The construction of quality coordinated supervision system of Chinese engineering master degree postgraduate training

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***Abstract*— In recent years, with the rapid growth of engineering master degree education, quality of the education has been widespread concern, and its quality control has become hot and difficult issue. Construction of Chinese engineering master education quality monitoring system is necessary for healthy development of Chinese higher education. This paper researches on the present situation of engineering master education in China, then forms a crossover quality supervision system, a system has integrated vertical quality control system and horizontal supervision system.**

Keywords- Master of Engineering, Quality coordinated supervision, Quality of education

I. INTRODUCTION

In recent years, engineering master degree education has been developing rapidly in China, which has made a positive contribution to Chinese economic and social development. At the same time, master education quality control has become an important issue. Engineering master education quality supervision system is necessary for healthy development of engineering master' education. This article extracted the major difficulties of the quality supervision through analysis of the current situation of master studies, establish an engineering master degree training quality coordinated supervision system which means longitudinal controlled by colleges and horizontal supervised by relevant government departments, social agencies, employers and universities.

II. ANALYSIS OF QUALITY PROBLEMS OF ENGINEERING MASTERS' EDUCATION

At present, the master's training approach is a combination of full-time and part-time training, namely "go to school but not off-post". Course study adopts "double teacher" responsibility system. Master's dissertation is guided by both mentor who have engineering practice experience in school and mentor with high professional skill in enterprise [1].

Master's training activities constitutes a integrate value chain. Value chain theory believe that not every step creates value in a project activity, value is actually created from the specific links of the value chain, only these links are the most valuable strategic links. By this theory, Master training can be divided in several stages: the recruit stage, training preparatory stage, courses stage, papers stage, and degree-granting stage. [2,3]For constructing a new supervision approach, this article specific analysis each phase of master training, points out where the problem lies.

A.Quality problems in recruit stages

Based on a large number of studies, the problems in this stage mainly express in two aspects in practice. First it is the quality of Student resource. Master's students source are enterprise staff who leaving school for a long period, master's entrance examination tend to be an obstacle because they have weak basic knowledge. In recent years, with the gradually increased scale of master admission, master students tend to be younger, and their professional experience relatively reduces. Research showed these students lack of engineering experience in accomplishing thesis research project, which brings challenge to their master training. Instability quantity of student sources is the second problem. Although master of engineering have developed fast in recent years, number of students are unpredictable in each year; and with increasing number of training colleges, a larger gap appears in the number of student source among colleges. Especially some common institutions have obvious problems of instability student sources.

B.Quality problems in training preparatory stages

At present, the master's training approach is a combination of full-time and part-time training, namely 'go to school but not departure from work, Course study adopts "double teacher" reponsibility system. Master's dissertation is guided by both mentor with engineering practice experience in school and mentor with high professional skill in enterprise.

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C. Quality problems in courses stage

Course stage issues mainly reflected in the curriculum setting, choice of teaching materials and teachers. Different universities have large differences in the curriculum setting, and some of differences have exceeded the scope of running characteristic school. Currently, master training adopts dual tutorial system. This system is helpful to management and guidance of engineering master, but there also exists some problems. First of all, university tutor and enterprise mentors are difference between theoretical knowledge and practical experience. Second, school faculty also exist some problems. With the graduate scale continues to expand, shortage of teachers appears. Finally, school mentors initiative issues. Master thesis topics belong to the enterprise, together with the different assessment orientation in different schools, some

school mentors' motivation to guide engineering graduate student are not high.

D.Quality problems in papers stage

Cultivation mode for engineering master is 'go to school but not departure from work', which bring about contradictions between working and learning. In the paper research stage, few students can take abundant time to work on paper, which leads their paper designs progress slowly. Learned from the analysis of recently engineering master degree papers in our school, there still exists unsatisfactory aspect in papers quality: insufficient of collected literature; workload less because of narrow papers topics; some papers digress from the need of actual work; papers writing specification need to be improve, such as in the English summary, illustrations and table; papers technology innovation are not enough, which cannot well uses frontier theories, knowledge, and methods to solve the urgent challenges in enterprise engineering techniques; lack of depth in topic choice.

III. DESIGN OF ENGINEERING MASTER TRAINING QUALITY SUPERVISION SCHEME

In allusion to quality problems mentioned above, we combine training processes and experiences of engineering master education quality supervision, and introduce the idea of project management, then build a solid engineering master education quality monitoring system on the basis of finding master points in all stages of education. This system consists of three sections, which are vertical quality self-control systems, multi-participation horizontal control system, as well as coordinated supervision system of the integration[4,5]. Construction of engineering master quality coordinated supervision system is showed in Figure 1.

