

THE PREDICTION OF THE ACADEMIC PERFORMANCE OF MBA STUDENTS BY MEANS OF SPECIFIC APTITUDES AND COMPETENCIES

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ABSTRACT

The Council on Higher Education (CHE) (2004) states that graduation rates across all provider types of MBA qualifications in South Africa are not very high. Various studies have reported that, in order to address poor throughput rates, one of the important aspects that needs to be addressed, is the criteria used to select students. The purpose of this study was to identify valid predictors and measures of the academic performance of MBA students. Multiple regression analysis was used to determine the significance of different competencies and aptitudes in predicting academic success. The sample consisted of 135 MBA students from a South African School of Management. The results show that certain aptitudes and competencies, namely numerical aptitude, personal motivation, verbal aptitude, and resilience, contributed statistically significant to academic success.

Keywords: MBA graduation rates, MBA selection criteria, Predictors and measures of academic performance, Aptitudes and competencies

1. INTRODUCTION

Despite a huge increase in postgraduate enrolments at tertiary education institutions in the field of business and commerce, there is still an endemic shortage of high-level professional and managerial skills in post-apartheid South Africa. This may be attributed partly to the significant fall in the graduation and retention rates in higher education, especially at the master's degree level. Graduation rates are calculated as a ratio between enrolments and graduation in each year (Ministry of Education, 2001:15; CHE, 2004:13). It was established in 2001 that 20% of all postgraduates drop out of the higher education system each year, which implies a cost of about R1.3 billion in government subsidies yearly for students who did not complete their study programmes (Ministry of Education, 2001:18).

Master's in Business Administration (MBA) programmes are situated within the broader landscape of postgraduate education in South Africa. An accreditation report compiled by the Council on Higher Education (CHE) (CHE, 2004:13 & 20) states that the graduation rates across all provider types of MBA qualifications in South Africa are not very high.

The low graduation rate was of great concern to the Ministry of Education, which stipulates that Higher Education Institutions that have been allocated postgraduate student places will have to improve their graduate outputs (Ministry of Education, 2001:67). It was announced in The National Plan for Higher Education (2001) that future funding would be linked to graduation rates instead of enrolment rates, with the consequence that poor throughput rates result in a loss of revenue for academic institutions. Furthermore, this low throughput rate also results in ineffective time spent by lecturers on students not completing or passing courses, possible negative perceptions of the image of the institution, and, on the part of the students, a loss of money and time, and lower self-confidence (Bisschoff, 2005:301; Visser & Hanslo, 2005:1161).

2. THE ROLE OF SELECTION IN MBA PROGRAMMES

Various studies report that, in order to address poor throughput rates, one of the important aspects that needs to be addressed is admission criteria used to select students (Van der Merwe & De Beer, 2006:548; CHE, 2004:20). The re-accreditation exercise completed in 2004 by the Higher Education Quality Committee (HEQC) indicates that student recruitment and selection is an area where many MBA programmes need improvement. Of a total of 37 MBA programmes in South Africa, only five were commended for their approach to recruitment, seven met minimum standards, 22 needed improvement, and three did not comply with minimum standards (CHE, 2004:50). The HEQC (CHE, 2004:48 & 98) states that the re-accreditation process showed that those MBA programmes whose overall intellectual integrity is maintained throughout the teaching and learning process are predicated on students possessing the necessary assumptions of learning to succeed in a master's degree. These business schools have the highest admission requirements and give proper attention to the careful selection of their candidates (CHE, 2004:98). Thus proper selection which relates to positive academic performance is crucial. This has caused many South African institutions offering MBA programmes to re-evaluate their admission systems (Adendorff & North, 2004:40).

2.1 Problems associated with MBA selection processes

Problems associated with admission and the validity of selection criteria of MBA students are not limited to South African Business Schools and have been researched and reported on extensively, both locally and internationally (Graham, 1991:721-727; Maree, 2002:141). Dreher and Ryan (2004:87) state that current selection processes at many graduate business schools may be seriously flawed and in need of systematic evaluation and improvement. They state that many MBA admission procedures are based on a collection of criteria adopted and perpetuated without serious consideration of the predictive validity of each requirement.

