Technical Assistance Consultant's Report

Project Number: 47009-002 / TA 8448 - PRC
September 2014

People's Republic of China: Guangxi Baise Vocational Education Development Project

(Financed by the Asian Development Bank's Technical Assistance Special Fund)

Prepared by

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For Baise Municipal Government
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Asian Development Bank

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Submitted by:

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Detailed Sector Assessment

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1.0 Introduction

1.1. Purpose

The purpose of this review is to provide an assessment of the technical vocational education and training (TVET) system as an input into the ADB Project Preparatory Assistance for the proposed Guangxi Baise Vocational Education Development Project. The review draws upon available policies and guidelines, statistical data, interviews and surveys with stakeholders and visits to institutions in Baise City and County.

1.2 Scope

The scope of the review is broad in that it provides information that considers the performance, issues and opportunities relating to the TVET system at the national (PRC), provincial (Guangxi) and local (Baise City and County) levels. Given the focus of the project on the development and enhancement of a multilevel TVET (MLT) system, the review provides more detailed information on the current levels of TVET at secondary vocational schools (SVS), vocational colleges (VC) and the undergraduate (UG) program. The main focus of the MLT system's development is centred on Baise University (BU) which includes a vocational college (BVC) and also the sponsorship of a private SVS, Baise Vocational School (BVS).

BU is a university in transition, as it attempts to change its academic focus to become a TVET-applicable university based on a MLT system that includes SVS, VC and UG levels. It is within this context that the review of local arrangements is set.

2.0 Socio-economic background

2.1 Socio-economic development in the PRC and the role of TVET as a tool in economic and social transformation

Globally, economic reform and change is the main driver for the focus on TVET in most countries and the PRC is no exception in this regard. Keating et al (2002) state:

"*Government and industry typically see TVET as a major factor in the drive to be internationally competitive, through its contribution to labour productivity. It is also seen as an instrument to counter unemployment, especially structural unemployment, which have been a particular feature of global economic change and the transformation of economies*. *…This has also been the experience of China."* [1]

Although this statement was made more than a decade ago, it still rings true for the current use of TVET as a tool by the PRC in its continuing efforts for economic and social transformation.

2.1.1 Urban rural development

The rapid development of the eastern coastal region of China has not been matched by rural regions and the industrial hinterland which supports two thirds of the population. The PRC government is actively encouraging migration of rural workers from their homes to urban locations to support the expansion of labour intensive manufacturing and as a means of improving the economic circumstances of people from these poorer areas.

[1] Keating, J, Medrich, E., Volkoff, V., Perry, J., et al, 2002, *Comparative Study of Vocational Education and Training Systems: National Vocational Education and Training Systems across Three Regions Under Pressure of Change,* National Centre for Vocational Education and Research, Australia, pp 2-3

A prediction in 2005[2] forecast an increase of 3% in the populations of urban centres over the next 20 years, in turn creating greater demand for educational facilities. With 70% of this labour force now likely to be employed in the manufacturing sector, this will also create increased demands for TVET.

2.1.2 The emergence of new forms of employment

The gradual decrease in the numbers of state-owned enterprises and the emergence of a socialist market economy is having a major impact on communities, regions and the education and training system. There is pressure on the state-owned enterprises to increase efficiency and effectiveness in order to become more globally competitive. This creates great pressure on the government to provide retraining programs for the enormous numbers of workers likely to be unemployed and underemployed in the next two decades.

While most employees find employment in state-owned enterprises and communal organisations, increasingly, new patterns of employment are emerging such as self-employment and jobs created by and with privately owned domestic and foreign companies. These changes are impacting on the aspirations of young people graduation from different levels of education, including TVET, in China.

2.1.3 Uneducated and unskilled workforce

China's *literacy* rates are quite high (85%+ for all adults and 98% for those under the age of 45 years[3]). However the *education level* of the Chinese labour force is much lower than that of South Korea and the other newly industrialised countries of Asia. China produces a large number of university graduates although many are ill-equipped to fill the available jobs and are therefore unemployed (one-third of last year's graduates)[4]. It is in the area of middle level technical skills (i.e. technicians and technologists) that China has the biggest skills deficit and given that the most rapidly developing area of employment is in the processing or down-stream stages of production, there is an urgent need for increasing the quantity, quality and effectiveness of TVET skills development.

2.1.4 The 12th Five Year Plan (2011- 2015): High demand skills in priority areas

The 12th Five Year Plan emphasises the need to re-structure and reform secondary TVET and tertiary TVET. The Government planned to have the numbers of students at TVET secondary schools and other secondary schools "balanced" (i.e. equal) by 2010 and this is being achieved in some, but not all, provincial areas. The demand for skilled labour is high and TVET is considered a key element in meeting employment expansion targets. The development and quality of TVET schools varies widely, both between eastern and western China (less developed) and between urban and rural areas (less developed). To meet these challenges, the scale and pace of TVET reform in China is of enormous proportions, driven by the skill needs of a rapidly industrialising nation and by the need to meet social challenges caused by large numbers of displaced or unemployed workers entering the urban centres.

2.1.5 Workforce changes and development needs

The PRC has the largest labour force in the world, adding about 7 million people to the labour force each year. China's labour market is characterized by surplus labour in rural areas and skill shortages in cities, particularly in manufacturing. The overall growth of the labour market has slowed to less than one per cent as a consequence of limited population growth.[5] The country's fast-growing

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[2] Qu, Hongbin, 2005, *The Great Migration: How China's 200 Million New Workers will Change the Economy Forever*, HSBC Global Research

[3] ILO Report, 2012

[4] 21st Century Research Institute, cited in *Reuters* article, 7 June, 2014

[5] ILO Report, 2012

sectors and coastal areas are experiencing skill and labour shortages, and wages of unskilled labour are rising in proportion. China's comparative advantage in unskilled labour-intensive products will therefore decline eventually. In view of shortages of labour many firms are shifting to more skill-intensive products and production and processing technologies. The country's strategy is also to balance economic growth geographically, expanding the productive capacity in interior provinces and to less developed provinces such as Guangxi. The demand for skilled workers, technicians and technologists is strong as evidenced by the growing high employment rates for TVET graduates both nationally and in Baise. All these developments make upgrading the skills of the workforce a major priority.

