

## An AHP approach to industry-oriented management competence development in an institute of technology

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**ABSTRACT:** This study proposes a framework based on Analytic Hierarchy Process (AHP). It explores the management competencies that industry employees in digital ages must possess and provides the best management curriculum alternatives based on a gap analysis of an institute of technology. A literature review and a Delphi survey were conducted to collect information on the current development of management competencies and first identify AHP factors. Through the AHP questionnaire, opinions of experts from industry and from institutes of technology were collected, and this study constructs a complete competence hierarchy and indicators. Conclusions were as follows: 1) the main professional management competence dimensions from the industry-perspective are core ability, professional ability and developing ability; 2) the competencies can be categorised into 3 dimensions, 14 sub-dimensions and 59 competence indicators; 3) considering the demands from industry, the core ability (42%) dimension is weighted the most. Developing these management abilities should also be seen as a graduation requirement in order to help students become successful in industry in the future.

### INTRODUCTION

Due to rapid globalisation, handling and managing human resources has become an increasingly challenging task. In this ever changing world, one of the main principles to follow in order to survive is to adapt. This principle is similar to Darwin's theory of *survival of the fittest*, but in this case the *fittest* means people who are able to adapt rapidly and efficiently in the ever changing environment of economics. Therefore, in order to make management students prepared for their future, teachers should place their focus on helping students develop essential abilities to survive in industry, and also teach students to become aware of the changes in the economic world. This will greatly diminish the differences between what students face in their master's courses at school and what they will face in the real world, thus, allowing them to adapt and feel comfortable quickly once they enter the industry. Schools should also utilise scientific surveying to find out what the industry is looking for, and use this to prepare and advise students [1-3]. This investigation examined the core elements needed in master level management courses to prepare students to become successful in industry.

Through thorough and meticulous planning, this investigation has created a set of efficient tools that will help create the most efficient education plan for students seeking their master in management. These tools include the *Delphi survey* and the *AHP survey*. The Delphi survey is a set of surveys created through examination of the industry's needs and course outlines of other master level management courses. The Delphi survey was then used as the basis for developing the AHP survey, which are basically a modified version of three Delphi surveys.

### PLAN OF INVESTIGATION

#### Industry's Needs and Course Development

The purpose of education is to help students learn, and therefore the purpose for designing an education model should be *how to learn* instead of *how to teach*. There are many factors that can affect the process of learning, for example: persistence, time management, quality of educators and the students' own capability. Therefore, in order to design an efficient education model, it is important to understand that instructional design is a journey instead of a destination, meaning the only way to create a *perfect* education model is to modify it repeatedly through experience [4][5]. By cross referencing information from business schools, the literature, and websites such as the 104 Human Resource website [6], a main direction focus for management courses was developed.

This investigation used the management course outlines of 18 local business schools in Taiwan and compare and contrast different focuses of each school. Moreover, resources that reflect the present industry's point of view (e.g. books or essays written by economists, scholars or top managers) were also used to understand the industry's

requirements for a top manager and different theories on managing human resources. Last but not least, information from the 104 Human Resources website was also referenced. The job search engine function is as follows: (Position=High end, Category=Management business, Industry=N/A, Key words=N/A, Job description= manager /CEO, Undesired job description= Advisor/sponsor/ secretary/ assistant, Work Location=N/A). By this search, qualities desired in a top manager can be discovered: total of 284 found, 230 relatable. By using all the resources listed above, a Delphi draft was developed to help examine the main qualities desired from people entering the management industry.

### Development and Design of the Delphi Survey

As stated above, the Delphi survey was developed through different business school’s course outlines and the industry’s needs. This study then invited several top managers from industry to fill out the Delphi survey three times. The third Delphi survey was a modified version of the first two surveys. Comparing and contrasting the reactions and advice given by the different managers on the Delphi survey led to a draft for the AHP survey.

### Development and Design of the AHP Survey

The Analytic Hierarchy Process (AHP), developed by Saaty in 1980, has been studied extensively and used in almost all the applications related with multiple criteria decision making in the last 20 years. The AHP method can deal with those studies, which are hard to quantify, such as the strategies for new industrial operation and resource distribution priority faced by social sciences, etc [7][8]. Since the management education in Taiwan is still in an immature pattern stage, the questionnaires adopted AHP to calculate the weights of the competences.