A literature overview shows that the screening and selection procedures most used by providers of MBA programmes in South Africa and abroad, are often a combination of some of the following: years of post-undergraduate work experience, letters of reference written by individuals selected by the applicant, standardised test scores - for example the Graduate Management Admissions Test (GMAT), the Graduate Record Examination (GRE) and the Undergraduate Grade Point Average (UGPA), which represent a combination of general intelligence and achievement - language proficiency tests, resumés, CVs, essays, interviews with the Head of the School, and psychometric tests (Bisschoff, 2005:302; Cushing & McGarvey; 2004:319; Robertson & Smith, 2001:462; CHE, 2004:48, 50 & 90; Dreher & Ryan, 1996:89; Kuncel, Credé & Thomas, 2007:51; Stricker, Wilder & Bridgeman, 2006:266; Koys, 2005:236; Dreher & Ryan, 2002:743, Wright & Palmer, 1994:348; Adendorff & North, 2004:40; Anastasi & Urbina, 1997:487). Research on the admission procedures employed by business schools in the USA and Europe reveals that the tests most often employed during admission to a MBA programme seem to be the GMAT and a language proficiency test called the Test of English as a Foreign Language (TOEFL test) (Bisschoff, 2005:302). Although some business schools in South Africa also make use of the GMAT, in general, the MBA admission systems used by South African business schools vary greatly (Adendorff & North, 2004:40).

The usefulness of many of the above-mentioned selection procedures and methods as predictors of graduate student performance has not been firmly established. The most notable example is the widespread requirement that candidates should have several years of post-undergraduate work experience prior to MBA programme admission, while there seems to be little support for the view that previous work experience leads to higher levels of academic or job achievement (Sternberg, 2004:195; Dreher & Ryan, 1996:87; 2000:505; 2002:739; Schmidt & Hunter, 1998:262-266).

Validation studies also quite frequently find contradictory results regarding the predictive validity of standardised test scores and undergraduate grades. Some researchers state that the predictive standardised tests, like the GMAT, the UGPA and GRE, yield scores that have surprisingly little predictive content (Bisschoff, 2005:302 & 303; Willingham, 1974:274; Swanepoel & Moll, 2004:291; Hansen, 1971:52; Sternberg & Williams, 1997:638-639). Further, test takers across different ethnic and gender groups, report moderately negative attitudes about the validity of the GMAT (Stricker, Wilder & Bridgeman, 2006:264-265). Others argue that the GMAT and UGPA yield a high level of validity for predicting academic grades (Kuncel, Credé & Thomas, 2007:65; Sternberg, 2004:195; Koys, 2005:236 & 239; Cushing & McGarvey, 2004:319), but that they measure a limited set of skills relevant to success and produce disparities in scores among gender and racial/ethnic groups (Hedlund, Wilt, Nebel, Ashford & Sternberg, 2006:121; Sternberg, 2004:196; Wright & Palmer, 1994:348).

These researchers suggest that the GMAT should be supplemented by measuring a broader range of abilities in admission testing. According to Adendorff and North (2004:40), for a South African applicant, writing the GMAT is relatively expensive. They state that the test is also contextualised for American applicants to graduate programmes and tends to be culturally biased.

Research done by Maree (2002:149) on selection mechanisms at South African tertiary institutions shows that unstructured interviews in particular should be viewed with extreme caution, while Robertson and Smith (2001:456) state that research data suggests that interviews serve primarily to measure social skills, experience and job knowledge, which may not necessarily be related to academic success in an MBA programme. Other readily available prerequisites, like letters of reference, resumés, CVs, and application forms have either not escaped scrutiny, or have been neglected by researchers (Hartnett & Willingham, 1980; Robertson & Smith, 2001:462).

A meta-analysis of 19 selection methods, with training progress used as criterion, shows that years of job experience showed the lowest validity ($r=0.1$), followed by interests ($r=.18$), years of education ($r=.20$), reference checks ($r=.23$), biographical data measures ($r=.30$), conscientiousness tests ($r=.30$), interviews ($r=.35$), integrity tests ($r=.38$) and general cognitive ability tests ($r=.56$), which showed the highest validity (Schmidt & Hunter, 1998:266). Since many of the above-mentioned studies on different admission and selection methods were in different subject fields in different institutions with contradictory results, they are not always comparable. It is this lack of conclusive evidence that necessitates further research into the matter of MBA selection methods. According to Huysamen (1997:67), it should be borne in mind that all methods predicting academic success have their limitations.

