A PRELIMINARY MODEL TO IDENTIFY LOW-RISK MBA APPLICANTS

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Abstract

Business schools throughout the world strive to admit "quality" students to their MBA programmes. To achieve this, various measures are employed during the selection processes. These measures include various tests such as the General Management Admissions Test, Test of English as foreign language and the Common Admission Test, to name but a few. Although these tests may be successful in indicating the quality of applicants, their predictive capabilities with reference to the academic performance in the discipline of management and leadership are unproven, while some researchers even regard these tests to be biased or unscientific across cultural boundaries.

This article attempts to provide a preliminary model that could be applied to applicants in order to predict their academic success on an MBA programme. To do so, the model makes use of historical academic performance of 729 MBA students who enrolled during the years 1999, 2000 and 2001 at the Potchefstroom Business School of the Northwest University. These students graduated in the years 2001, 2002 and 2003. A vast array of demographic, academic and historical variables is employed by discriminant analyses to categorise the applicants into 2 groups, namely:

- "Low-to-no-risk" applicants for the MBA programme (most preferred applicants that should graduate within the minimum period of 3 years);
- Applicants who did not complete their degree in 3 years. This category contains two groups of students, namely those who extended their studies to 4 years, and those who failed and subsequently dropped out of the MBA programme. Further analysis of this category identified:
  - "Medium-to-low-risk" applicants who are expected to complete their degree in 4 years (they need an additional year to complete the 3-year degree). Although this category is less favourable, they do complete their studies.
  - "High-risk" applicants are those who are not expected to complete their degrees and would probably exit the programme without obtaining any qualification. These applicants should not be allowed to enter into the MBA programme.

The reliability of the discriminant function rates favourably with 71 per cent (MBA in 3 years), 62 per cent (MBA in 4 years) and 83 per cent (dropping out of the programme) being categorised correctly by the respective discriminant functions. Being a preliminary model, its predictive capabilities need to be verified in practice before it can be implemented as tool to render assistance in MBA admissions. The value of this research lies in the fact that it constitutes a model that could be employed and improved as a predictive tool in an environment where very limited predictive tools exist. Therefore, although it is by no means a tried and tested model, it sets the scene by supplying a scientific base from which incremental improvements could result.

JEL M1, M10

1 Introduction

Academic institutions throughout the world are constantly aware of the **discrepancy** between the number of students who **enrol for tuition** and those who actually **obtain the qualification**. This erosion effect of students is two-fold, namely the students who discontinue studies all together and those students who change their

study discipline to some related or unrelated course. In both events, this erosion results in the loss of revenue for the academic institution, ineffective time spent by lecturers on students not completing or passing the course and possible damaging perceptions of the image of the institution. On the part of the student, a loss of money and time, damaged self-esteem and lower self-confidence are but a few of the consequences of failing or dropping out of academic programmes.

The academic environment poses a fine balancing point between the responsibility of the academic institution to afford students the chance to enter and acquire an academic qualification, but also to be responsible in their admission process as not to set students up for failure by admitting them to a level of academic programme that is too stringent for the student, thus allowing students to enter into degrees or other academic programmes for which they are not (yet) ready.

Philosophically, this institutional responsibility as a point of debate is much easier solved than its application in practice. The application process requires criteria, real-life decisions and also some subjective judgment, because a decision to allow or not to allow an applicant to enter into an academic programme has a significant effect on the future of that specific individual (and the academic institution as mentioned earlier). As a result, each decision in this regard has to be weighed carefully.

Regarding the degree *Masters in Business Administration* (referred to as MBA), the market value and image surrounding it make it a favourable option for post-graduate management studies. As a result, a vast number of applicants strive for acceptance at business schools on their MBA programmes. This market demands further emphasis on the responsibility of business schools to admit suitable applicants.

However, although most business schools in South Africa and the First World apply clear and above-board criteria in their admission process, few have been able to predict the success of their students during admission to the programme. This article thus aims to:

- **Primarily**: introduce a preliminary model with the purpose of predicting the academic success of an MBA applicant (thus the risk to exit the programme or fail) by categorising them into "*medium-to-low-risk*" and "*low-to-no-risk*" applicants; and
- **Secondly:** identify "*high-risk*" applicants (those applicants that show a high probability to fail or exit the MBA programme).