3.0 The national TVET System

3.1 Structure of the TVET system in the PRC

About 6 million students graduated from more than 1,300 registered vocational colleges in the PRC last year, a figure almost on par with the number of university graduates in 2013. Currently, 29.34 million students study at 13,600 vocational schools and colleges across China. Their average employment rate is anticipated to reach 90%[6]. What this is indicating is the size and growing importance (and influence) of the TVET system in China. The national government has increasingly recognised the importance of the TVET system as a key strategy in providing economic competiveness as well as social stability and benefits and opportunities for individuals. In company with the introduction of market-oriented economic reforms, China has made significant efforts to modernise and restructure its TVET system, making it more demand driven and responsive to industry's needs.

The role of TVET in supplying people with knowledge and skills for new or transformed industries (increasingly in manufacturing and service industries has meant a focus on the development of technicians, technologists and managers. This has required the TVET system to develop from a predominantly alternative stream at the secondary school level to embrace higher levels of training in VC and more recently, undergraduate (UG) programs.

The formerly fragmented system of TVET under different ministries and state-owned enterprises was consolidated under MOE and MOHRSS in the 1990s. Two parallel TVET systems now coexist– one for vocational *education* under the MOE and another for vocational *training* under MOHRSS. Delivery is mainly school-based on both sides. The two main types of pre-employment TVET under the MOE are secondary vocational schools (SVS) and vocational colleges (VC) at the post-secondary level.

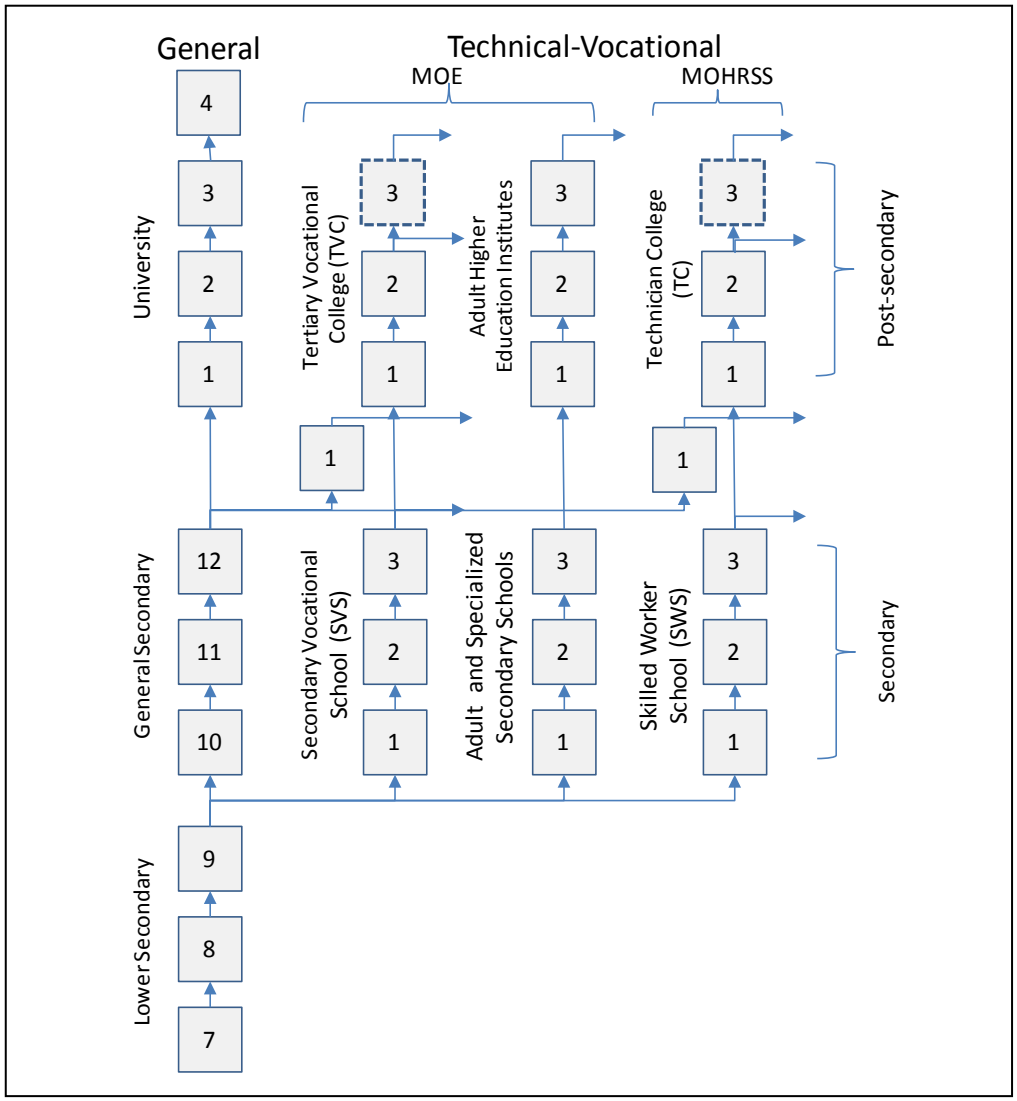
Table 3.1: S*tructure of the formal TVET system in the PR*C provides an overview of the education and training system in the PRC and the organisation of the formal TVET system within this. From the perspective of the MLT system being developed at Baise University and associated institutes, all levels of the system are shown: the secondary vocational school (SVS) and the Technical Vocational College (VC) are shown in the *Technical-Vocational* Stream and the undergraduate (UG) level is at the top of the University stream in the diagram. The number of years for each of the program levels is also consistent with the Baise MLT system.

The administration of vocational institutions under provincial departments of education is complex, posing a challenge for coordination. A high degree of state control exists, yet there is room for flexibility in course design at the institutional level. At the upper-secondary level officials strive to

[6] Premier Li Keqiang's speech June 22 2014 to the 2014 TVET Conference, PRC

achieve a 50:50 balance between vocational education and general secondary education. This is a continuing challenge, primarily because of the perceived status of TVET as an alternative to academic education. Private institutions are active providers in TVET, especially at secondary (SVS) level, but private secondary enrolments have been declining.

Table 3.1: Structure of Formal TVET system in the PRC



Source: *Hunan TVET Reform Project* Sector Assessment 2010, p.12

3.2 Government funding for TVET

The government has tended to underinvest in TVET in the past compared with basic, general secondary and university education. Tuition and other fees account for a relatively high proportion (an estimated 60% at VC and 35% in SVS) of total revenue of public institutions[7]. Public financing for TVET is supply-driven, primarily because the key expenditure item is full-time permanent teachers' salaries (and associated benefits), provided by provincial governments. This nexus between the tenure and total number of existing permanent staff makes changes to the deployment of teachers difficult e.g. no transfers can be arranged to fill shortages of teachers in priority programs.