2.2 The role of aptitudes and personality in selection processes

Measures of cognitive ability have been one of the major methods used to attempt to discriminate between candidates. Such measures tend to be rather valid predictors of various job performance measures, academic performance, managerial performance, as well as learning in general (Blinkhorn & Johnson, 1990:671; Schmidt & Hunter, 1998:266; Robertson & Kinder, 1993:225; Robertson & Smith, 2001:453; Kuncel, Credé & Thomas, 2007:53-55; Saville et al., 1996:260-261). General cognitive ability can be conceptualised as the “repertoire of intellectual (or cognitive) skills available to the person at a particular point in time” (Humphreys, 1989:194). Cognitive ability measures or tests can be defined as samples of this repertoire. Individuals who have acquired a larger and more advanced repertoire are more likely to already have the needed knowledge and skill necessary for academic tasks (Kuncel et al., 2007:53).

When specific cognitive abilities are being described, the term “aptitude” is used. It refers to the individual's ability to acquire, with training, a specific skill or to attain a specific level of performance, for example, verbal aptitude (vocabulary, verbal reasoning, reading comprehension, and memory) and numerical aptitude (numerical reasoning and calculations). The abilities measured by aptitude measures correspond to the intellectual abilities measured by tests of general ability. The difference is that the items and subtests of measures of general cognitive functioning are selected primarily to provide a unitary measure, and not to provide an indication of differential abilities (Foxcroft & Roodt, 2005:133).

Ability can thus be assessed at different levels of breadth, from the narrowly defined aptitude of specific tests, through increasingly broader trait levels, to an overall score such as that yielded by IQ tests. For different testing purposes, a different level of breadth is most appropriate (Anastasi & Urbina, 1997:41-42). Although some authors (Maree, 2002:143) state that the practice of using aptitude and intelligence testing in South Africa has been frequently criticised, several meta-analytical studies of the criterion-related validity of cognitive ability tests produced conclusive results (Robertson & Smith, 2001:453).

Some authors (Van der Merwe & De Beer, 2006:559; Nofle & Robins, 2007:126-128) propose that, in compiling a selection battery that satisfies all the aims of Higher Education and reflects high predictive validity, it is recommended that various cognitive factors as well as non-cognitive factors should be taken into consideration. According to Schmidt and Hunter (1998:266 & 272), general cognitive ability can be considered the primary measure for selection decisions, but one can consider the remaining non-cognitive measures, such as personality attributes, as supplements to general cognitive ability measures.

Although personality tests were not held in high regard as selection instruments during the eighties and early nineties (Blinkhorn & Johnson, 1990:671-672; Johnson & Blinkhorn, 1994:167; Visser & Du Toit, 2004:45; Robertson & Kinder, 1993:225), the middle and late 1990s have seen a huge growth in the use of personality assessment. Research has shown that non-cognitive factors, such as self-perception and expectancies, as well as certain personality traits, like conscientiousness, perfectionism, self-efficacy and integrity, also influence academic and/or job performance (Ochse, 2003:67-73; Cobert, Mount, Witt, Harter & Barrick, 2004:607; Visser & Du Toit, 2004:66; Schmidt & Hunter, 1998:272; Nofle & Robins, 2007:127; Stoeber & Kersting, 2007:1100; Klomegan, 2007:412; Nonis, Philhours, Syamil & Hudson, 2005:58).

Meta-analytic procedures provide positive evidence for the criterion-related validity of personality, and results suggest that personality scales can provide additional criterion-related information beyond that which is provided by cognitive ability tests alone (Saville et al., 1996:260-261; Robertson & Smith, 2001:455; Robertson & Kinder, 1993:228; Schmidt & Hunter, 1998:272).