The AHP consists of three main operations, including hierarchy construction, priority analysis and consistency verification. The AHP survey was again taken by the previous candidates that took the Delphi survey to avoid inaccuracy and overlapping information. After the surveys were completed, the importance each candidate places on different abilities and personal qualities was examined to confirm further the education direction for students and to help students develop into successful managers in the near future. Through the questionnaires, this study constructed a complete competence hierarchy and indicators.

### FINDINGS

In this study, a framework of industry-oriented management competence for an institute of technology is proposed. This framework is also based on Delphi and AHP surveys to provide optimised management learning for learners.

### Framework of Industry-Oriented Professional Management Competence Dimensions

In Figure 1, it clearly shows that the management competence dimensions of industry orientation include the core ability (42%), professional ability (26%), and development ability (32%) and should be developed most rapidly.

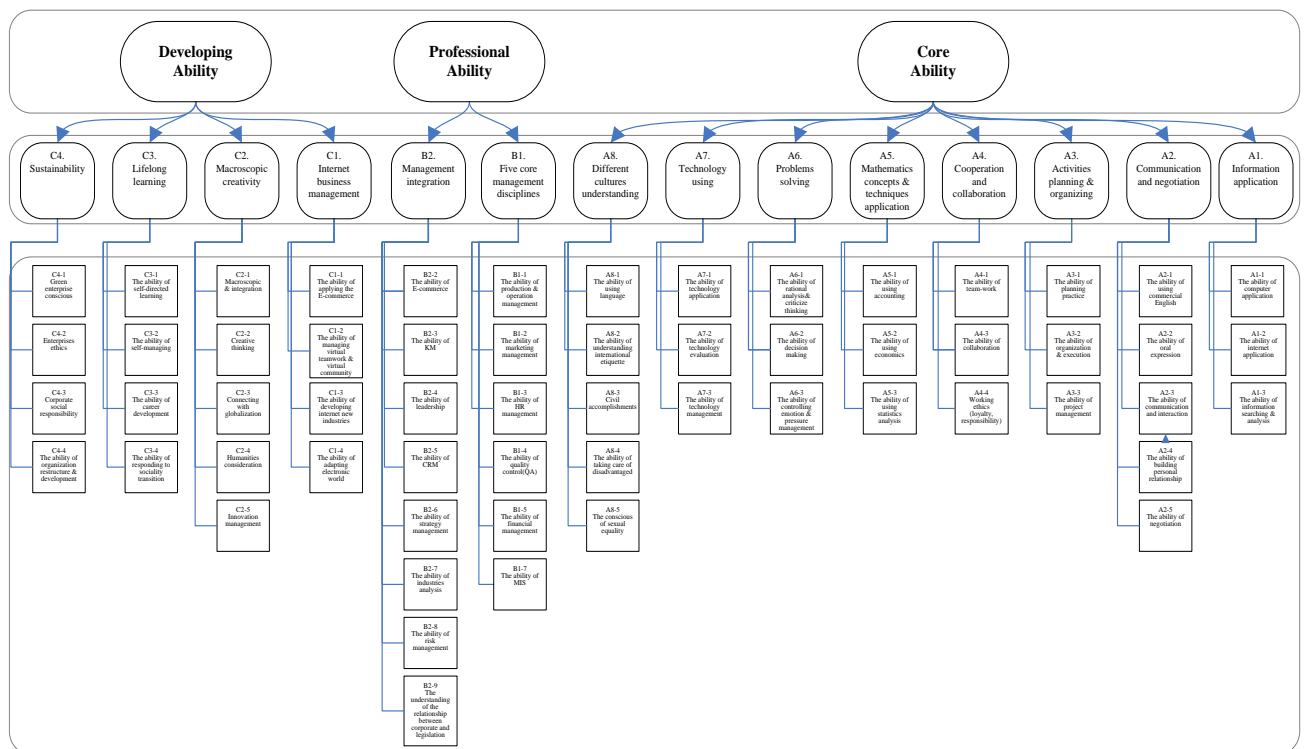


Figure 1: Framework of industry-oriented management competences.