[7] MoE Statistics, 2013

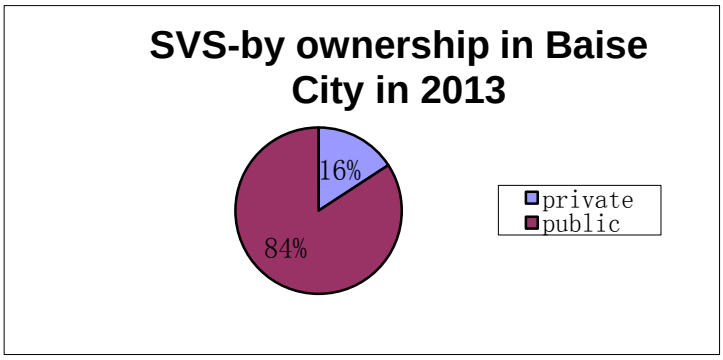
Over the past 5 years more national government funds have been directed to TVET, primarily for capital works programs and particularly in support of Demonstration Schools, where institutions are designated as *lighthouses* of exemplary practice. This has rejuvenated many TVET campuses at both the SVS and VC levels. It has also stimulated provincial governments to create their own Demonstration School program based on additional funding support for TVET institutions showing exemplary practice.[8]

Funding varies for TVET at provincial levels, with economic development often determining funding levels. The poorer provinces generally provide fewer funds.[9]

3.2.1 Private-public ownership of TVET institutions

Private TVET investors and providers are relatively new in the PRC. The national government would like to diversify the funding courses for TVET, including more involvement of the private sector in TVET provision. While there has been a promising level of involvement of the private sector, as investors in TVET, over the past decade, private secondary enrolments have been declining (especially at the SVS level). There are issues of quality related to private TVET institutions, particularly related to attracting and retaining good teachers for their program delivery.

Another key factor in the decline of private SVS institutions is that tuition in public SVS became free from the September 2012 student intake. Nationally, there were 47% of private SVS and 18% of private VC in 2010.[10] As Table 3.2 indicates, in Baise in 2013 there were 16% of SVS that were privately owned. There is one private and one public VC (the one included as part of the BU MLT system) in Baise.



Source: *Baise Yearbook of Statistics for Education*, 2014

Table 3.2: SVS by ownership in Baise City in 2013

On June 22, at the PRC national TVET Conference, Premier Li Keqiang spoke about the need for reforms to promote vocational education, in particular the greater involvement of private investment in TVET. Li said:

[8] A Star ranking system has also been introduced as an incentive system for TVET institutions to achieve higher standards

[9] Between 2008 and 2010 Guangxi government invested RMB7.5 billion in TVET, equivalent to the total amount invested in the previous ten years. In 2014, the total TVET investment from Government is RMB 1.7 billion and a total of RMB 4.7 billion is expected over the next four years (Quote from Deputy Governor, Guangxi, in education reform meeting, March 2014)

[10] MoE Statistics, 2010

In addition to the government, social entities, companies and private investors should take part in establishing more vocational training of different levels to integrate practical needs with teaching.

Li said most of the vocational schools in China still take the initiative in teaching and in course planning, rather than using the models of foreign countries, such as Germany, that rely on industry-school cooperation. "In many cases, education-related organizations are the ones that care about improving vocational education. Companies and employers don't have strong motives. It is important for them to recognize the importance of developing vocational education. It means a lot to the companies and the country.[11]

This also underlines the importance of developing school-industry partnerships where industry is given more opportunities to contribute to the shaping of TVET in the PRC. This will also require efforts on the behalf of education to involve them as equal partners in the development of the system.

3.3 National policies and plans

China has many policies and plans that indicate the importance of TVET. The main documents are the 1996 Vocational Education Law, the *National Medium and Long-Term Plan on Education Reform and Development (2010-2020*), the Twelfth Five Year Action Plan (2012 -2016), and – in Baise—*The Report on the Current Situation in TVET development in Baise*.

The main elements of TVET policy reform that have emerged during the past two decades can be summarized as follows:

- *Expansion* of vocational education and vocational training, in terms of the overall capacity and quality of the system as well as student numbers being relative to general education. Expansion was concentrated initially on the senior secondary level of TVET i.e. on SVS. The long-standing target of a 50-50 ratio between TVET and general secondary enrolments has effectively been achieved. Between 1978 and 2011, the proportion of upper secondary students nationally enrolled in TVET rose from 5% to 51%. The emphasis has now shifted to increasing the supply of TVET at higher education levels. This has seen the development of more VC and also TVET-applicable universities (see below);

- Emphasis on increasing *access and equity* in TVET, notably targeting rural areas, ethnic minorities, women, disabled, unemployed (especially through subsidised migrant worker programs) and other disadvantaged groups in the labour market.

- *Decentralization* – with responsibility for planning, coordination and macro-management vested in relevant central government organizations and for overall leadership and coordination, supervision, guidance and assessment with local governments. Increased autonomy has been allowed for public training institutions in terms of management, decision-making on courses and selection of trainees. More remains to be done in this policy area;

- *Diversification of providers*: Central and local governments continue to be the main providers and financiers of TVET, but private providers have been encouraged to deliver TVET training;

- A more active *role for employers* in delivery and funding of training. The policy support for this has been incremental, with rather limited support until recently. It is hoped that the recent announcements (see above) indicate more formal arrangements for involving employers in TVET;

[11] *China Daily,24.6.2014*

- *Diversification of TVET funding*, mainly through the introduction of tuition fees;

- *Integrated approach*: the Vocational Education Law of 1996 explicitly addresses all kinds of formal and non-formal technical education and training schemes provided by public and non-state training institutions. The emphasis is still on formal, institutionalised TVET:

- *Management reforms.* The administrative system of TVET is subject to further reform outlined in the *National Guidelines of Education Reform and Development*. At the national level, the inter-ministerial liaison meeting mechanism is responsible for formulating major TVET strategies and policies. At the local level, provincial governments are responsible for planning, resource allocation and supervision;

- *Modernisation of curricula and teaching* methods: Increasingly, emphasis is put on modernising and modularising curricula and promoting and developing the use of modern teaching methodologies and technologies;