Although some investigators (Noffle & Robins, 2007:126-127; Wagerman & Funder, 2007:227; Higgins, Peterson, Pihl & Lee, 2007:313; Robertson & Smith, 2001:455; Nguyen, Allen & Fraccastoro, 2005:114) state that the utility of broad measures of personality, such as integrity and the Big Five Factor Model, consisting of factors like conscientiousness and openness to experience, produce good validity coefficients in terms of the prediction of academic and overall job performance, others have shown that, for particular occupational areas and particular job performance factors, broad measures, such as the Five Factor Model, do not provide convincing levels of validity. Some theorists have argued that these personality factors are too broad and general to predict accurately specific behaviours in particular situations. They maintain that it may be useful for understanding general patterns in behaviour, but may not contain the specificity required to predict highly circumscribed instances of behaviour. Narrow personality traits, on the other hand, contain trait-specific variance, variance that is statistically removed in creating the broad Big Five factors of which they are part. This trait-specific variance may be predictive of particular instances of behaviours, such as those involved in academic performance. These writers are of the opinion that narrow personality traits are therefore more effective predictors of job and academic performance because strong relationships with specific dimensions of job performance are demonstrated (Visser & Du Toit, 2004:45; O'Connor & Paunonen, 2007:985).

2.3 The importance of the identification of competencies as selection criteria

The success of any selection system should be gauged against pre-identified criteria while the choice of these criteria should not be decided by convenience (Robertson & Smith, 2001:447). Thus, the knowledge, skills, and abilities targeted by the selection process should be clearly described, and each of these selection criteria should be examined for its relevance to educational or employment goals (Dreher & Ryan, 2004:67). Several authors (Kuncel et al., 2007:55; Dreher & Ryan, 1996:90; Robertson & Smith, 2001:442) propose that graduate student performance is complex and multidimensional, and may well include multiple competencies associated with learning (e.g. ability, critical thinking, a mastery of certain quantitative and statistical reasoning skills, and communication). Competencies include knowledge, skills, and abilities that would be essential to achieve successful academic performance at MBA level.

The analysis of the competencies also needs to indicate the psychological attributes required by an individual who may complete the MBA successfully. Many dimensions of these competencies (for example, time management) may occur outside the classroom and involve problem-solving tasks not unlike those found in jobs. This more complex conceptualisation of the performance of students in business schools has important implications for the prediction of performance.

Furthermore, there should be a clear and well-thought-through approach to the measurement of each identified competency in order to be able to predict those who will most likely engage in this set of important behaviours or criteria of interest (Robertson & Smith, 2001:442; Kuncel et al., 2007:52). Kuncel et al. (2007:52) state that the measures being used to predict these important criteria can be categorised roughly as either signs or samples. A sample is a direct measure of the actual criterion behaviours of interest, while, in contrast, a sign is a measure that tends to be associated with the actual behaviours of interest without measuring them directly. The use of prior work experience in MBA admissions, for example, is purely an indicator (sign) and not a direct measurement (sample) of the actual knowledge, skills and abilities the programme wishes the students to possess. That is, using prior experience is measuring something that is only associated with the actual characteristics desired by the programme while not quantifying the desired characteristics directly. Ideally, the focus of selection should thus be on samples; in other words, on the direct measurement of the desired knowledge, skills, and abilities (competencies) and not on just signs.

There should also be evidence that basic types of validation studies have been carried out to determine whether the components of the admission system do indeed predict subsequent academic and career success. Thus, high quality admission programmes would be driven by data-based selection processes (Robertson & Smith, 2001:442). By virtue of the inconclusive evidence regarding the predictor variables of the academic performance of MBA students, it is imperative to get more clarity in this regard.

3. EMPIRICAL INVESTIGATION

The purpose of this study was to identify valid predictors and measures of the academic performance of MBA students as part of the admission system of a School of Management at a South African tertiary educational institution.

3.1 Research Methodology

The following research process was followed.

3.1.1 Identification of predictor variables (competencies) of MBA academic performance

In order to identify the competencies (knowledge, skills, and abilities) needed to be able to complete the MBA programme successfully at this particular School of Management, an analysis was done of the MBA role by means of a review of previous selection and admission research, the conducting of several focus groups with MBA students, MBA-Alumni, and MBA lecturers, as well as an online competency profiler completed by MBA lecturers and MBA Alumni. The latter was used in order to prioritise the competencies identified during the focus groups and literature review in terms of extremely important, highly important, moderately important, and baseline competencies. The following competencies, drawn from SHL's Inventory of Management Competencies (IMC) were identified (Table 1):

Table 1: Identified predictor variables (IMC competencies) of MBA academic performance

Extremely important	Highly important	Moderately important	Baseline competencies
Problem solving and analysis	Leadership	Oral communication	Quality orientation
Written communication	Planning and organising	Action orientation	Persuasiveness
Commercial awareness	Strategic	Interpersonal sensitivity	Creativity and innovation
Personal motivation	Resilience	Flexibility	Specialist knowledge

Since the review of previous research showed that abilities play a very important role in academic and job performance, the following two aptitudes were included as selection criteria, namely verbal and numerical reasoning abilities.