2
Problem statement

Business schools are continuously faced with the problem of admitting the "*right*" students on their programmes. The "*right*" students would in this context refer to students who perform well academically, pass the programme well, make a difference in the business community and develop into alumni to whom the business school could proudly refer in their marketing efforts and the market place. However, hindsight remains the perfect science when admitting students to MBA programmes. It would be most beneficial if an admission test could predict, on a significant level, if an applicant would become that "*right*" student after admittance. In essence, this is what this paper attempts to suggest: a way to identify and predict the "*right*" students during the process of application and admission.

The importance of such a prediction benefits not only the most efficient use of the resources of the business school, but also the applicant, namely:

- Efficiency of teaching resources, as no time is wasted on students who are not coping with the programme;
- better quality academic work and as a result also a better pass rate;
- increased income due to the structure of the subsidy formula employed by the Department of Education;
- image advantages, which in itself poses a number of benefits in areas such as recruitment, faculty and additional training programmes; and

- responsibility to applicants because they are not set up for failure.

3
MBA admission processes

Business schools try (with varying success) to increase the quality of applicants via specified admission criteria, some of which are linked to an array of tests. Although these criteria and tests may be successful in increasing "quality" or suitability of admittees, their predictive capabilities are unproven in the fields of management and leadership (a core discipline in MBA education). These tests range from the popular *General Management Admission Test* (GMAT) to standardised and even in-house tests that measure various criteria such as mathematics, psychological profiles and language proficiencies. Research on the admission procedures employed by business schools in the USA and Europe reveals that the favourite testsemployed during admission to an MBA programme seem to be the GMAT and a language proficiency test called the *Test of English as a Foreign Language* (scored on a scale of 200 to 677 and commonly referred to as the TOEFL test).

The purpose of these (and other) tests is to increase the suitability of post-graduate management applicants (thus indirectly attempting to increase pass rates). The tests, however, do not predict academic success *per se,* nor do they answer the question posed on the balanced responsibility of the academic institution to afford potential students the chance to enter into the MBA programme if they are ready to do so. Scrutiny of the existing applications of various test models reveals that some applicants could be excluded due to biased results, while few tests seem to be good academic performance predictors (Arbor, 2001: 1). Be it as it may, there are as many different admission criteria as there are different business schools.

Typically, entrance to an MBA programme has certain prerequisites. Analysis of three Ivy League business schools reveals that both GMAT and TOEFL tests are employed in their admission procedure. Harvard Business School requires a GMAT score of 705 or higher, Stanford requires a GMAT (with no minimum score) as well as a TOEFL score of 250 or higher, while at Wharton Business School "satisfactory" scores on both GMAT and TOEFL tests are required (Harvard Business School, 2004; Stanford Graduate School of Business, 2004; Wharton Business School, 2004).

Other business schools seem to follow these guidelines. At the University of Texas in Arlington (2004), for example, admission to the MBA programme is based on the completion of the general admission requirements of the Graduate School. MBA programme admission relies on a favourable score on the GMAT, and the students' record of undergraduate academic performance. However, GMAT scores are not employed as the sole criterion for acceptance. Applicants whose native language is not English must also complete the TOEFL test and score at least 550. Furthermore, applicants should have two to five years of relevant work experience. At the National Institute of Technology (2004) in Karnataka, a "*bachelor's degree in any discipline from a recognised university with not less than 60 per cent marks in all subjects of all the university examinations conducted during the entire prescribed period of the degree programme*", is required for acceptance on their MBA programme in addition to the ranking obtained in the *Common Admission Test* (CAT) (see the discussion of the CAT below), the group discussion and the interview.

These criteria do not differ significantly from other business schools, internationally and in South Africa, where some of the business schools make use of GMAT and/or other supplementary tests, for example: Wits Business School in Johannesburg and the Graduate School of Business at the University of Cape Town (Wits Business School, 2004; Graduate School of Business, 2004). Others, such as the Potchefstroom Business School, the Graduate School of Business and Leadership at the University of South Africa and University of Stellenbosch Business School refrain from formal tests as entrance criteria (Potchefstroom

Business School, 2004; Unisa, 2004; University of Stellenbosch, 2004).