- Vocational *training as a requirement for employment*: The Labour Law (Article 68) and the Vocational Education Law (Article 20) stipulate that completion of vocational training is a prerequisite for employment in technical occupations;

3.3.1 Two recent central government policy announcements

Two recent policy announcements have particular relevance to the current Guangxi Baise project:

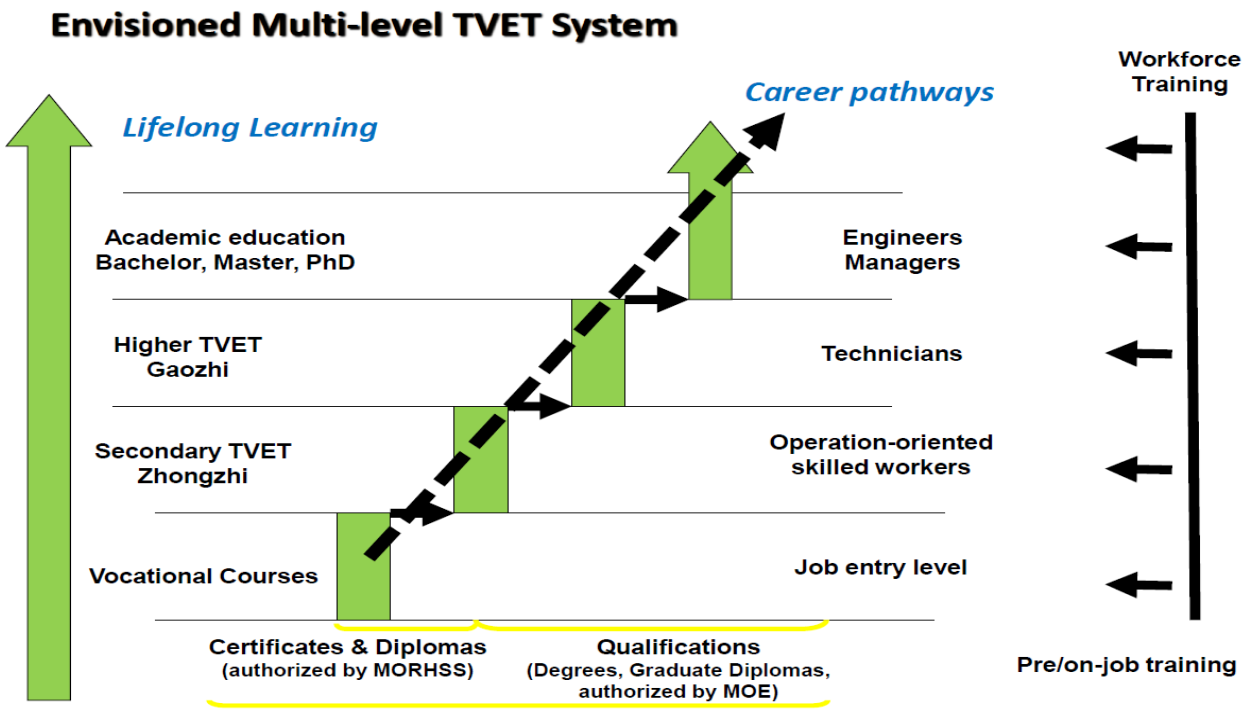
1) **Development of an MLT system:** A statement was made by PRC Vice-Premier Liu Yandong to the *Third International Congress on Technical and Vocational Education and Training* in Shanghai on March 2012 regarding the establishment of:

   ….a world-class modern TVET system that is relevant, connective, and multi-dimensional Although agreement has not yet been reached on the precise definition of such a TVET system, there is strong consensus among PRC policy-makers that a key component of the new TVET system will be a well-structured and better-coordinated "multi-level TVET" (MLT) subsystem, which exhibits the following characteristics:

   - *responds to the PRC's future economic and social development needs, as well as regional and international trends;*
   - *caters for and promotes lifelong learning;*
   - *provides learning pathways and fosters career development opportunities;*
   - *blends vocational training and academic education; and*
   - *articulates and "ladderises" levels of TVET.*

This is an extremely important new policy direction and provides a clear rationale for the development of a MLT system at BU[12]. The envisioned MLT system for the PRC (and for BU) will need to clearly define and link curriculum and competencies targeted by TVET programs at different levels. The system should also provide learning pathways that provide access for students to further study or to enter the labour market at different exit points (with the potential to return to continue TVET studies at a later date). As illustrated in *Figure 3.3* below, such a MLT should allow TVET students to progressively enter higher level TVET programs, while also allowing them to return to the academic education stream, through "knowledge + competency" assessment and other innovative approaches, such as linked majors and a mutually recognised credit system.

[12] For the purposes of this document and the work to establish a MLT system in the Guangxi-Baise TVET reform project, this description above can be considered as **a working definition**.



***Source**: Author's (Liu, Amy) depiction of proposed MLT (2014)*

Figure 3.3: Envisioned Multi-level TVET System in the PRC

As depicted on the left-hand side of *Figure 3.3* the PRC has traditionally divided TVET and post-secondary education into at least 4 tiers: (i) vocational courses offered mainly by MHRSS for both students and through adult education short courses, (ii) secondary TVET (*zhongzhi*) centred mainly on secondary vocational schools, (iii) higher TVET (*gaozhi*) offered though Vocational Colleges and (iv) post-secondary academic education levels (mainly focused on undergraduate courses).

Efforts have been made to form a hierarchy across levels of education in the PRC. Examples in Shandong and Hainan are summarised by Liu (2014)[13]. As another example, in Guizhou, DOE plays an overall role in the planning and coordination between secondary and higher TVET schools in occupational targets, curriculum, teaching means, and resource allocation, to promote "3+2 model" that other provinces have been implementing. At the same time, Guizhou is exploring other models that better suit its circumstances. Firstly, Guizhou is advancing a "5-year TVET model" by identifying and developing several TVET schools to accommodate such a model. Secondly, the province is exploring a "3+4 model" (3-year secondary TVET plus 4-year undergraduate results in a Bachelor's degree) by connecting nationally identified demonstration secondary TVET schools (zhongzhi) with academic universities. To implement this model, academic universities in the province will establish application-oriented majors under the guidance of Guizhou DOE in the short term. In the mid to long term, Guizhou will accelerate the establishment and development of *application-oriented* colleges targeting secondary TVET graduates.