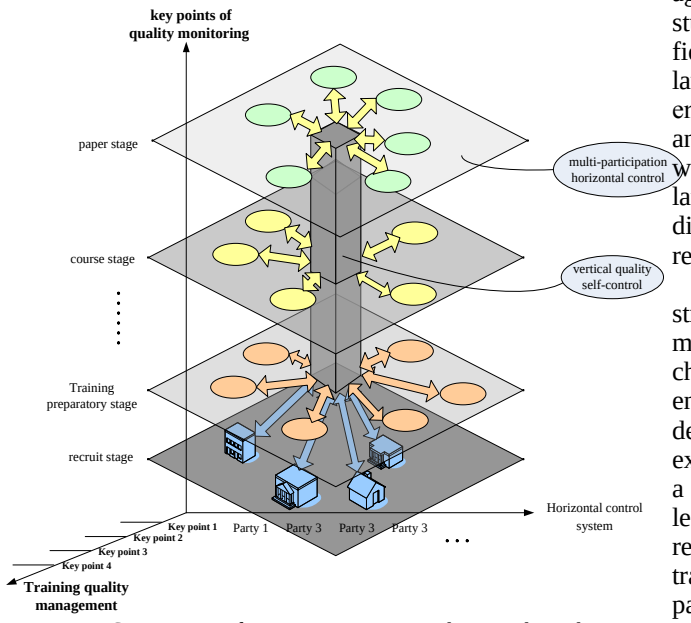

Figure 1. Construction of engineering master quality coordinated supervision system

A. Vertical self-control system

We build up a vertical controlled system making full life cycle of professional degree education as mainline, making social, enterprises and students personal needs for guiding, through refinement the management content of training stage within training process life cycle, identifying training units management personnel responsibility and weaknesses of regulatory, combining quality regulatory points of engineering master professional degree education training full life cycle.

1) Quality control in recruit stage

Aimed at characteristics of this stage, training units should pay attention on the following works: (a) Starting from the requirements of enterprise, seek corporate support. Master's training quality is inextricably linked with support of all sectors of enterprise. Therefore, when formulating the master training plan, we must be well equipped with the specific circumstances of the enterprise, enhancing communication and coordination to the related departments of the enterprise in order to smoothly implement the master training plan. (b) Preparing for pre-exam work. Students who apply for master study are mostly excellent serving staff graduated more than three years, they have little time for basic theory knowledge learning because of bearing the enterprise workload tasks. Therefore, enterprises should organize systematic review before examination prepensely.

2) Quality control in course stage

We should pay attention on two points aim at curriculum supervision. (a) Existing engineering master courses system for graduates in school is relatively mature after many years of practice and constantly optimize. We should work out basic master courses plans taking example of the according professional master curriculums. (b) Most of the people trained by engineering master have rich experience because of working for a long period of time, and they have clear understanding about knowledge and skills, meanwhile there have problems of knowledge aging and basic theory weak, and engineering master students from same class come from more than one related field. So class setting is not only following the general laws of post-graduate education but also fully considering engineering master's features, at the same time, deepening and broadening the basis of knowledge, and combining with engineering practice, reflecting the outcome of the latest achievement is also important, setting accord to different enterprises, industry characteristics and requirements as well.

Supervision for teachers teaching should focus on strengthens talents integration in schools. Due to the multidisciplinary integration of postgraduates' education characteristics, schools require to consider entirely, enhance the cooperation among the educational school, department and institute, and playing the potential of existing human resources. For the discipline direction with a certain development potential but lack of high level leaders, effective measures should be taken from the recruitment at home and abroad. We should enhance the training for existing backbone teachers, except for actively participating in unified training which organized by professional degrees steering committee, we should also be organizing teacher training systematically, including encouraging them to continue further study or to study abroad, at the same time, sending teachers to relevant occupational sector to practice, in order to gain practical work experience.

3) Quality control in paper stage

Complete dissertation proposal work well. Dissertation proposal can ensure that master's degree thesis quality, through the dissertation proposal report, graduate students are able to select topic accurate and reasonable, clear understand levels of academic papers and find problems in the topic under guidance of the instructors and subject experts, so thesis research work can proceed smoothly.

Complete dissertation mid-term review well. The mid-term review is one of the important measures taken to guarantee the quality of paper. On one hand, it allows schools to comprehensive learn the master's thesis work, and detect problems in paper timely. On the other hand, through the mid-term review, the experts can propose amendments about paper, which make engineering master clarified further.

We should do monitoring work of paper process well. Establish thesis instruct system, strengthen the supervision and management of paper process, request regularly report to the supervisor, and require tutor guidance regularly. If it is not convenient for interview, teachers may communicate with students via the web (such as e-mail), and record the time and content, report to the college at the same time and keep record. Training company unify supervise investigate and make it not formality.