Regarding testing and specifically the popular GMAT, closer investigation reveals not only a debate on the validity of tests and their predictive value, but also contrasting research results. The major controversy seems to be not the validity *per se* of GMAT, but rather the significance of the positive correlation between performance in the test and business success. In this regard, Hong (2001: 1) points out that strong performance on GMAT does not necessarily translate into success in business, while Arbor (2001: 1) highlights the value of GMAT as a standardised test. Sternberg (in Arbor, 2001: 1), however, reports that research on predictive capabilities of tests of academic performance (1999 & 2000) showed that MBA students are confronted by practical as well as academic endeavours, and that predictive tools should include both aspects. As a result, the GMAT standards do not report on practical business abilities and are thus limited in application for MBA student performance prediction. Standard GMAT scores are also influenced by experience, and although Tyson (2002: 1) regards it to be a fair predictor of performance, it is pointed out that in a study by Hedlund (1999-2001) it was indicated that on average a total score increases significantly by 30,3 points if the test is taken for the second time by a candidate. This implies that if the test is used as a gateway for entry into an MBA, relevant coaching in the test or repeating the test procedure would make a candidate a more favourable one (some business schools offer preparatory courses in GMAT). Clearly, this view is under suspicion, if not seriously flawed in a practical application setting. In addition, Hedlund found that disparity exists in the scores by gender, race and nationality (Sternberg, Forsythe, Hedlund, Horvath, Wagner, Williams, Snook & Grigorenko, 2000). Although various researchers such as McCloud (1991), Nebel (2002) and Wilt (2002) scrutinised GMAT as a predictive tool, some other researchers (Sternberg 1997-2001; Hedlund, 1999-2001; Wilt, 1997) engaged in new research on predictive models (Tyson, 2002: 34-37).

Predicting academic success in the business application setting by employing the standardised CAT is also a widely used method of categorising student admissions on MBA (and other) programmes. According to the University of Arcadia (2004) in Philadelphia, USA it is a prerequisite to qualify for the post-graduate programmes. However, in recent years, for the benefit of students, many other institutions in the USA have also accepted the CAT (which is regarded to be one of the toughest entrance tests in the world) as their qualifying test. According to IMS Learning resources (2004), the CAT tests two subjects, namely *English* and *Maths*. These subjects are subdivided further into areas of *Quantitative Ability, Data Interpretation, Data Sufficiency, Logical Reasoning, Reading Comprehension, Verbal Reasoning* and *Verbal Ability*. To be eligible to take the CAT, a student should either be in his last year of graduation, be a graduate or post-graduate in any discipline. The CAT is not a test of intelligence, it only indicates whether the applicant has the necessary aptitude to do well in the course he/she wishes to study and also identifies general scholastic ability. The results are a scorecard to show performance on the sections and overall performance in the format of a percentage score and percentile for each section and the overall test.

Alternatively, the in-house *Thinking test* at the University of Arcadia (2004) requires applicants to apply basic science knowledge, maths and verbal skills to:

- Reading comprehension – 45 questions in 45 minutes
- Biology – 50 questions in 30 minutes
- Verbal – 75 questions in 45 minutes
- Quantitative analysis – 50 questions in 35 minutes
- Chemistry – 50 questions in 25 minutes

A new avenue of research was pursued in a joint research project between the Universities of Yale and Michigan in the USA by the researchers Sternberg and Hedlund (1997-2001). This project is regarded to be one of the most significant ones on predictability of business and academic success (Tyson, 2002: 2).

Sternberg and Hedlund compiled a model called the *Successful Intelligence Assessment* (SIA) to predict successful business, workplace and academic performance. The core of the model lies in problem-solving abilities. Two core problems are employed, namely *case-based* and *situational-judgement problems* (Holmes, 2004: 2). The focus of the test is on the response of the candidates being tested, but the evaluation concentrates primarily on the quality of the response, and secondarily, on the actual correctness thereof (Oswald, Schmitt, Kim, Ramsay, & Gillespie, 2004: 3; Tyson, 2002: 1). The researchers found that the higher scores on these two criteria, the better MBA students fared in their grade point averages (Arbor, 2001: 1). In addition, these students participated more freely in academic discussions and clubs, while they also held more/better leadership positions than those who did not fare so well in the test (Holmes, 2004: 2; Hong, 2001: 1).

