

## **Hierarchy in Bloom's Taxonomy: An Empirical Case-Based Exploration Using MBA Students**

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### **Abstract**

Bloom's taxonomy is the most referred to of the frameworks in education. Implicit assumption in Bloom's taxonomy is that the higher order levels incorporate lower order levels. Except for few exceptions, studies in this field have been dominated by the use of multiple choice questions, mapped to different levels of Bloom's taxonomy. To explore this area in management education, we analyzed data of one of the compulsory courses, conducted in first year of MBA curriculum, which had multiple case-based components. Each component was conceptually distinct from each other and mapped to the Bloom's taxonomy. Analysis of the data reveals that the scores of students on the different components do not correlate significantly. Based on the exploratory data analysis, we propose hypotheses for further exploration. The implications of such findings are discussed.

### **Introduction**

Students in management education are in-reality managers-in- training, who would start their careers with significant expectations from their respective employers. The recruiters' expectations from their new inductees regarding responsibilities has led to adoption of "30, 60 and 90-day impact targets by employers" (Hirschhorn, 2002).

Therefore success for management institutes would imply their graduates performing in real world situations better than graduates of other competing business schools. This, however, can only take place if the course content, pedagogy and evaluation practices are mapped to skills

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required for the responsibilities the graduates would face. However the existing scenario may be quite different if one looks at reports about employability of graduates arising out of existing education systems (Bose, 2013). While this may not be applicable to the few top-ranked institutions, it is possible that an unstated concern of many a recruiters could be “the curriculum in most places is outdated and disconnected from the real world.” Anand (2011). Therefore to be of value to the two sets of stakeholders – the recruiters and the students, a professional course like that of business administration should be so structured so that the skills developed are closely aligned with the actual requirements of students to cope with real world challenges. Students aiming to be entrepreneurs would form a distinct category compared to graduates looking for employment, for whom the relevance of the courses would be even more indispensable. Therefore one needs to explore the paradigm or framework that guides the courses’ learning and evaluation.

Bloom’s taxonomy is among the most recognized frameworks that guide learning. While there have been other frameworks like Structure of the Observed Learning Outcomes, SOLO, (Biggs & Collis, 1982), and reflective thinking measurement model (Kember et al., 1999), empirical tests found that students’ scores on these frameworks were closely related to each other (Chan et al., 2002). The progressive and hierarchal nature of SOLO mirrors Bloom’s taxonomy which can allow us to extrapolate the results of this study to SOLO. The levels in reflective thinking measurement model focus on *reflective capacity*, and not on application and therefore Bloom’s taxonomy with its focus on application is considered a better framework for management education. In this paper, we confine our focus on Bloom’s taxonomy.

### **Literature Review**

The original Bloom’s taxonomy had six levels, indicated in bottom-up hierarchy:

1. Evaluation
2. Synthesis
3. Analysis

4. Application
5. Comprehension
6. Knowledge

Later scholars working in the field of education have modified the levels. For example, the modified levels as given by Loring Anderson and others (2001) are

1. Creating
2. Evaluating
3. Analyzing
4. Applying
5. Understanding
6. Remembering

The modified taxonomy differs from the original in the relative position of 'Evaluation' and 'Creation/ Synthesis' while the definitions of 'Knowledge' and 'Comprehension' overlap that of 'Remembering' and 'Understanding' respectively. Essential to both the original as well as modified framework is the belief that individuals progress from one level to the higher levels, implying that lower levels are contained within the higher level. As given in Chapter 1: "The Nature and Development of The Taxonomy", in *Taxonomy of Educational Objectives: The classification of Educational Goals*, "the objectives in one class are likely to make use of and be built on the behaviors found in the preceding classes in this list." (1956:18). Objectives have been indicated as desirable behaviors, such as "to understand the ideas of others and to express one's own effectively; to acquire and use the skills and habits involved in critical and constructive thinking" (p31). Objectives in each class have been illustrated using action verbs, by some institutes (e.g., Assessment Handbook of SDA Bocconi School of Management) in contrast to broad descriptions as given above, for consistency of understanding by faculty (e.g., Knowledge has the verbs - describe, distinguish, identify and so on).

