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Research on the Transformation, Development and Improvement of Higher Education in Third-tier Cities of China

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Abstract: Over the past 10 years, higher education in third-tier cities has went through the process of scale development and entered the new intensive development stage. Faced with new requirements in the transformation to modern vocational education and new changes of industry background, universities and colleges in third-tier cities have some difficulties in quality and ability of teaching staff, industrial connection in discipline and specialty, enterprise development pushed by talent and intelligence and so on. Therefore, it is supposed to carry out "Take root in mainland, fit in industry, open and inosculate, establish school on culture" strategy, and push all-round transformation in faculty structure, way of resource distribution, the foundation and construction of discipline and specialty, connotation of talent training, direction of scientific research and social work, mode of culture construction and college management system

Keywords: Third-tier Cities; Higher Education; Transformation and Development

1. Introduction

When higher education quickly becomes popularized and universal in China, in Third-tier Cities, the process of such rapid development generally consists of secondary vocational (normal) schools being upgraded to vocational (normal) colleges, vocational (normal) colleges being combined into or upgraded to universities, independent institutions being established under universities and sponsored by local governments or state-owned enterprises, public institutions, social organizations authorized by local governments or individuals, and universities being combined in cities where higher education is well established. Over the past decade, higher education in Third-tier Cities has made historical breakthroughs in terms of the level and the scale. For the present, the environment for higher education in Third-tier Cities is changing, since the state is attaching importance to higher education classification, encouraging colleges and universities to focus on technology application instead of orientation to industrial and local socioeconomic development and independent institutions to transform into applied technical colleges. Local universities and newly established universities, institutes and higher vocational colleges in Third-tier Cities all will be included into the modern vocational education system. As a result, it will be a strategic choice for Third-tier Cities to reinforce education sector and build a modern vocational education base.

2. Existing Problems in Incorporating Colleges and Universities in Third-tier Cities into the Modern Vocational Education System

Leaders in the building of applied disciplines are in shortage, and academically and technically qualified teaching team needs to be strengthened. In Third-tier Cities, teaching staff are not as qualified as necessary for the building of "modern vocational education and academically and technically qualified teaching team" and for the transformation of these colleges and universities. Specifically, leaders in applied research are in shortfall, and limited by geographic location, research platform and opportunity. It is difficult to attract and retain talents and form a talent pool for applied research. At the same time, teaching staff's academic and technical capacity needs to be effectively improved to accommodate industry development. Besides, teaching activities by part-time teachers in businesses and full-time teachers in colleges and universities are isolated, and there is not yet a teaching team that is effectively integrated for the cultivation of applied technical and skilled talents.

Academic disciplines and specialties tend to be repetitive, all-embracing but seldom outstanding. There is repetitive investment and construction as a result of lack of coordination and connection between colleges and universities in Third-tier Cities. Several years ago, under heavy cost pressure associated with science and technology, colleges and universities successively introduced economics and

management specialties. From 2014, applied technology has become the focus once again, and there is a rush to science and technology disciplines. Now, lured by intelligent manufacturing, colleges and universities are competing to introduce "robot", "internet of things" and the like. Due to homogenization, competitive and characteristic specialties have not received due attention and support, valuable higher education resources in Third-tier Cities have not be fully utilized, and colleges and universities there have not coordinated their efforts to serve local development.

Funding is strained and the mechanism for resource integration and sharing is not yet in place. In Third-tier Cities, newly-upgraded colleges and universities require adequate funding so as to be fully qualified for undergraduate education; tuition alone is not enough for independent institutions to maintain a stable teaching team and promote specialty transformation. Besides, due to campus and laboratory expansion, some colleges and universities are highly indebted. For colleges and universities in the same city, in spite of some degree of resource sharing, there lacks a mechanism for integration and resource sharing.

Few college graduates choose to remain in Third-tier Cities in less developed regions, and there, colleges and universities have not fully played the role of talent pool. The reasons include: on the one hand, specialty construction is disconnected from local industry development and fails to take into account actual talent need; and on the other hand, there lack enough sustainable opportunities, and the environment for graduates' career development needs to be improved.