Ivey, the MBA programme manager from the University of Western Ontario (USA), used a number of assessment tools with first- and second-year MBA students (Tyson, 2002: 35). These included the *Myers Briggs Type Indicator, Firo Element B: Behaviour* and the *KAI Feedback,* in an attempt to find positive correlations between academic success and pre-tests. Closer to home, Van der Watt (1982) has already struggled with the same problem two decades ago. Van der Watt employed a combination of profile analysis, discriminant analysis and multiple regression to compile predictive models to evaluate student performance.

In conclusion to pre-testing with the purpose of predicting performance, it is clear that various models and tests do exist. Naturally, some seem to perform better than others. Generic or standardised tests have the advantage of a wide application setting. By contrast, customised tests have a limited application setting, but could lead to better results designed for specific business schools.

Finally, the wise words of Leebaert should send a stern warning when any test is used as a performance predictor (Tyson, 2002: 37):

> "*You never want to use it (pre-tests) as a gatekeeper for admittance.*
> *You want to use it to ask better, deeper questions and make more informed decisions*."
>
> Derek Leebaert. CEO of Intellicue, Washington, D.C. USA

4
Research methodology

The research was conducted among a total of 729 respondents consisting of MBA graduates and those MBA candidates who have to leave the programme without having obtained any qualification. All the MBA students who studied at the Potchefstroom Business School between 1998 and 2003 were used in the research. This student sample was homogeneous regarding their method of study as all of them studied towards MBA by means of the *Telematic Route of Delivery.* Of the 729 respondents, a total of 118 students dropped out of the MBA programme due to unsatisfactory academic performance. The remaining 611 obtained their MBA degrees. These students graduated in the years 2001, 2002 and 2003. A vast array of demographic, academic and historical variables is employed by discriminant analyses to categorise the applicants into 2 groups, namely:

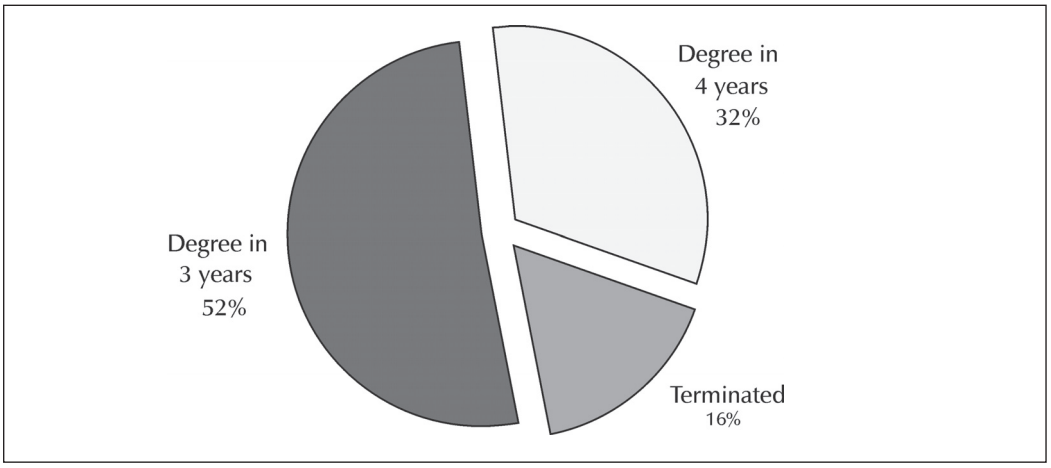
- "*Low-to-no-risk*" applicants for the MBA programme (most preferred applicants that should graduate within the minimum period of 3 years). This group consisted of a total of 368 cases.
- Applicants who did not complete their degree in 3 years. This category contains two groups of students, namely those who extended their studies to 4 years, and those who failed and as a result dropped out of the MBA programme. Further analysis of this category identified:
  - "*Medium-to-low-risk*" applicants who are expected to complete their degree in 4 years (they need an additional year to complete the 3-year degree). Although this category is less favourable, they do complete their

studies. The research on this group consisted of 230 cases.

– "*High-risk*" applicants are those who are not expected to complete their degrees and to exit the programme without any qualification. These applicants should not be allowed to enter into the MBA programme. This group consisted of a total of 118 cases.

A total of 13 cases were not considered due to incomplete records. Figure 1 shows the distribution of these 3 groups in the research.