In addition, a TVET framework has been developed for agriculture, farmers, and rural areas to seek a harmonious and rural-urban integrated TVET, though limited information is publicly available and it is unclear to what extent this framework has been operationalized.[14] Finally, the PRC is also exploring experiences and systems in neighbouring countries including Singapore.

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[13] *Developments and Prospects for TVET and Related Regional Cooperation with Southeast Asia in the PRC, Guangxi, and Baise*, Liu, revised on March 2014

[14] UNESCO (2012)

As a first step towards developing a MLT system, MOE revised the *Specialisation Catalogue* for secondary TVET schools in 2012[15]. The revised catalogue defines 19 specializations and 321 majors, and provides possible options on how these specialisations and majors in secondary TVET can be linked to 1,185 occupations, 720 qualifications, and 554 further education directions in higher level TVET or academic-track undergraduate education. While restricted to secondary-level TVET, the revised catalogue depicts connections across three dimensions, as elaborated below: (i) across qualifications, (ii) across institutions, and (iii) across occupations. An example is illustrated in Table 3.1 below.

Table 3.1: An Example of Connections across the Three Dimensions

Specialization	Major	Skills	Associated Occupations	Certificates	Future Study Directions
Agriculture	Agricultural production techniques	Agricultural cultivation Pest control	Agronomic worker Crop Protection worker Agricultural Experiment worker	Agronomic worker Crop Protection worker	Higher TVET: Agricultural Techniques undergraduate: Agricultural Scientist & Engineer

Source: PRC MOE policy note

MOHRSS has also undertaken work to upgrade the categorisation of occupations and related standards[16], as well as promoting "dual certificates" for programs which may be offered at both academic-track and TVET institutions and equip graduates in either track with both theory and practice and provide them with both an academic-track qualification plus a vocational certificate. Such models are currently being pilot tested in many areas, such as Tianjin and Beijing. More detailed discussion regarding the envisioned MLT system for both the PRC and one based on BU and associate schools follows.

2) TVET Applicable Institutions

An announcement was made by Premier Mr Li Keqiang in February 2014, where he declared the national government's requirements and support in guiding universities' transition to become more demand driven and focused on industry's requirements for skilled technicians, technologists and managers. This coincided with the issuing of *Guidelines on Local Governments Administrative Universities' Transition Development* drafted by the Ministry of Education (not yet formally adopted as policy) in March 2014. A further announcement followed from the National State Council in April 2014 on the plans for 600 academic universities to become *TVET applicable* institutions. This is highly significant for the ADB Guangxi Baise TVET Development project, given that 19 of the 600 universities expected to make the transition, including Baise University, are in Guangxi province. Several of the key points from the MoE guidelines (cited above) include[17]:

[15] http://www.moe.gov.cn/publicfiles/business/htmlfiles/moe/cmsmedia/document/2010/6/doc95222.pdf

[16] As of November 2013, the PRC classifies 1,071 occupations.

http:// www.cettic.gov.cn/zyjnjd/zyjnbz/2013-12/03/content_433733.htm

[17] English translation

- *To produce more technical skilled people to better serve industrial transformation and upgrading through **industries and education integrated collaboration** as well as university enterprises cooperation;*

- *To build up demonstration transition universities: encouraging more collaboration between industries and education: **more cooperation between TVET, higher education and further (adult) education**;*

- *To upgrade the employment quality of the piloting transition universities: more demand driven curriculum will be developed to upgrade the undergraduates' technical skills and entrepreneurship. **Employment rate to achieve is above 90% and 80% will be matching their majors.** Graduates' salary will be more than those from universities;*

- *To initially shape the pathways of skills development: to build up pathways in local regional TVET with leadership from transition universities, **facilitating pathways between applied technical universities and VCs & SVSs** and providing more opportunities for both SVSs and VCs students in terms of further studies and their careers, thus shaping the local regional modern TVET system.*

- *To develop **an entrepreneurship education strategy** …. to equip students with more entrepreneurship awareness and skills. To develop entrepreneurship education trainers in terms of strengthening the team in the universities as well as inviting part-time trainers from industries. To establish entrepreneurship bases and joint funds with enterprises, providing comprehensive services for both students' and teachers' practice, innovation and entrepreneurship as well as science and technology incubation. To focus more on small business entrepreneurship and allow students' being released to do small business through providing guidance and training.*

These two recent draft policy statements (1 and 2 above) underline the importance now being placed in the PRC on **the development of a TVET system that is integrated between and within levels**: includes linkages of learning outcomes in modular and competency based curriculum: is responsive to industry's demands for knowledge and skills in high priority areas; and, is focused on providing more opportunities for students graduating from the TVET system (market responsiveness).

3.4 Sector Performance of TVET at the national (PRC) level

Seven ADB reports (listed below) have been analysed to determine the main features and issues related to the performance nationally of the TVET sector in the PRC. Although the reports cover a six year period (2007 – 2013), include analyses of three provinces and have different purposes for reporting, it is evident that there are common constraints and challenges (to a greater or lesser extent) both nationally and in the provinces (including Guangxi Province). The reports have different purposes in that some are reviews of TVET (primarily at the provincial level): some are concerned with project planning: and, some are reporting on discrete and smaller scale project outcomes (e.g. the Hunan 2012 *Labour market and skills mapping report*). However there are common themes evident in the reports.

References

Guandong

- *Study of the development of vocational education in Guandong*, December 2007, ADB Project No. 40047

Hunan

- *Hunan TVET development situation and the counter-measure study*, October 2008, ADB Project No. 40047
- *TVET sector assessment: Hunan Province*, April 2012, ADB Project TA – 7978
- *Labour market analysis and skills mapping report: Hunan TVET Demonstration project, September 2012,* ADB Project TA – 7978 (PRC)
- *Hunan TVET and Training Demonstration Project,* June 2013, ADB Project No. 45511

Shanxi

- *Shanxi's development strategy for TVET*, May 2010, ADB Project No. 40644
- *Shanxi TVET and Training Development Project* (Concept Paper), May 2013, ADB Project No. 47029

Table 3.4 summarises the main economic and social factors impacting on the demand for TVET in the PRC. The information is derived from the seven ADB reports and provides further comments on the sector performance of TVET in the PRC.