As seen in the figure above, the three most significant abilities can also be divided into several small sub-dimensions. For example the *Core ability* includes eight sub-dimensions: problem-solving (23%), cooperation and collaboration (18%), communication and negotiation (15%), activities planning and organising (15%), technology using (9%), different cultures understanding (9%), information application (7%), and mathematics concepts and techniques application (5%), with *problem-solving* being the most important subgroup. The sub-dimensions of professional ability include *management integration* (59%) and *five core management disciplines* (41%). Last but not least, the most important sub-dimensions of development ability include *macroscopic creativity* (35%), *lifelong learning* (26%), *sustainability* (25%) and *Internet business management* (14%). After classifying the sub-dimensions in their level of importance, a clear direction for management courses can be given to help students develop into managers that the industry needs and seeks.

### An Industry-Oriented Management Education Model

Through previous surveys done by professionals, it was discovered that in order to become successful in industry, three essential qualities must be possessed. These qualities include the core ability, the professional ability and the development ability with the each ability's importance in the ratio of 42:26:32. These three qualities should, therefore, be used as the main focuses for management courses, and teachers should strongly advise and encourage students to develop in the direction of these qualities. Follows are the most important indicators of each competence for learning direction:

- A1 - Information application: A1-3 the ability of information searching and analysis (57%);
- A2 - Communication and negotiation: A2-4 the ability of building personal relationships (30%);
- A3 - Activities planning and organising: A3-2 the ability of organisation & execution (42%);
- A4 - Cooperation and collaboration: A4-4 working ethics (loyalty, responsibility) (41%);
- A5 - Mathematical concepts and techniques application: A5-3 the ability of statistics analysis (45%);
- A6 - Problem-solving: A6-2 the ability of decision making (39%);
- A7 - Technology using: A7-1 the ability of technology application (42%);
- A8 - Different cultures understanding: A8-1 the ability to use languages (26%);
- B1 - Five core management disciplines: B1-2 the ability of marketing management (19%) and B1-3 the ability of HR management (19%);
- B2 - Management integration: B2-1 the ability of strategy management (16%);
- C1 - Internet business management: C1-3 the ability of developing Internet new industries (27%);
- C2 - Macroscopic creativity: C2-2 creative thinking (27%);
- C3 - Lifelong learning: C3-2 the ability of self-managing (32%);
- C4 - Sustainability: C4-3 corporate social responsibility (27%) and C4-4 the ability of organisation restructure and development (27%).

With such an industry-oriented management education model with specific indicators, the learners can understand more about the system, structure, connections and combination of knowledge in management learning. Sharing and delivery quality of leadership knowledge is also improved. By using the AHP survey, the importance of the three kernels in the industry (core ability, professional ability and development ability) can be confirmed and, thus, be used as main focuses for business school education, allowing students to become successful in the competitive industry and aid the development of the world's economy as a whole.

### Curriculum Design and Relative Techniques-Moodle Platform

This study approached creating an efficient education model in two steps: 1) by utilising information from the Delphi and AHP surveys to create a basic course outline that satisfies the industry's needs; 2) by performing experimental teaching and examining the effects to determine the legitimacy and efficiency of the competence oriented model. Through thorough examination of course orientation, industry's needs, and information from the Delphi and AHP surveys, this investigation has established an education plan for management courses in graduation school. In the experimental course design, the interactive mechanism is an important feature.

In Figure 2, a content delivery process is proposed with the interactive mechanism and provided a suitable online resource to the learner. Figure 3 proposed a feedback and upload space of course assignment for learners. It is important because the learner can obtain desired content, the learner's knowledge can be improved and evaluated. Each sub-function of Moodle is bounded to specific capability goals, such as:

- A1 - 3 the ability of information searching and analysis;
- A2 - 4 the ability of building personal relationships;
- A4 - 1 the ability of team-work;
- C3 - 2 the ability of self-managing, etc.

Through feedback function, the learner's experiences can be fed back to the system, preserved to the database, and then passed down to teacher and other learners.



Figure 2: Moodle interface of experiment course-online resource.