This hierarchical or progressive view of learning has been reinforced by other scholars. For example, Robinson (2009:25) had remarked “Bloom’s taxonomy is sequential, meaning that a learner must master a given step before a significant progress is possible on the next.”

In other words, if a student is evaluated on higher order learning level and he/she scores high on that, it would imply that he/she is also equally, if not better, competent on the lower levels. This is a basic characteristic of a hierarchical framework.

A lot of research has been done on Bloom’s taxonomy including comparative approaches to measure learning, (e.g., Wilson and Wilson, 2013). A search using Google Scholar using keywords “Bloom’s taxonomy” identified 37,400 results as on October 10, 2014. Our exploration in the subject seems to preliminary indicate that majority of researchers in education have left the basic assumption of progressive hierarchy untested and unchallenged, while others have found faint support. For example, Ekstrand (1982) using maths scores data of 112,000 students of the USA found weak support for Bloom’s taxonomy. Results obtained by Ursani, Memon, & Chowdhry (2014) showing attempt rate paralleling the levels of Bloom’s taxonomy, with higher order questions perceived more difficult by the candidates, probably provide a further support. Our search using key words of “Empirical” + “Bloom’s Taxonomy” revealed no unequivocal test of this basic assumption of a hierarchical progression of learning. Thus the alternate idea of students displaying competence on the different levels of Bloom’s hierarchy in a parallel manner has not been explicitly tested.

In this paper we test this assumption of a step-wise learning hierarchy following the original taxonomy as proposed by Bloom.

### **Methodology**

Use of different kinds of tests mapped to different levels of Bloom’s taxonomy has been used by researchers to gauge students. For example, Crowe, Dirks and Wenderoth used combinations of labeling, fill-in-theblank, true/False, Multiple – choice, Short answer and essay

to develop a hierarchy of question papers that mapped to knowledge, comprehension, application, analysis, synthesis and evaluation (2008:369). Similar approach has been adopted in information and communication technology by Ursani, Memon, Chowdhry (2014) where different questions mapped to different levels were administered in a single test. For this paper, we have mapped three different quizzes to different levels.

This research explores the actual course marks of 123 first-year students of MBA curriculum (120 MBA students with 3 FPM students). The course was administered in the third term of first year, over 20 sessions. The course was a management course of applied nature (non quantitative oriented). The students prior work experience ranged from 0 – 66 months, with a break of male: female breakup of = 84:39. The different components of evaluation are described below, and are also mapped to different levels of Bloom's taxonomy (refer table 1).

### **Course Pedagogy**

1. **Case Analysis, Report Writing and Presentation:** The course consisted of 20 case based sessions wherein students were expected to be ready with case analysis and presentation (in PowerPoint format). This work was to be carried out in groups which were decided on the basis of roll-numbers. Two groups were randomly selected each session to present and defend their case analysis. In addition they would be required to present a report on the case. Each group would be required to participate in two such presentations and report writing exercises. Each round of case presentation and report writing had a weight of 10%, thus a total of 20% for each group.
2. **Quizzes:**
  - a. **Case based Quizzes:** Two case based quizzes (Quiz 1 and Quiz 3) were given. The students were given the case in advance before the day of test, while the specific questions to be answered based on their analyses were declared during the test. The first quiz was based on a manufacturing organization (consisting of 21 pages) while the second quiz was based on a service based organization (consisting of 6 pages). Details of the quizzes have been indicated in appendix. Quiz 1, mapped

to higher levels of Bloom's taxonomy was administered prior to Quiz 2 which was mapped to the lower levels. Such a ordering allowed us to be more aligned with this paper's objectives.