3.1.2 Predictor Measures (Assessment Instruments)

An assessment battery was developed in order to measure the above-mentioned competencies, as stated in Table 1, as well as candidates' numerical and verbal aptitudes. This assessment battery, utilising instruments published by SHL, was implemented at the School of Management towards the end of 2003. Applicants to the MBA programme completed two aptitude tests, namely, the Verbal Critical Reasoning Test (VMG3) and Numerical Reasoning Test (NMG3) from SHL's Managerial and Graduate Item Bank (MGIB).

The Occupational Personality Questionnaire 32i (OPQ32i), a personality questionnaire especially developed for the world of work, was also included. The OPQ32 model provides valuable information on 32 dimensions or scales of people's preferred or typical style of behaviour at work and is particularly appropriate for use in the case of managerial and professional groups.

Validity and Reliability of Instruments

In terms of the reliability of the ability tests, high alpha coefficients (between 0.82 and 0.91) have been obtained (SHL, June 2003:1-2; Saville et al., 1996:260-261). In terms of the reliability of the OPQ32, the alpha coefficients for the 32 scales vary between 0.65 and 0.88 (SHL, March 2001:3 November 2001:5-6; March 2002:1-2).

Studies on the validity of the instruments, including both ability tests and the OPQ personality scales, show predictable, significant, and substantial correlations with criteria of management job success, the majority of the estimated validities being in the region of 0.3 to 0.5 – high coefficients by the standards of personality validation (Saville et al., 1996:244; 260-261). The OPQ32, a more recent and updated version of the OPQ Concept Model questionnaire, reports similar validities (Bartram, Brown, Fleck, Inceoglu, & Ward, 2006:152-188).

3.1.3 Selection Strategies for decision making

The aptitude and personality assessment results were combined in order to measure the identified competencies. Different competencies thus consist of a combination of relevant personality attributes, as well as aptitude results, where appropriate. A Person-Job Match Score was calculated which includes a combination of the identified competencies which were weighted according to their identified importance for the MBA role. This single indicator of potential to succeed in the MBA programme, based on the different weighted competencies, is called the "PJM score".

In the final decision-making the institution used a weighted score derived from the PJM score, as well as the results of the two aptitude tests (verbal and numerical reasoning). The contributions used to calculate the weighted score were 40% PJM Score and 60% Aptitude results. This weighted score is referred to as the "Weighted MBA Selection Score". Since previous research has shown that abilities tend to contribute more significantly to academic success than personality, it was decided to give more weight to the aptitude results in the final decision making.

3.1.4 Criterion Data (Course results)

Course results were made available for MBA students studying at the institution from 2004 to 2006. Five core modules of the specific institution's accredited MBA programme have been selected. These modules included: Marketing for Managers, Strategy and Company Analysis, Business Conditions Analysis, Financial and Managerial Accounting, and Analytical Methods. Students' first-attempt scores were used for the analysis in this study. To obtain a single measure of success in the programme, the students' results in the five core modules was aggregated to obtain an average academic performance score.

3.1.5 Sample group

The total sample consisted of 135 students who were selected for the MBA programme between late 2003 and 2006 and who had gone through the selection process with the objective assessments included. The age of the students ranged from 28 to 62, with an average age of 38.20 (SD=7.26). Sixty-five percent (65%) were male and 35% were female, while 70% were Black and 30% White.

3.1.6 Statistical methods

The data were analysed for significant relationships between assessment results and the students' performance in terms of the individual course results as well as their average academic performance on the five subjects. Multiple regression analysis was used to determine the significance and weight of the contribution of the assessments in predicting academic success. Specific variables were identified that significantly explain the variance of the academic performance of the MBA students.

4. RESEARCH FINDINGS

The research findings are presented in Tables 2 to 6. The correlation matrix between numerical and verbal aptitudes (predictor variables) and criterion (individual course results and average academic performance) were determined and are reflected in Table 2.