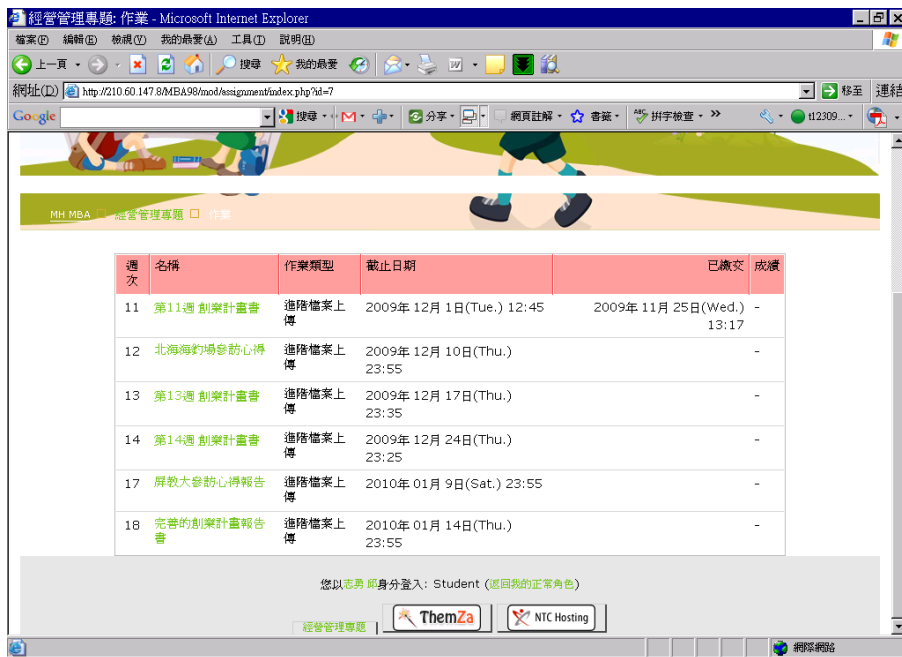


Figure 3: Moodle interface of experiment course – assignment.

## CONCLUSIONS

Through thoughtful planning and design, this study has successfully collected information for creating an efficient management outline by examining the industry's needs. Furthermore, using the Delphi survey as a foundation, the AHP survey was then developed. These surveys are then sent to successful managers and domain professors to complete and critique, through this, this project can now examine what the industry seeks in the next generation of managers.

After collecting data from the two surveys, it was discovered that the core ability is considered a fundamental management ability that is greatly sought by industry, with its importance being 42% of the industry's demands and expectations. This shows that most managers in industry now lack this ability, and thus it should be given the most attention by each graduate school.

However, abilities that are usually emphasised by graduate schools, such as professional ability, are considered a prerequisite for students in graduate school, and should have already been acquired during their undergraduate studies. Therefore, this ability should not be the main focus because it would inhibit students from more in-depth investigation into projects and limit them to only achieving an undergraduate level of understanding. Although professional ability is

thought to be acquired during students' undergraduate studies, it should still be considered significant because it still remains to be 26% of the industry's demands and expectations and still considered a fundamental ability. Therefore, each graduate school should encourage students to acquire any management competences of industry orientation they lack by taking undergraduate level classes during their spare time. Moreover, these management competence indicators of industry orientation should be part of their graduation requirements in order to prevent unprepared students from entering industry. Another fundamental ability, development ability, is 32% of the industry's demands and expectations. This shows the industry's need for managers that are able to evolve and prevail in the challenging and ever changing environment of the management industry, and also possess the ability to plan ahead for any future economic disasters and diminish the amount of damages in the shortest time possible.

Considering the demands for professional competencies in an institute of technology, the core ability (42%) dimension is weighted the most. Among competence sub-dimensions, *problem-solving* (23%) is most required in the core ability dimension; *management integration* (59%) is most required in professional ability dimension; and *macroscopic creativity* (35%) is most required in developing ability by digital age.

In conclusion, graduate schools should not only place their focus on letting students develop professional abilities but should also place emphasis on all of the management competence dimensions from industry orientation, because they are what are being demanded by today's management industry. Each graduate school should examine and utilise the three management competence dimensions of industry orientation and incorporate them to part of their course planning in order to efficiently and successfully prepare students for being a good leadership and for their future in next-generation industry.

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