- b. **Non Case based quiz:** A single quiz (Quiz 2) based on 34 Multiple Choice Questions, with penalty @50% for wrong answer as well as un-attempted question, and 3 open ended questions was administered. Questions were unrepeated questions as compared to that of previous year's course so as to prevent the batch from knowing about the questions.
  - c. Each quiz has weight of 20% in overall course marks.
  - d. Quizzes Quiz 1, Quiz 2 and Quiz 3 were administered in the order as mentioned.
3. **Additional group based assignments:** While quiz-scores, administered individually, allowed us to test five out of six levels of Bloom's taxonomy, we decided to explore group outcomes as well. For that objective following assignments were given for students divided into 30 groups (group composition constant for all group assignments):
- a. **Case Development:** Identifying a management problem in a real organization and developing into a case, and then analyzing the same case. This was done in groups. This had a weight of 16%.
  - b. **Paper development:** Groups were asked to write a paper on a topic. The paper was supposed to be of publishable standards, in terms of process followed and format. This had a weight of 4%.
  - c. **The distribution of weights of case development and paper writing was not announced to the students before the submission.**
  - d. While difference between individual students were ignored in this exercise, average scores of group members in a group provided us an idea of average group competence on the lower levels of Bloom's taxonomy.

## **Course Evaluation**

The raw marks, in percentage, (marks obtained after evaluation of each component and review by students for any discrepancies/ omissions, but before declaration of course grades) have been used for this paper. Marks were given by one of the authors, who was the faculty for the course. The near equal distribution of each of the components implied that students could not play to certain components and had to give focus on all the components.

## **Mapping to Bloom's Taxonomy**

The mapping between the course objectives, the delivery of the course and the testing is given in Table 1. We have indicated synthesis as the higher order level as this provides a better mapping to the course evaluation components.

As can be seen from Table 1, the case development spans multiple levels of Bloom's taxonomy. It might be conceptualized it also incorporates additional elements of project management, negotiating with organizational members for access, communication skills, and collating, evaluating and structuring data in a meaningful manner apart from the knowledge levels.

The above mapping provides us the following advantage: for individual students, the Quiz 1 and Quiz 3 are theoretically higher levels. It involves both 1) analysis and 2) evaluation of the management case

Quiz scores on quizzes 1, 2 and 3 allowed for testing of Bloom's taxonomy by focusing on individual students. However group work forms a critical component of the course, based on the idea of orienting the students towards group work. Such group based working is required for the students to actually go through team-building, working under pressure and being able to deliver. Group scores, obtained by aggregating the scores of individual students, facilitated additional exploration of influence of average group 'intelligence' as measured by quizzes on group based exercises.

**Table 1: Mapping of Evaluation Components to Bloom's Taxonomy**

Original Label	Brief Description (Bloom et al., 1956)	Evaluation Components (Individual)	Evaluation Components (Group)		
Synthesis	Production of unique communication, plan, or proposed set of operations		Paper writing		
Evaluation	Judgment in terms of evidence and criteria	} Case based Quiz 1 (open ended) and Case based Quiz 3 (open ended) with pre-identified questions		} Case Analyses (two rounds)	} Case Development and proposing a solution based on exploration of real organization
Analysis	Analysis of elements, relationships, and organizational principles				
Application	Familiar and unfamiliar problems				
Comprehension	Interpretation and Extrapolation	Quiz 2 – subject matter open ended			
Knowledge	Knowledge of specifics	Quiz 2 – Multiple choice Questions			



**Variables:**

The details of the variables are indicated in table 2. Apart from the marks of individual students as well as those of student - groups on group assignments, averages of individual quiz scores in a particular group has also been indicated. This will give us an understanding of any influence of group 'intelligence' (as indicated by average of individual scores) on the marks obtained by the group on different group assignments (i.e., case presentation 1, case presentation 2, case development and proposing recommendations, and paper writing). There were 30 groups with group composition remaining unchanged for group components.