Figure 1
Distribution of respondents (n= 729)

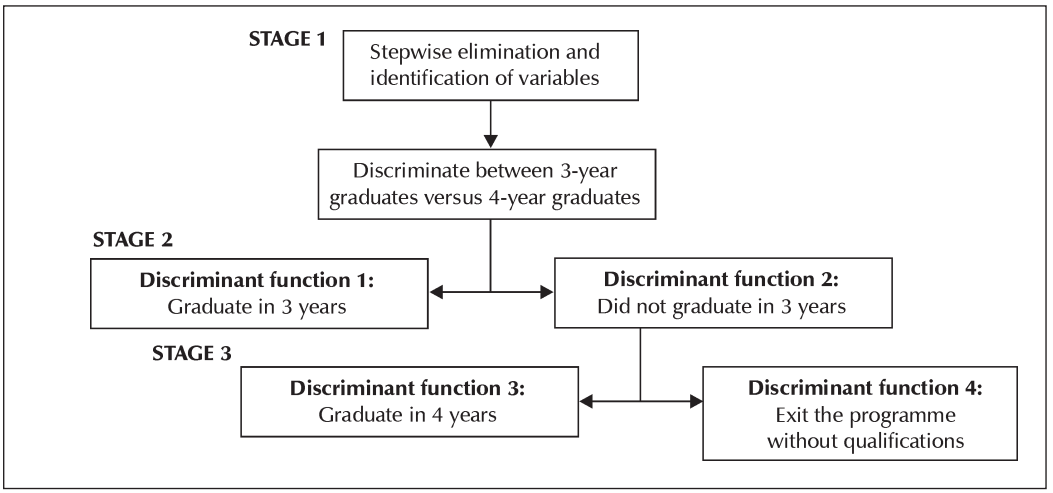


The composition of the data consisted of a wide array of demographic, performance and historic variables. The data were analysed by means of stepwise discriminant analyses on the mainframe version of the *Statistical Analysis System* (SAS).

5
Preliminary predictive model

The discriminant analyses make use of 2 stages, namely to discriminate between graduates completing their degree in the minimum time of 3 years; next, the remaining students are classified into those who completed their degrees in more than 3 years (maximum time allowed is 4 years to complete an MBA at the Potchefstroom Business School) and the students who dropped out of the programme. In each case the discriminant function is formulated by means of a logistic regression formula (logistic function because of the binomial data format). The formula that yields the highest calculated value between the two categories indicates belongingness or membership to that group. Figure 2 shows the different stages of the research and the eventual discrimination as performed by the functions.

Figure 2
Stages of discriminant analyses



From the above figure it is clear that:

- Discriminant function 1 identifies "*Low-to-no-risk*" applicants for the MBA programme and thus the category of most preferred applicants that should graduate within 3 years.
- Discriminant function 2 identifies applicants who did not complete their degree in 3 years. This category includes students who extended their studies to 4 years, as well as those who failed and thus exited the MBA programme without any qualification.
- Further analysis of this category identified by the discriminant function 2 leads to the employment of the discriminant function 3 that identifies "*Medium-to-low-risk*" applicants. They should thus complete their degree in 4 years. This implies that this group will need an additional year because they will fail some modules and as a result need the additional year to complete the degree. Although this category is less favourable, they do complete their studies.
- Discriminant function 4 identifies "*High-risk*" applicants who would, according to the discriminant analysis, not complete their degrees and would have to exit the programme. These applicants should not be allowed to enter into the MBA programme.

The resultant discriminant functions show favourable reliability. Reliability was tested by employing the discriminant functions to categorise the data into the three groups. Although a measure of bias is internalised by the data, it remains a good initial measure to apply (Steyn, 2004). The reliability measures are shown in Table 1.

Table 1:
Reliability of discriminant functions

	Classified correctly	Classified incorrectly	Classified correctly (%)
MBA in 3 years	320	129	71%
MBA in 4 years	100	62	62%
Exit programme without any qualification	98	20	83%

N=729

The stepwise discriminant function identified a number of variables that were included in the functions. The discriminant functions and their corresponding values pertaining to the variables are shown in Table 2.