Table 3.4: Situational analysis of the economic and social factors impacting on the demand for TVET in the PRC	
Situational factor	**Rationale and supporting information regarding impact on TVET**
1) Demand on TVET owing to the overall economic and social development needs of the nation (and provinces)	• Shortage of skilled workers in priority industry sectors and jobs; • Need to accelerate the development of TVET to provide skilled workers for new industries; • Pressure on existing infrastructure accentuating the need to provide more facilities and equipment to allow more student access and enrolments to Secondary Technical Schools (SVS) and Vocational Colleges (VC); • Concomitant financial pressures experienced by TVET institutions: need for greater share of available finances to be directed to TVET; • Requirement for greater diversity of financial sources.
2) Demand on TVET because of changes in agriculture	• The value of agriculture in GDP terms has decreased. Between 1990 and 2010, the relative contribution of agriculture dropped from 27% of GDP to just 10% (*World Bank national accounts data*); • Agricultural structure has changed from subsistence farming to cash crop production that is requiring new skills e.g. fruits, floriculture, aquaculture, poultry breeding; • Many surplus unskilled agricultural labourers are migrating to urban centres: lack of places or suitable courses for re-skilling or up-skilling these people; • Difficulties absorbing low skilled people into rapidly expanding manufacturing and service industries; • Many people with low levels of initial education and training: unable to meet demands of new industries' entry and ongoing learning requirements; • Rural re-training programs hampered by lack of infrastructure in rural/remote areas: unequal access to training as a result
3) Demand on TVET owing to structural upgrading of manufacturing industries	• The planned spread of manufacturing industries into inland areas (e.g. Shanxi, Guandong and Hunan provinces) has created more need for TVET in these areas – a shift from the previous focus on the coastal areas; • Requirement for both preliminary and ongoing training to facilitate industry transfers
4) Demand on TVET owing to development and expansion of service industries	• Rapid added value of service industries has created new types of work requiring re-training for employees in traditional industries (e.g. changes in the Logistics sector; • Different and higher level skill requirements (e.g. technical, technological, managerial, customer focus skills) • Impact on school leavers to have the new and higher level skills required: requires course changes and

	different (and non-traditional) skills to be developed in TVET: this also emphasises the need for linkages between school, college and university level courses
5) Acceptability of TVET by society	• China's long tradition of scholarship has meant a preference by society for a general academic education rather than TVET: this view has been supported by pay scales and the social acceptability of various occupations. However, this is changing, as VC graduates are gaining more employment and receiving higher starting salaries than university graduates[18]; • Preference by enterprises for academic records of graduates rather than specific technical skill sets: this has a deleterious effect on student choice and gives a marginal position to TVET; • The translation of higher levels of training into a better-paid job is often difficult to achieve; • The high cost of TVET means many poor parents prefer their children to do paid work rather than to attend school/college: the low rate of acceptance of TVET by rural labourers is mainly related to cost (value for money), as well as access and social acceptance reasons: the resulting low skills of many rural communities has restricted industrial and economic development of these regions
6) The roles of different levels of government in the PRC: National TVET policy formulation exists, but implementation can be variable and disconnected at the provincial level	• TVET policy setting occurs at the national level in the PRC. While provinces, local authorities and individual institutions are expected to comply with and implement national TVET policy (as part of the Five Year Plans) this is variable across the provinces. The variability is due to a number of factors including: I. The available funding allocated to TVET at the provincial and local levels. Until recently, the national government provided the policy but not the funding for TVET – this was left to the provinces. The national government now funds social development programs and provides capital grants (for infrastructure and equipment) to the provinces for the expansion of TVET, but recurrent costs are still the responsibility of the provinces and local authorities. This creates variability in provision of TVET; II. The priority the province places upon TVET as an important component of the education and training system; III. The effects of economic and social reforms are variable at the provincial level. For example, the emphasis on restructuring of the coal industry and the expansion of manufacturing industries to inland provinces has led to the increased migration of workers (mainly unskilled rural workers) seeking new skills for employment: TVET is therefore viewed as more of a priority in some provinces than others;

[18] Reuters article, *China taps tech training to tackle labor market mismatch,* Beijing, 7 June 2014

7) Limited understanding of the importance of TVET by local authorities, enterprises and the broader public	• While there is evidence of strong national and provincial support for TVET, that does not always translate into implementation because of local government misconceptions or an active disregard for its urgent development; • Large enterprises have more capacity and are also more inclined to provide staff training and up-skilling programs for employees; • There are misconceptions about the role of TVET: enterprises have shown a preference for people with academic backgrounds rather than for workers with TVET skills and knowledge, constraining TVET development, acceptance and relevance: this is changing
8) The need for supportive, relevant and flexible course structures to increase access to TVET	• In spite of the perceived poor image and status of TVET, there is a growing recognition of the importance of the new high demand skills required for new types of enterprises; • The importance of short courses that are linked to learning pathways is required to both meet demand and also to provide ongoing skill development and career opportunities; • The needs of students, as clients, suggests the development and proliferation of free, or subsidised, or grant-in-aid short courses that focus on high demand skills in high demand sectors and jobs; • Linkage of courses (including short courses) is required, to qualifications that are recognised, particularly by employers, as having value in addressing high skill needs; • The recurrent costs of operating VCs are often passed on to students, restricting access and motivation to undertake TVET.

3.5 Major challenges facing the development and expansion of TVET in the PRC at the national level

Given the significant economic and social factors impacting on the demand for TVET, the PRC faces major challenges in the reform of the TVET system. A summary of these challenges follow:

- ***The historical provision of two main forms of TVET***

In spite of the attempts to consolidate the TVET system there are still separate mandates and management responsibilities primarily centred on provision by either MoE or MHRSS. This has led to a lack of coordination and management issues that is evident in the development and delivery of courses, certification arrangements and funding mechanisms. The entry of universities into TVET as *TVET applicable* institutions and the development of MLT systems challenge the separate arrangements. It will be important to provide a more streamlined and cohesive TVET system if the full value of these reforms is to be realised.

- ***An imbalance in supply and demand of different levels of workers***

This has created a paradox of a current oversupply of unskilled workers (especially unemployed rural workers) but an undersupply to meet demand for managers, technologists and medium to high level technicians and skilled workers in priority sectors. This underlines the need for good labour market information which is then shared with all stakeholders, including the TVET system and used in the medium and longer term by the TVET and higher education system to meet the demand for more and different knowledge and skills. Regular and accurate labour market information is often lacking and a coordinated system is not in place to provide information on high demand skills in the short to medium terms as well as in priority sectors;

The requirement for high demand skills underlines flexibility in course duration as well as curriculum content and planning for re-training and ongoing professional development of teachers to ensure that supply from the education and training system meets demand.