**Table 2: Details of Variables**

Individual scores		Group variables	
Q1OE	Quiz 1 (Case - open ended)	Case_Dev	Case Development and proposing recommendations
Q2OE	Quiz 2 (Subject open ended)	PAPER	Paper writing
Q2MCQ	Quiz 2 (Multiple Choice Questions)	C2TOT	Case Analysis – 2 <sup>nd</sup> round
Q3OE	Quiz 3 (Case - open ended)	C1TOT	Case Analysis – 1 <sup>st</sup> round
QAVG	Average of all quizzes	G_AVG_Q1OE	Group's average on Q1OE
QOE_AVG	Average of all OE quizzes	G_AVG_Q2OE	Groups' average on Q2OE
		G_AVG_Q2MCQ	Group's average on Q2MCQ
		G_AVG_Q3OE	Group's Average on Q3OE
		G_A_QAVG	Group's Average on QAVG

**Data Analysis:**

Descriptive statistics of quiz scores (percentage) of individual students are given in Table 3:

**Table 3: Descriptive Statistics of Individual Marks**

	N	Minimum	Maximum	Mean	Std. Deviation
Q1OE	123	.180	.960	.40846	.123155
Q2OE	123	.150	1.000	.63293	.213560
Q2MCQ	123	.441	.912	.65685	.092842
Q3OE	123	.167	.800	.43509	.138351
QAVG	123	.339	.827	.53336	.096106
QOE_AVG	123	.266	.838	.49218	.113978
Valid N (listwise)	123				

Descriptive statistics of the group variables are given in Table 4.

**Table 4: Descriptive Statistics of Group Marks**

	N	Minimum	Maximum	Mean	Std. Deviation
C1TOT	30	.3222	.4722	.396111	.0381051
C2TOT	30	.4111	.7111	.604333	.0770471
CTOT_AVG	30	.4056	.5806	.500222	.0438319
Case_Dev	30	.6500	.9250	.773889	.0594005
PAPER	30	.433	.850	.66217	.114164
G_AVG_Q1OE	30	.2800	.5550	.409800	.0657091
G_AVG_Q2OE	30	.4200	.8500	.635917	.1129836
G_AVG_Q2MCQ	30	.5765	.7647	.657598	.0448071
G_AVG_Q3OE	30	.2750	.5667	.436639	.0729935
G_A_QAVG	30	.4151	.6376	.534988	.0506260
Valid N (listwise)	30				

Pearson's Correlation coefficients of the individual students' scores was calculated. The results are given in the Table 5.

**Table 5: Correlations between Individual Students' Marks**

		Q1OE	Q2OE	Q3OE	Q2MCQ
Q1OE	Pearson Correlation	1	.277**	.262**	.229*
	Sig. (2-tailed)		.002	.003	.011
Q2OE	Pearson Correlation		1	.229*	.216*
	Sig. (2-tailed)			.011	.017
Q3OE	Pearson Correlation			1	.330**
	Sig. (2-tailed)				.000
Q2MCQ	Pearson Correlation				1
	Sig. (2-tailed)				

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Pearson's Correlation coefficients of scores on group assignments and group variables were calculated and are given in the table 6.

Table 6: Correlations between Group Variables

	C1TOT	C2TOT	CTOT_AVG	Case_Dev	PAPER	G_AVG_Q1OE	G_AVG_Q2OE	G_AVG_Q2MCQ	G_AVG_Q3OE	G_A_QAVG
C1TOT	1	.051	.479**	.140	.018	-.223	.091	-.030	-.219	-.107
C2TOT		1	.901**	.024	.459*	-.044	.295	-.393*	-.135	.015
CTOT_AVG			1	.082	.411*	-.136	.299	-.358	-.214	-.034
Case_Dev				1	-.050	.100	.086	.056	-.043	.078
PAPER					1	.340	.155	-.084	.094	.212
G_AVG_Q1OE						1	.286	.119	.151	.565**
G_AVG_Q2OE							1	.408*	.185	.808**
G_AVG_Q2MCQ								1	.460*	.653**
G_AVG_Q3OE									1	.614**
G_A_QAVG										1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

N= 30 groups

## Discussions and Propositions

Examination of the correlations analysis of individual student quiz scores indicates all the correlations are statistically significant. Correlation between Quiz 2 open ended and Quiz 2 MCQ is significant at 0.01 level. Similarly correlations between: Quiz 1 open ended and Quiz 2 MCQ, and Quiz 2 open ended and Quiz 3 open ended are significant at 0.01 levels.