Table 2
Variables in discriminant functions

Variable	MBA in 3 years	MBA in 4 years (a)	MBA in 4 years (b)	Exit without any qualification
Constant	–3.94	–4.18	–6.39	–2.72
X_1	3.29	4.49	7.10	2.17
X_2	2.88	1.91	–0.29	2.69
X_3	0.95	1.28	4.19	2.12
X_4	5.63	5.38	0.41	0.28
X_5	0.56	0.29	–2.12	1.80
X_6	0.82	1.08	1.19	0.25
X_7	0.87	0.53	–0.18	1.26
X_8	0.03	0.03		

Reference to (a) and (b) refers to discriminant functions 2 and 3 in Figure 2

The selected variables are identified and labelled in Tables 3 and 4.

Table 3
Variables identified: MBA 3 years and MBA 4 years

Variable	MBA in 3 years versus MBA in 4 years (a)	MBA in 4 years (b) versus those who exit the programme
X_1	Traditional RSA university first degree	B Status (no degree; allowed on experience)
X_2	Degree at university level	Obtained a post-graduate degree
X_3	Degree at Unisa (Distance education experience)	Mathematics (Grade 12 symbol below C)
X_4	Mathematics (Grade 12: symbol above C)	Work experience
X_5	Mathematics in Grade 12	B-Tech degree
X_6	Degree at Vista University	Mathematics (Grade 12: symbol above C)
X_7	Obtained a post-graduate degree	Degree at Unisa (Distance education experience)
X_8	Number of modules failed during first degree	***

Reference to (a) and (b) refers to discriminant functions 2 and 3 in Figure 2

With reference to the function that discriminates between the completion of the degree in either 3 years or 4 years, it is evident from Tables 2 and 3 that the more important variables are:

- X_1: Traditional RSA university first degree (original RSA universities such as the Universities of Pretoria, Stellenbosch, Potchefstroom, Orange Free State, Witwatersrand and Cape Town);
- X_2: Degree at university level; and
- X_4: Mathematics (Grade 12: symbol above C).

Regarding the discrimination between completion of the degree in 4 years and dropping out of the programme (from Tables 2 and 3), the more important variables identified are:

- X_1: B status (no degree);
- X_3: Mathematics (Grade 12 symbol below C); and
- X_5: B-Tech degree.

In addition, dropping out of the MBA programme is also significantly influenced by an unexpected variable, namely:

- X_2: Obtained a post-graduate degree.

This variable is unexpectedly identified by the analysis because it stands to reason that students already in possession of a post-graduate degree should be able to adapt to the higher level of tuition more easily than students who have no experience of post-graduate studies. This issue was pursued by means of informal conversations with a number of MBA students in study group context. Results from these conversations pointed towards the concept of motivation levels as culprit rather than ability or experience. This clarification, however, remains speculation and has to be substantiated in future research.

6 Future research

This research project serves as a pilot study to compile a predictive model for the academic success of MBA students. From the results and research design, the following areas are open for further research:

- Validation of the obtained results by inputting data from MBA students who graduated in 2004 and comparing their predictive values with actual outcomes. This should be repeated for a number of years to ensure an acceptable level of validation.
- The model should be tested on students from other business schools as well. The model currently focuses on the data obtained from the Potchefstroom Business School (PBS), which consequently results in a PBS in-house model rather than an MBA generic one.
- Scrutiny of the more significant variables identified, and thus attempting to limit the number of variables identified within the discriminant functions. It would add value if the number of variables could be reduced, but that these variables reflect higher significance respectively. Whether this would be possible to obtain, can only be resolved through additional research.

7 Conclusions

The primary objective of the research is to devise a method or model to discriminate among applicants for the MBA degree programme at the PBS, specifically to categorise them into high-, medium- or low-risk applicants. By doing so, drops-outs in the programme could be limited and the desired classification of applicants who complete the degree in the minimum time-span, could be selected to join the programme. This aspect becomes particularly important when the number of students allowed onto the MBA programme is limited or fixed. In such cases it becomes even more important to select candidates with the "best" chance of success and to weed out high-risk cases.

Finally, it is important to realise that although predictive models are aids in decision-making and selection, the stern warning by Leebaert that

these models should never act as gatekeepers for admittance on programmes should constantly be kept in mind. At most, predictive models provide managerial assistance in decision-making and should never be an absolute measure.

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