- ***Low teaching quality and relevance***

Until recently there was no requirement for pre-service training to become a TVET teacher. There is now a requirement for teachers entering TVET (at all levels) to undertake a short course of instruction, culminating in an examination that provides a teaching certificate (a licence to teach). However, there is no requirement to do any supervised teaching practice in a classroom or workshop for any period of time as part of the initial teaching certification requirements. This means that many teachers enter TVET with no formal teaching experience and a very limited preparation.

China compares well with many other countries in terms of TVET teachers/instructors' **levels of qualifications.** However, the relevance of the qualifications and the accompanying experience or the application of knowledge and skills in industry is a different story for many teachers.

The change to TVET applicable universities has particularly highlighted many teachers' lack of the necessary teaching skills and their inadequate preparation to teach TVET courses that are (or should be) based more on competency based methods than formal lectures and textbook-driven courses. The feedback provided by the Baise Teacher Survey in Section 5.5.1 and in more detail in *Appendix Two* reveals the concerns and needs expressed by teachers for more training and professional development in teaching methods that will engage their students and provide the skills development that is needed by industry.

- ***Funding support from the national government***

Until recently, limited funds have been provided from national government to support both the capital investment in TVET as well as to manage recurrent budgets. This situation is changing, with government providing more funds for capital works, for demonstration schools and for specific upgrading programs (e.g. national curriculum templates for SVS and VC). However TVET is still underfunded in comparison to other education sectors. In most countries the TVET sector receives 1.5.to 2 times as much funding as general education because of the need for more infrastructure, equipment and consumables. The lack of private investment in TVET has also been an issue related to underfunding in the PRC. Given the demands being placed on the TVET system, the funding issue remains a major challenge for all levels of government in the PRC.

- ***Limited understanding and appreciation of the important role of TVET***

There is a need for improved stakeholder knowledge of the importance of TVET as a tool for economic and social transformation: this includes improving understanding by government (especially at the local level), industry and the broader public. There are emerging success stories at individual and institutional levels that need to be effectively communicated.

- ***Migrant workers***

Large numbers of rural migrant workers require increased access to skills training that leads to meaningful employment or further study opportunities. Migrant worker training is mainly based on individual government department's subsidy schemes, with different training standards, relevance of content and quality, and differences in the levels of subsidies. There are also issues of ownership and accountability for the training provision and quality which makes improvements difficult to achieve. Linking this training to other institutional learning will provide both individual and broader economic benefits.

- ***Qualification and certification system***

The current qualification and certification system has inherent problems that have been identified previously in Table 3.4 e.g. lack of recognition of some qualifications by employers: the need for students to obtain dual certificates. The current system is also very expensive for students and has created equity issues, especially for rural and poor students.

A national skills' testing system exists for vocational qualifications under the MOHRSS with open access. About 80% of applicants pass the occupational examinations. Student

repetition and dropout are relatively low, especially at college level. Completion and graduation rates are correspondingly high. While access to skills assessment is generally good, it is primarily funded by student fees. The planned changes to a competency-based system provide an opportunity to revise the system to more readily meet the requirements of a modern TVET system.

- ***Industry involvement in education***

Where enterprises are involved in TVET it is mostly in activities such as:

- the development of competency (occupational) standards at the national level (particularly through the MHRSS);
- developing curricula and course content at the provincial and institutional levels. This is well done in some industry sectors in some institutions, but industry are not integrally involved in most cases ; and
- providing training places for internships for vocational institutions. There is a strong commitment to workplace training. Student internships in enterprises are an integral part of training programs, lasting usually from one semester to one year, and are increasingly important for teachers as well.

Apart from standards development, enterprises have little involvement in TVET at the national level. Enterprise participation is low in most other areas of the TVET system's operation, including governance and management, financial and material contributions, the validation of qualifications and the assessment of students. Premier Li's June 22 2014 announcement cited earlier promotes a much greater role for industry in partnering with education in the future, which also includes greater involvement in the governance of TVET. Involvement in the governance and quality assurance of TVET at the institutional and provincial levels are two of the main areas where industry participation is needed. The following Table 3.5 provides a current assessment of the involvement of industry (enterprise) with TVET at the three administrative levels of TVET in the PRC.

Table 3.5: Enterprise-TVET cooperation: level and type of enterprise participation in TVET by function, activity and level of authority

Function	Activity	Level		
		National	**Provincial**	**Institutional**
1. **Governance, policy, analysis and planning**	**Participation in governing bodies**	Very Low	Very Low	Low/Medium-- Only industry-run schools (one third of total) have boards with enterprises member[19]
	Design of TVET policies	Low, but increasing. 46 Industry Steering	Low, but increasing. Provincial department consults employers	N/A

[19] One-third of SVSs and TVCs are run by industries.

		Committees provide occasional advice	about policies	
	Assessment of labor market needs	Low- Periodic studies by industry association	Low- periodic studies by Industry associations and MHRSSB	Medium - institutions assess labor market needs with employers
2. **Standards and curricula development**	Development of occupational (competency) standards	High - Industries participate regularly in standards development	[N/A]	N/A Standards not always applied at institutional level
	Participation in curricula development	N/A	High: more substantial roles needed in some QA aspects such as external reviews	High: more substantial roles needed in validation of courses and verification of assessment
3. **Training Delivery**	Enterprise use of TVET providers	N/A	N/A[20]	Low
	Provision of internships in enterprises	N/A	N/A	High – widespread use of "post-practice" work experience in enterprises
4. **Training finance & resources**	Financial contributions to TVET system or institutions	Very low	Very low	Low. A few enterprises contribute.
	Subsidizing training fees for individuals	Very low	Very low	Low. Some enterprises finance scholarships.
	Provision of used equipment or training materials	Low	Low	Low, Some enterprises contribute used equipment
5. **Trainee assessment**	Participation in assessments of trainees	Very low	Very low	Low
6. **Employment of graduates**	Assistance in guidance and counselling	N/A	N/A	Medium, e.g. Contract training and cooperative training

[20] Both national and provincial governments have issued policies to encourage enterprises to use SVS and TVC to train their workers.

7. **System assessment**	Feedback on quality and competences of graduates	Very low	Very low	Low. Some enterprises evaluate schools for their recruitment purposes but do not provide the information to schools.