This leads us to the following two conclusions:

1. The underlying factor which is driving all the variables is student's intelligence. This factor is the reason for obtaining statistically significant correlations between all the individual quiz scores.

2. The low value of correlations between the individual quiz scores strongly hints that the different quizzes mapped to different level of Bloom's taxonomy are of different complexities and are conceptually distinct. The low correlation between Quiz 1 open ended and Quiz 3 open ended can be due broad nature of instructions in Quiz 3, as compared to specific questions given in Quiz 1.

Therefore from these findings we propose the following propositions:

**Proposition 1:** individuals can be better on higher learning levels without necessarily being equally competent on lower levels.

These tests were arranged in an order that was not in line with the Bloom's taxonomy. Quiz 1 was taken before Quiz 2. Quiz 2 was more on knowledge of specifics using multiple choice questions. Quiz 3 was a test mapping higher order levels of Bloom's taxonomy. Scores in Quiz 1 should have been mirrored by scores on Quiz 2 (both MCQ and open ended) had Bloom's argument of a hierarchy held true. Similarly scores on Quiz 3 should have mirrored the Quiz 2 scores. The low value of correlation gives us reason to disapprove this. Therefore,

**Proposition 2:** Individuals do not progress across the different levels of Bloom's taxonomy, in a linear hierarchical fashion.

And we also posit,

**Proposition 3:** Individuals can demonstrate competencies related to higher order levels without necessarily being competent at lower order levels.

The correlations between the different group variables also conform our finding that different components of Bloom's taxonomy are unrelated. Correlation between C2TOT and C1TOT is insignificant implying that different content on the same level can test different aspects of student's intelligence. The only significant correlations are between PAPER and C2TOT (0.459 at 0.01 level) and C2TOT and G\_AVG\_Q2MCQ (-0.393 at 0.01 level). The results at group level therefore provide tentative support to our proposition.

### **Significance of the Study**

Our study is the first of its kind in Indian management post-graduate education context. This study has explored the use of cases in its various formats to empirically test assumption of hierarchy in Bloom's taxonomy.

Cases have been used as pedagogical tools since the start of management education. The use of cases to test students is also quite prevalent in different management institutes. While case based evaluation of individual students is resource-intensive, it is also acclaimed to be higher on the Bloom's taxonomy, and therefore educators using this method have an implicit belief in its superiority over other tests such as multiple-choice- questions based evaluation. Multiple-choice-questions are easily administered and therefore are significantly used to test the basic foundational level of knowledge. They are also used by faculty in the form of easy-surprise tests to keep students on their toes.

However our study has illustrated, tentatively we may propose for the first time using data from marks obtained by students of post-graduate management curriculum, that these assumptions are not supported by data. It is possible for students to be relatively better on tests that map to higher levels of Bloom's taxonomy while not being competent on the lower order levels.

Expressed differently, it is possible that the students may be able to get things done, in an unsophisticated manner while not being able to express what he/she had achieved in a professional language that uses the appropriate terminology. The reverse is also possible, students may be extremely articulate about the concepts, and terminology of a particular subject, but may find it difficult to apply in a real world problem scenario. This is supported by Jones (2008) whose research on nursing students had revealed that there was a big challenge among students in resolving situations requiring synthesis and analyses, due to which he had proposed adoption of problem based learning. This is in contrast to results obtained by Ursani, Memon, & Chowdhry (2014) in which the attempt rate has paralleled the levels of Bloom's taxonomy, with higher order questions perceived more difficult by the candidates; the success rate of the questions however show clusters with questions mapped to lower three levels having similar success rates, and questions mapped to upper 3 levels vaging nearly equal success rate. However Ursani, Memon, & Chowdhry (2014) have not reported any correlations of candidates' scores. This, we think, is due to having a single question mapped to the levels, instead of multiple questions mapped to a single level. This also supports our research methodology.

