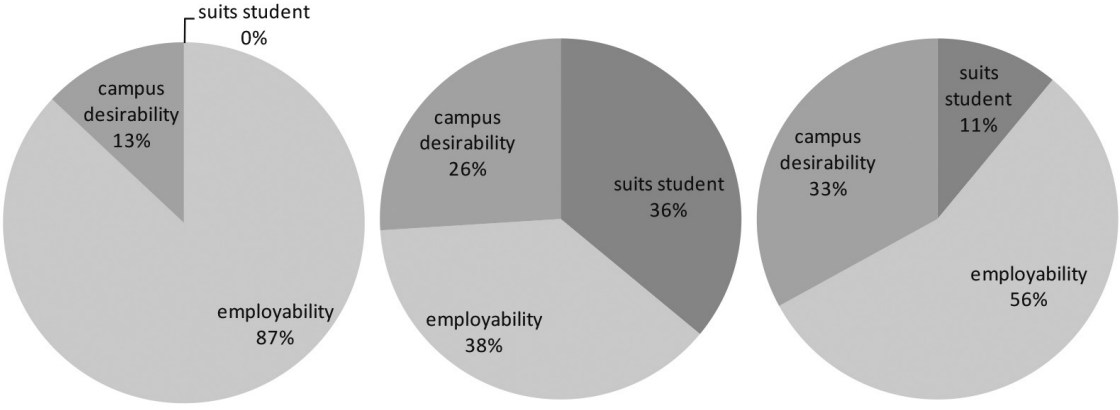

Figure 4. Major factors relating to students' choice of university, based on (from left to right) relevant literature, focus groups and survey.

could suggest that students are not receiving enough information from universities to know what they should consider for each institution, and are therefore relying on populist opinion to make their decisions for them.

The Australian ranking system, as set out by the Australian Education Network, is unclear about which factors exactly determine the placement of each institution. Membership of the Group of Eight, which is marketed as the leading group of Australian universities, is determined on the basis of: research outputs, industry links, graduate outcomes and the standing of the university's academic staff. From this study, it is apparent that one way in which a university can greatly improve its popular reputation is through improvement of its home website, focusing on quality content, communication, audience, exposure, credibility and authority.

The key factors identified in this study are broadly comparable with those identified in most of the published literature (see, for example, Beswick, 1973; Chapman, 1981; O'Connor & Moodie, 2007; Soutar & Turner, 2002). Whereas they overlap with the findings of Jung (2013a, b), they almost directly contradict the findings of Catley (2004), in which course-related factors were the most influential, over university or external factors. This can perhaps be explained by observing the difference between subjects in the survey: Catley's students were all second semester freshmen in a law school, suggesting they would have a particularly strong preference for academic and future critical success.

Overall, this study has two main benefits. First, it proposes a rigorous modelling approach to identification of factors that influence choice in a complex problem. Second, it employed appropriate age subjects and a relevant time period in which to assess the subjects.

The study also has two main limitations. First, it is essentially a pilot study, focused on Australian universities in general, and students in one city (Brisbane) in particular. The study could be broadened to larger samples of students, other locations within Australia and, indeed, other countries. Second, the scope of the study is restricted to traditional age prospective university students, who may have different priorities in their choice of university than other students. The study could, for example, be broadened to postgraduate students, or focused further to particular discipline groups. The success of the present study in meeting its objectives provides motivation for these more general analyses. It also provides important data for universities preparing marketing strategies to attract students in what is becoming an increasingly competitive environment.

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