Colleges and universities have not fully played a role in research-promoted local industry development, and their contribution to regional development need to be strengthened. Colleges and universities in Third-tier Cities are weak in four aspects of research. Specifically, they are weak in research and teamwork; uncompetitive in applying for key research projects, with few high-level projects; incapable of resolving key technological issues, with few science and technology awards, especially at or above provincial or ministerial level; superficial in industry-university-research cooperation, with little horizontal service. Local businesses, seeing their low contribution, do not trust much in local colleges and universities, and a mechanism is not yet in place for fair cooperation between local businesses, universities and research institutes.

Overall, higher education in Third-tier Cities, with a short history, is relatively weak. In the next phase, their strategic focus will move from expansion to "transformation and second start-up".

3. Strategies for Transformation of Colleges and Universities in Third-tier Cities

3.1. Taking root in respective cities

"Contribution to regional development" is a mission for colleges and universities in Third-tier Cities. They shall deepen cooperation with local entities, fully localize their "specialties, talent cultivation, research and social service" and build themselves into local colleges and universities that are interdependent with local economic and social development.

3.2. Serving the industry

"Serving the industry" is a path of development for colleges and universities in Third-tier Cities. They shall work with the industrial community, closely watch the shift of industrial structure and development to "upgraded, optimized, light, green and intelligent sectors", upgrade their specialty arrangement, teaching team, experiment and lab equipment, pattern of talent cultivation, curriculum system design, direction of applied research, social training and the like accordingly, and build themselves into industrial colleges that coexist in harmony with the industry.

3.3. Opening for integration

"Opening for integration" is a pattern of development for colleges and universities in Third-tier Cities. They shall expand their resources, form an alliance with local counterparts, and grow together with partner colleges and universities elsewhere. Independent institutions shall be thoroughly integrated with their parent universities. They shall strive to be open and inclusive and introduce innovative patterns of education on the basis of fair practices of vocational education across the world as well as national and local conditions.

3.4. Being characteristic

"Being characteristic" is a strategy of survival for colleges and universities in Third-tier Cities. They shall put greater emphasis over education quality and characteristic specialties. Therefore, in addition to common specialties, they shall highlight their characteristic specialties that are tailored to local priority industries and several emerging industries, and build themselves into characteristic universities that can accommodate specific market demand.

4. Seven Measures to Promote Higher Education Transformation in Third-tier Cities

4.1. Structure of teaching staff: from focus on academic qualifications to emphasis over academic as well as technical qualifications

First of all, construct an academically and technically qualified structure. On the one hand, it is necessary to cultivate and introduce "academic" teaching staff, especially those that can build new specialties and reinforce

the building, teaching and research of existing specialties. On the other hand, it is necessary to introduce "technical" teaching staff, optimize the employment of part-time industrial teachers and establish and maintain a stable team for industrial teaching.

In the next place, cultivate academically and technically qualified teaching staff. In introducing teaching staff, it is desirable to refrain from competing to introduce top talents, overseas innovation talents or teams, and instead, it is necessary to turn to qualified interdisciplinary talents with fair academic capability and certain engineering experience. In cultivating teaching staff, door-to-door master or doctoral graduates may be made technically qualified as well by engaging in both theoretical study and practical teaching, participating laboratory construction, instructing college student innovation contests and acting as visiting engineer, etc., and engineers and managerial personnel informed of advanced technologies may be made academically qualified as well by strengthening ethics and teaching capability. In evaluating teaching staff, it is necessary to establish a performance evaluation system to evaluate from diverse aspects, such as capabilities in respect of teaching, instruction to student development, teaching work, specialty building, applied research, etc.

By the end of the 13th Five-Year, establish the academically and technically qualified teaching team. It is necessary to introduce a pattern of teaching motivated by construction or management projects, explore the possibility of teaching staff to work with experts in various industrial sectors in teaching activities and establish an academically and technically qualified teaching team.