### **Implications for Educators**

Our findings have significant ramifications. They indicate that an education system, that would include both the pedagogy and the evaluation methodology, would need to be equally oriented towards multiple competencies. Focusing at any higher order level of Bloom's taxonomy due to the implicit assumption that students good in higher levels would, on their own, be equally

competent at lower levels, would not produce students will well-rounded competence on a particular subject.

The other conclusion is that the final course grade would depend on the method a particular course faculty follows, along with the weights assigned to different components (Baldizan and McMullin, 2005) bringing into question the validity of course-tests in judging a student's competence.

A single test would not be able to test all the levels. A similar appeal for having variation in testing had been made by Holmes (2002) using the critique of "what you test is what you get". As pointed out by Hampton & Krentler (1993) "Unwary instructors can be in the position of hoping for critical thinking while rewarding memorization". This is compounded by faculty's use of test bank, questions to which students can be pre-exposed (Usova, 1997) due to "leakage" from one batch to another batch of students, or the nature of the questions being more aligned to lower levels of memorization (Ari, 2014).

Education programmes have learning objectives based on identified needs of the target audience (Shannon, 2003); for management institutes, it is therefore important to understand the needs of the recruiters, and work backwards.

Our analysis on evaluation methods also points out a possible need to relook at the teaching methods. The thinking that higher order thinking and learning cannot happen until the student had mastered the foundations is a driving force for many teaching programme design with a heavy slant towards classroom lectures. Such a view also has support among certain educators e.g., Booker (2007). However our study reveals a different picture, thus highlight the need for more research. This has been supported by other researchers. E.g., Lucas & Mladenovic (2009) observed lack of appreciation of abstract topics and reasoning in students who however had knowledge of the fundamentals derived from rote usage among accountancy students.



Inquiry based learning (Madhuri et al., 2012) as well problem oriented learning (Jones , 2008) are possible pedagogies which can offer better results when suitable combined with the traditional class-lecture method. Hybrid methods often had better student participation and feedback (Mosalam et al., 2013). Experiments on students in subjects like economics have seen students score better on understanding (Tisha & Beck, 2004). Further questions of higher complexity cannot be achieved by increasing difficulty levels of questions as illustrated by Tan & Othman (2013). Such complete re-orientation in any education system will require significant efforts to rework the pedagogy as well as evaluation methods.

### **Implications for Organizations**

The campus placement process which is a major source of talent for Indian companies would need to be relooked at by the HR teams of the companies. They may be shortlisting as well as selecting candidates on the basis of scores which have no correlation with their learnings in a course. Furthermore the interviews conducted by the HR teams of companies may not reliably test the knowledge of the subject and may also miss out the higher level competencies. It is therefore important for the organizations to develop appropriate tests which map to the kind of competencies required among the candidates.

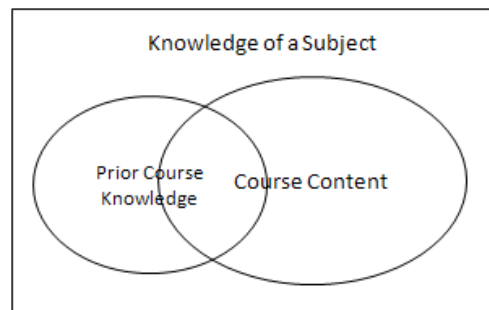
### **Limitations**

Management students, given their prior work-experience, bring with them a certain understanding of most subjects. This is specially so for students coming after working in consultancy firms, or in IT firms where they have been exposed to such concepts/ principles.