Table 2: Correlation matrix between verbal and numerical aptitudes (predictors) and criterion

MBA Course	Verbal aptitude (VMG3)		Numerical aptitude (NMG3)	
	r	N	r	N
Marketing for Managers	0.24*	111	0.27**	110
Strategy and Company Analysis	0.32**	112	0.38**	111
Business Conditions Analysis	0.36**	56	0.33*	55
Financial and Managerial Accounting	0.22*	109	0.41**	108
Analytical Methods	0.29**	81	0.45**	80
Average Academic Performance	0.34**	123	0.45**	122

* $p \leq 0.05$

** $p \leq 0.01$

Statistically significant positive correlations of moderate to large effect size are observed between students' ability test results and course results, and with their average academic performance. In other words, those students who obtained higher ability test scores also obtain higher average academic results.

The correlation matrix between the PJM score and Weighted MBA Selection Score (predictor variables) and criterion (individual course results and average academic performance) was determined and is reflected in Table 3.

Table 3: Correlation matrix between PJM score and Weighted MBA Selection Score (predictors) and criteria

MBA Courses	PJM Score	Weighted MBA Selection Score	N
Marketing for Managers	0.28**	0.31**	109
Strategy & Company Analysis	0.33**	0.44**	110
Business Conditions Analysis	0.45**	0.47**	55
Financial & Managerial Accounting	0.33**	0.39**	107
Analytical Methods	0.43**	0.48**	79
Average Academic Performance	0.41**	0.50**	121

** $p \leq 0.01$

Table 3 indicates that significant positive correlations ($p \leq 0.01$) of moderate effect size are observed between students' PJM scores and course results, and with their average academic performance. When giving the ability tests additional weighting in the Weighted MBA Selection Score, the strength of the relationship observed between the predictor and course results increases. This is understandable because of the largely cognitive composition of academic courses.

The relationship between the individual IMC Competencies and the academic performance of MBA students was also determined and is reflected in Table 4.

Table 4: The relationships between predictor variables (weighted competencies) and academic performance of MBA students

Predictor variables	N	r	p-value
Problem solving and analysis	121	0.27	0.00 3**
Written communication	121	0.19	0.03 5*
Commercial awareness	121	0.35	0.00 0**
Personal motivation	121	0.31	0.00**
Leadership	121	0.16	0.075
Planning & organising	121	0.11	0.235
Strategic	121	0.11	0.240
Resilience	121	0.24	0.009**
Oral communication	121	0.10	0.267
Action orientation	121	0.11	0.225
Interpersonal sensitivity	121	0.14	0.117
Flexibility	121	0.119	0.195
Quality orientation	121	0.088	0.338
Persuasiveness	121	0.05	0.550
Specialist knowledge	121	0.27	0.003**
Creativity and innovation	121	0.05	0.609

* $p \leq 0.05$

** $p \leq 0.01$

It follows from Table 4 that academic performance correlated highly significantly ($p \leq 0.01$) with problem-solving and analysis, commercial awareness, personal motivation, resilience (negative correlation) and specialist knowledge. Academic performance also correlates significantly ($p \leq 0.05$) with written communication.

Table 5: The prediction of MBA students' academic performance by means of aptitudes and the Person-Job Match Score (PJM score)

Step	Predictor variables	Standard Error of the estimate	Multiple R	R square	F-value	p-value
1	Numerical aptitude	0.09	0.43	0.18	26.85	0.000**
2	PJM score	0.09	0.49	0.25	10.19	0.001**
3	Verbal aptitude	0.09	0.51	0.26	2.15	0.14

* $p \leq 0.05$

** $p \leq 0.01$

Multiple regression analysis was used to determine the predictive validity of using the assessment and PJM methodology to select applicants for the MBA programme. It follows from Table 5 that numerical aptitude (as measured by the NMG3) showed the greatest contribution and explained 18% of the variance in academic performance of MBA students, whilst the PJM score contributed an additional 7% to the explanation of the variance in academic performance. The contribution of these two variables was significant on the 1% level. Although not significant, verbal aptitude (VMG3) contributed an additional 1% to the variance in academic performance. This means that a total of 25% of the variance of success in average academic performance could be explained by numerical aptitude (NMG3) and the PJM score.