4.2. Resource allocation: from "passive reliance and exclusivity" to "alliance cooperation, co-construction and sharing"

Given limited resources and weak development base of colleges and universities in Third-tier Cities, it is necessary for municipal governments to take the lead in organizing local undergraduate, higher vocational and secondary vocational institutions to form a modern vocational education alliance, members of which are entitled to resource co-construction and sharing. This will help resolve the higher education bottleneck in Third-tier Cities, reduce meaningless repetitive construction and enable more efficient use of public resource and government investment. Specifically:

It is necessary to co-build talent attraction platform, teacher database and faculty development center to facilitate talent attraction, employment and cultivation. Co-construct and share the "Smart Campus", combine and form the zone for the sharing of laboratory and teaching resources, and put in place proper mechanisms for college and university resource co-building and sharing. Co-build a team for reforming the cultivation of applied technical and skilled talents, co-develop applied course resources, and co-build open course platforms for mutual course selection and recognition, and co-construct a quality management system for monitoring third-party talent cultivation. Co-construction also includes productivity training institutes, corporate technical support center, technology transfer center, vocational certification center, consultancy center and other technical and social service entities. Expand direct passage from secondary and higher vocational education to undergraduate education, define the connection among "objectives of cultivation, curriculum system, process of teaching and pattern of evaluation". At the same time, applied technology institutes may work with prominent applied universities to offer "undergraduate + specialized master" education.

4.3. Specialty building: from "non-coordinated and all-embracing" to "staggered, characteristic and innovative" construction

Specialty establishment shall be "demand-oriented and dually connected". First of all, in connecting to local dominant industries, local colleges and universities may introduce specific team and resource, enhance relevant specialties in a short time and work with local entities to build competitive industries. In the second place, in collecting to emerging industries actively promoted by local governments, specialties may be expanded as necessary. In the third place, subject to quantitative control, humanities and sciences in connection with basic research may turn to qualitative improvement and construction. Besides, dynamic specialty adjustment is necessary so as to maintain fair interaction between specialty deployment and local industrial structure.

Specialty building shall give priority to competitive specialties and cluster development". It is necessary for colleges and universities to identify a proper point for serving the local industry, concentrate their forces to build competitive specialties and arrange other specialties as appropriate for the development of these competitive specialties, to form a competitive specialty cluster and cultivate their own characteristics. Colleges and universities in the same city may work together for a staggered, complementary and diversified specialty arrangement.

Specialty adjustment shall focus on "transforming conventional specialties and cultivating prospective ones". For specialties that cannot be connected to industrial demand, it is necessary to adjust their direction of construction and transform them for applied purpose. Meanwhile, it is necessary to take into account the changes of newly established industries and cultivate new specialties accordingly. Inter-disciplinary specialty integration is necessary so as to cultivate interdisciplinary talents necessary for industry integration. Moreover, it is necessary to take into account the whole chain of several characteris-

tic local industries and establish industrial schools across different colleges and specialties.

4.4. Talent cultivation: focus on technical and skilled talents for intelligent manufacturing rather than specialized technologies and skills

Cultivate technical and skilled talents to accommodate the progress of intelligent manufacturing technology. It is necessary to track and identify the applied talent demand in connection with intelligent manufacturing, adapt the curriculum system to intelligent manufacturing by strengthening core courses, consolidating common courses (improve the quality of these courses), reducing outdated courses, and imbedding vocational certification and emerging courses, and enable students to satisfy the requirements of modern manufacturing technologies and processes.

Cultivate comprehensively qualified talents as necessary for intelligent manufacturing. As a result of the "Made in China 2025", manual work may be done by robots, and production line may involve different content of work, and relevant technical and skilled persons not only shall be proficient in specific technologies and skills, but also shall be capable of macro-engineering, market judgment and corporate operation. Therefore, modern vocational education shall cultivate interdisciplinary talents by expanding optional courses, dual-degree, major and minor courses. Besides, through classroom instruction and on-the-job practice, it is necessary to strengthen the cultivation of professionalism, humanities and science learning, capability for lifetime learning and teamwork, awareness of "internet+", clean energy and modern finance, and management capability.