B. Horizontal control system

Throughout the whole life-cycle of engineering master's degree education, participants mainly contains training company, education supervision departments, students' family and department. Due to different start point throughout the training process, participants' focus is different too. By constructing a horizontal control system of participatory and focused, coordinating focuses, integrating various supervisory resources together, in order to ensure the quality of master degree training. In the supervision process, we should make the implementation of the master training quality plan as the main line, and grab the key link to carry out supervise, optimize coordinating supervision goals on the basis of quality control followed by training plan implementation. Participatory training quality horizontal supervision responsibility should be defined, try to minimize unnecessary regulatory aspects, participants should make great use of internal and inherent constraints and incentives to restrain and encourage training quality, ensure achievement of engineering masters education quality, as shown in Figure 2.

Fig. 2 horizontal control system of participatory and focused

1) Basic idea of horizontal supervision

Participants are important direct participants and stakeholders in the engineering master education quality management, and they also bear some responsibility for training quality of master, which mainly for controlling supervision of master quality, assessing responsibilities. The management of participation on masters training quality is macroscopically, specific control works generally as follows: ①Be responsible for developing program about total target of masters training quality control and the guidance of regulatory points; ②Be responsible for establishing rules, system, and approach about engineering masters training quality control; ③Be responsible for the establishment, situation assessment, and evaluation of the system about masters training control; ④ Do quality collaborative regulatory of regulatory points well, find and correct project department problem in costs control timely; ⑤On training quality of master control and supervision of major decisions, thematic meeting of related personnel should be organized.

2) Methods and measures

a) Supervision in recruit stage

In this stage we implement the horizontal monitoring, which should make main points in two stage above for regulatory points. Different participation party carry out corresponding supervision based on their standard rules. Specific implementation as follows:

For the source of students quality problems, in recruit stage, policy guidance sector should develop corresponding guidance policy and implement corresponding regulatory, to ensure the related engineering masters training policy guidance regulations work well, and implement the regulations in the training company department, at the same time, we should make decision-making on corresponding training units feedback, and improve it.

For instability sources issues, as participants of the company can select the appropriate training company according to their own personnel policies, and combine with the industry features. Through the cooperation with training company in the way of co-culture talents, which not only protect the talent requirement reserve of enterprise development, but also guarantee training companies have a steady source of students. In addition, students can also set up communication mechanisms between training company and company students in, then keep track of employee training situation.

b) Supervision in training preparatory stage

Unreasonable curriculums setting and unscientific training programs are seriously affect the quality of students' learning, thereby affecting the quality of postgraduates' education training. Degree office of the State Council, the ministry of education master's guidance centers and other master's education authorities may establish the inspector group or appointed inspectors on the basis of the related systems; targeted examine and inspect the training units regularly, or even communicate between students, share their opinions and views in-depth. Combination of teaching and practice, education department of masters inspect the combination of company education and practice according to the major

features, carry on guidance simultaneously, and finally achieve the combination of guidance and supervision.

c) Supervision in course stage

Participants that have regulatory responsibilities are plenty in this stage, which mainly conclude students' company, master's competent department and students' family. Master's competent department mainly takes charge of courses setting of training company whether meet national degree ordinance requirements or no. Many engineering masters need return to original company for work after finishing study, therefore, their company is necessary on supervising training quality of cultivation units, corresponding investigate the materials selecting and faculty in the view of enterprise personnel training. Students studying for a master's degree is supported by their family's financial, and quality of student learning will also have some impact on his family at a later time, therefore, students' family should bear a certain supervisory responsibility, inspect the work of training company in the perspective of family.

d) Supervision in paper stage

We should encourage two-way selection method in the topic selection of thesis. At first, the training unit organized instructors who have practical experience to declare their own research contents. Then, making these materials available to students, students select tutors and the subject according to their actual work, actual capacity and the topic of interest. At the same time, training units establish engineering master degree education steering committee consisting of technology leader in the relevant enterprise and experts with rich experience in school in the corresponding fields. Bring the educational expert advisory group into full play.

IV. CONCLUSION

Researching on this subject, the situation of engineering master degree education has been elaborated. We also clarified the major quality problems of the education at all stages. Then, we applied project management ideas, defined the weakness points of various stages of quality control basing on characteristics of master education, and further innovate a collaboration supervision system of master's degree quality. This regulatory system make engineering master education throughout the life-cycle as the main line, joint with the horizontal control system about vertical self-control, participatory and focused of training company, eventually integrate both of them, build viable educational quality control system.

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