That prior understanding (articulated in terms of certain ability to comprehend and certain level of knowledge, as well as holding certain mental frameworks for application) is before the course is delivered. For subjects which are near to student's prior experience, it is difficult to exclude that prior course knowledge in the evaluation (see fig.1). Prior knowledge may also be

a contaminant, if “everyday/intuitive understandings” disorients the student and prevent them from fully appreciating the faculty instructions (Lucas and Mladenovic, 2009).

**Figure 1: Knowledge of Subject: Distinction between prior-course knowledge and course content**



Quiz 1 by focusing on analysis, evaluation and application from a general manager’s perspective, tested the higher levels prior to testing the lower levels of Bloom’s taxonomy. Knowledge of the specific issues was evaluated in quiz 2. Though statistically significant, the low values of correlation between quiz 1 and quiz 2 components provide measured support for the existence of prior-knowledge. Further research using technical subjects or subjects like foreign languages where the prior course knowledge is likely to be negligible, would throw additional findings on the different levels of Bloom’s taxonomy and the impact of course pedagogy and assessment methods. The study by Ursani, Memon, & Chowdhry (2014) is an example using technical subject, and the results are distinctly different from the results obtained by us.

This study has the limitations related to students’ evaluation being done by a single faculty who delivered the course. The students’ efforts towards individual components may have differed over a period of time. The effort towards group assignments would have seen differences, due to possible free riding and other group dynamics, among students’ participation. Further exploration using all individual tests and assignments can be used to extend this study. Case analysis is also influenced by personality factors. In a study by Parkinson and Taggar (2006) students high on openness-to-experience were higher on problem identification while students higher on general intelligence were found to score high on analysis.

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## Appendix

### Quiz 1 (Partial list of questions):

The case was given in advance while the question-paper related to the case was distributed in the examination hall.

1. Identify the factors which will influence a typical customer's decision to give orders to <name of the organization>?
2. At an operational level, what would be the organizational structure of <organization>? Indicate in form of a brief diagram.
3. What are the managerial implications of such an operating structure?

### Quiz 2 (Partial list of questions):

**Choose the best option for the questions given below.**

1. The overall goal of performance management is to ensure that
  - A. organization and all of its subsystems are working in an optimum fashion to achieve organizational goals.
  - B. all the employees are employed to the maximum of their individual capacity since the organization is paying wages/ salaries.
  - C. employee appraisal is done in a scientific manner and can be legally defended.
  - D. organization's employees are satisfied with the performance appraisal system.
2. Of all the errors committed by management of <taken from a case to check recall of the in-class discussion> the most inexcusable can be :
  - A. Did not have a competency mapping model before the recruitment and selection process
  - B. Recruit a military personnel for managerial role
  - C. Trying out an academic person for managerial role
  - D. Not monitoring organizational critical success factors
3. An organization wants to make all the employees conscious about the need for increasing revenues, decreasing costs, time efficiency, and also improvement in the utilization of the company assets. Therefore the company has decided to have a reward system that links the organization's goals to employees' rewards. The best parameter would be:

- A. Revenue versus target
  - B. Profit versus target
  - C. Profitability versus target
  - D. Revenue versus target along with cost versus target
4. Michael Porter advocated the use of
- A. Strategy Linkage maps
  - B. Activity system maps
  - C. Critical Path method
  - D. Balanced Scorecard
5. Kaplan and Norton advocated the use of-
- A. Activity system maps
  - B. Critical Path method
  - C. PERT Diagrams
  - D. Balanced Scorecard

**Quiz 3:** This quiz had a comprehensive management case of 6 pages, with the case distributed in advance. Specific instructions were indicated in the examination hall. The students were required to present their analyses and offer recommendations. Students had to offer their answers in the following format:

- 1. Situational Analysis
- 2. Identification of Problems
- 3. Generation and evaluation of options
- 4. Framing recommendations