Since the PJM score includes a broad range of competencies (consisting of personality attributes and, where appropriate, abilities), it is possible that some of these attributes and abilities could have contaminated the joint contribution of the predictive variables. It was therefore more appropriate to differentiate between these different competencies and to include the competencies as separate variables in the stepwise regression analysis. This assumption is supported by the results reflected in Table 6.

Table 6: The prediction of MBA students' academic performance by means of aptitude and competencies

Step	Predictor variables	Standard Error of the estimate	Multiple R	R square	F-Value	p-value
1	Numerical aptitude	0.42	0.43	0.18	26.85	0.000**
2	Personal motivation	0.31	0.51	0.26	11.28	0.001**
3	Verbal aptitude	0.45	0.56	0.31	8.96	0.003**
4	Resilience	0.31	0.58	0.34	5.99	0.02*
5	Quality orientation	0.37	0.60	0.36	3.53	0.06
6	Leadership	0.38	0.62	0.39	4.72	0.03
7	Flexibility	0.33	0.63	0.39	1.3	0.25

*p ≤ 0.05

**p ≤ 0.01

It is evident from Table 6 that numerical aptitude (as measured by the NMG3) explained 18% of the variance of academic performance of MBA students while personal motivation as a competency raised the total variance explained to 26%. Verbal aptitude (as measured by the VMG3) increased the variance explained to 31% and resilience contributed to a further increase of 3%. The contribution of the first three predictor variables was statistically significant at the 1% level and that of resilience was statistically significant at the 5% level. A total of 34% of the variance of success on the average academic performance could thus be explained by these four predictor variables. Although not significant, quality orientation, leadership and flexibility contributed an additional 5% to the variance of academic performance.

Separate stepwise regression analyses have been conducted for all the respective MBA subjects included in the study. Numerical aptitude (NMG3) was the best predictor variable of academic performance in Strategy and Company Analysis, Financial and Managerial Accounting, and Analytical Methods, while personal motivation was the best predictor for academic performance in Marketing for Managers. Verbal aptitude (VMG3) was the best predictor of academic performance in Business Conditions Analysis.

Personal motivation played a significant role as a predictor of academic performance in Marketing for Managers, Strategy and Company Analysis, Business Conditions Analysis and Analytical Methods.

Other predictors that contributed significantly to the prediction of academic performance are interpersonal sensitivity (Strategy and Company Analysis), quality orientation (Business Conditions Analysis and Analytical Methods), planning and organising (Financial and Managerial Accounting), and oral communication (Analytical Methods).

5. CONCLUSION

There seems to be a statistically significant positive correlation between students' aptitude test results (verbal and numerical abilities) and individual course results, as well as with their average academic performance. There also seems to be a strong relationship between students' Person-Job Match scores and their subsequent academic performance; even more so when working with the Weighted MBA Selection Score (where abilities carry 60% of the weight and competencies 40% of the weight).

The research shows further that numerical and verbal aptitudes, as well as competencies (which contain personality attributes), seem to play an important role in the prediction of MBA academic success. The important role of personality attributes and managerial competencies, in addition to abilities, thus became apparent. Although verbal aptitude did not contribute significantly to the prediction of average academic performance, it did contribute significantly towards the prediction of academic performance in specific courses, such as Marketing, Strategy and Company Analysis and Business Conditions Analysis. In terms of the overall results, it seems that that these occupational tests are good predictors of success on MBA academic performance where the aptitudes (NMG3 and VMG3) carry the greatest weight, as reflected in the Weighted MBA Selection Score (60% abilities and 40% competencies).

Further the research shows the importance of the identification and prioritisation of competencies as selection criteria for MBA selection, as well as the validation thereof by means of continued research. Although average academic performance correlated significantly with predictor variables problem solving and analysis, commercial awareness, specialist knowledge and written communication, these predictor variables did not, however, contribute significantly to explaining the variance of average academic performance or individual course results.

The weighting of those competencies that did contribute significantly to the explanation of the variance of either average academic success, or success in specific courses, like personal motivation, resilience, quality orientation, planning and organising, oral communication, and interpersonal sensitivity, should thus be adapted in accordance with their contributions.

It is also imperative to identify other possible predictors of MBA academic performance in order to increase the percentage of the variation of academic performance that can be predicted.

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