4.5. Research and social service: from focus on "top academic papers and programs" to emphasis over "research and training service oriented to medium, small and micro businesses"

The priority is to serve medium, small and micro businesses, assist technical innovation, commercialization and product upgrading. It is necessary to go deep into medium, small and micro businesses, start with technical service and training, and introduce their technical innovations to enterprises by establishing a business innovation demand database, creating applied technical team and platform, and working with enterprises to establish engineering technology research center, technical innovation promotion website, online patent supermarket, etc. Moreover, to attract phoenix, a nest shall be built at first. Therefore, it is necessary to allocate research resources to enterprises from colleges and universities across the country, and in particular, to focus on key technical breakthroughs as necessary for industrial development in Third-tier Cities.

Build talent training base for medium, small and micro businesses in Third-tier Cities. Since a part of employees may have to change their jobs as a result of production and operation transformation, it is necessary to offer relevant courses to help them learn what is necessary for job transfer; for the purpose of introducing any new technology, program or equipment, it is necessary to offer upgraded courses to enterprises' technical and managerial personnel.

4.6. Culture: from "accumulation-based and natural formation" to "transplantation from other universities, integration into local culture and absorption from industrial culture"

Colleges and universities in Third-tier Cities, which are usually young and in the course of transformation, shall pay due attention to culture cultivation. Firstly, they may transplant the culture of other universities and enrich their own one in the course of derivation, evolution and accumulation. Secondly, they may introduce local culture by offering local culture courses, participating in local cultural activities and working with local culture and museum facilities; explore local culture by studying and compiling local culture; disseminate local culture through students and teachers across the country; promote local culture by sponsoring organizations in connection with local intangible cultural heritage; enhance local culture by making higher education resources available to the public; and take a lead and serve as a think tank for local culture. Thirdly, they may promote natural integration of campus culture and industrial culture through students and teachers "going to the factories", and entrepreneurs, technical innovation experts, industry development history, simulated production line, simulation lab, corporate workshop and industry research institutes "entering the campus".

4.7. Governance system: from "independence" to "government-industry-business-university" coordination and cooperation, including voluntary action by universities, promotion by government, participation by industry, and cooperation with businesses.

Voluntary action by universities: colleges and universities may establish development advisory committee and specialty steering committee that consist of members from government, industry, business and university, and accommodate local development needs, maintain communication with governmental departments, join industry associations, go deep into local businesses, carry out local culture and technology activities, and cultivate the recognition of Third-tier Cities as a "second homeland", all in a voluntary manner.

Promotion by government: 1) Establish local higher education committee to formulate an overall higher education plan and coordinate university cooperation and key

investment. 2) Establish local education transformation and development fund, organize specific construction and evaluation, treat public universities and private ones equally, and construct a benign competitive environment for higher education. 3) Promulgate relevant policies to encourage outstanding talents to play a dual role in industry as well as education. 4) Attract more high-tech businesses and optimize relevant policies to retain graduates, and form a positive cycle of talents being cultivated by local universities and being employed by local businesses. 5) Competent industry authorities may encourage and facilitate well-targeted and more efficient university-business cooperation, and encourage universities and key enterprises in relevant sectors to co-build competitive specialties. 6) Encourage provincial and municipal technical research centers to open their talent and platform resources to local colleges and universities. 7) Promulgate specific policies and support large enterprises and key transformed and upgraded enterprises to provide internship and practice positions to students and teachers of local colleges and universities.

Participation by industry: Industry associations may combine resources of member companies and participate in local colleges and universities' formulation of criteria for the cultivation of relevant specialized talents, optimization of the scheme, compilation of applied teaching materials and evaluation of talent cultivation quality, etc.

Cooperation with businesses : The businesses may provide local colleges and universities with high-quality training and internship conditions, work with the latter to sponsor relevant workshops, industry institutes, labs, academically and technically qualified teaching team, corporate university, etc., and enable "industry-education integration" in the whole course of talent cultivation.

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