Source: Framework adopted from Hunan TVET & Training Demonstration Project. A similar set of judgments were made for both Huan and Guangxi. N/A = not applicable, i.e. the activity is not carried out at that level

4.0 TVET in Guangxi Province

Many of the issues and challenges outlined above at the national level are also evident in TVET in Guangxi Province, which is included in the group of most disadvantaged provinces in the PRC. The province perceives the significance of TVET in two main dimensions[21]:

(i) as an accelerator for industrial transformation and upgrading, mainly for its advanced cities such as Nanning to attract advanced companies from both home and overseas; and,

(ii) as a major tool for poverty reduction (especially for the areas with large populations and adjacent to Guizhou or Yunnan, e.g. Baise).

To advance these twin aims, Guangxi has developed an overarching plan to reform its TVET system and released its *Five-Year TVET Action Plan* in March 2012. Key objectives of the Action Plan include: i) Establish Guangxi as a model for educating ethnic groups, and international education sector exchange and cooperation with ASEAN;
ii) Develop a modern TVET system, as a pilot for reform in TVET for ethnic groups, with a quality ranking among the top provinces in the PRC's western area, approaching the standards in developed areas;
iii) Prepare a pool of technicians that is sufficient in quantity, appropriately structured to meet high demand needs and of high quality; and iv) Improve the efficacy of TVET's role in creating employment and reducing poverty.

Guangxi Province has current involvement with another ADB project[22] through the Guangxi Nanning Vocational Education Development Project (2013 – 2018). The project will help improve the capacity and effectiveness of social services through TVET programs being delivered in two Nanning secondary vocational schools. The project is focused on pre-school education at Nanning No.4 SVS and on nursery, healthcare, including rural health care, at Nanning Health SVS. The project aims to create a cadre of qualified kindergarten teachers and nurses to address current skilled worker shortages and inadequate extension of social services. It is anticipated that there will be project sharing with the Baise project, particularly in the priority area of pre-school education.

[21] *Five-Year TVET Action Plan*, March 2012

[22] *Guangxi Nanning Vocational Education Development Project*, ADB Project No: 46047-001

4.1 Guanxi Province's involvement in creating TVET applicable universities

The Chinese Government made a strategic resolution in February 2014 that 600 traditionally academic universities across China were to be transformed into more market responsive *TVET applicable* universities. In a quick response, Guangxi selected eleven public academic universities and eight private universities (all founded since 1999) for inclusion in the program: Baise University is one of these 19 universities. Transformation in this context is defined as those provincially run, traditionally academic undergraduate universities being changed into a status that will provide a more science or TVET applicable education. The move is aimed at establishing a TVET educational system that will create learning pathways within and between SVS, VC and UG levels of TVET (with plans to eventually include post-graduate programs).

Of the nineteen selected universities in Guangxi, eight (42%) have previously been either upgraded into an undergraduate university from a former three-year teachers' college, or have had a strong background in teachers' education and training. Six (32%) are private colleges run within a university and five (26%) used to be a vocational colleges. These universities main training area has predominantly been teacher preparation and they lack a science and technological background. More than 160 000 students, with 8 600 full-time teachers will be involved in this transformation. Table 1 provides a profile of the 19 universities in terms of their students, teachers and major programs that are currently offered.

A report on the majors offered by each of the 19 universities and the numbers of dual qualified teachers in each university[23] reveal that BU, by comparison with most of the other universities, is extremely well-placed to make the transition given its involvement in the ADB funded Guangxi Baise TVET reform program. The report (attached as *Appendix Three*) indicates a potential favourable market share of students for BU in courses offered in Agriculture: Pre-School Education (across all 3 levels) and Bio-technology. It also indicates that BU is in the lower middle group in terms of numbers of teachers with dual qualifications. The reality is that many of the other universities will be making the transition to TVET applicable status without the same advantages of funding and technical support as BU has for the next 5 years. This provides many opportunities for BU to play a leading and central role in building TVET capacity to deliver economic and social benefits in Guangxi Province and regional areas.

5.0 TVET Development in Baise: context and background

5.1 Socio-economic context of Baise

Baise is economically underdeveloped with a large population of poor people, many of whom are from ethnic minority groups that compose a significant proportion of the Baise population (cited earlier). Baise is located in a rocky mountainous region, which accounts for over 95.5 percent of its total areas. All 12 counties in Baise are listed in China's *Plans for Development and Poverty-reduction* in the *rocky desertification regions* of Yunnan, Guangxi and Guizhou. With a high percentage of impoverished population, Baise is one of the 14 regions of the PRC included in poverty reduction programs. Approximately 87% of the population in Baise is from various ethnic groups. GDP in Baise in 2012 was 74.62 billion RMB Yuan ($US12.1 billion) with an average GDP of USD3 000 per capita. Total industrial

[23] Only 9 of the 19 universities listed the number of dual qualified teachers on their websites

output was 100 billion RMB Yuan (USD16.2 billion) providing an annual financial revenue of 9.81 billion RMB Yuan (USD 16 billion). Average annual net income for urban residents was 19 561 RMB Yuan per capita (USD3180) with rural workers earning 4 774 RMB Yuan (USD770). These indicators place Baise in the group of less developed regions in China.

5.2 Supply and demand gap in human resources for economic development Baise had a population of 4 million by the end of 2013, with 3.3 million people living in the rural farmlands. The labour force in the rural areas in Baise was 2.1 million, with 600 000 of these people seeking a job in other parts of Guangxi. A breakdown of this figure lists 410 000 working in the more developed area of Guangdong: 50 000 in working in Fujian Province: 44 000 in Hainan Province: 18 900 in Zhejiang Province: 10 500 in Shanghai and around 61 100 working in other parts of China. About 180 000 are immigrant workers, seeking a job inside Guangxi, while a million others remain in their rural homes. In 2012, Baise produced 9 347 full-time TVET graduates in total, with about 7 500 of them seeking employment within Guangxi Province. However, in the same period nearly 90 000 job vacancies existed in Baise, indicating a gap of 80 653 positions. The unfilled positions required mainly technician and technologist skills which are in short supply in Baise.[24]

5.3 Students in TVET in Baise

The TVET system in Baise is underdeveloped with a number of key issues and challenges related to students that require attention in the short term. The first challenge for TVET in Baise is encouraging more students to stay longer at school beyond junior high school and particularly for **more students to choose TVET as an option**. In 2012, 42 246 pupils graduated from primary schools in Baise, with 22 398 (53%) of them attending general high schools and 2 635 (6.2%) of them seeking a TVET education. 7 213 (17%) of these primary school graduates discontinued their education in either of these two schools[25]. This indicates both a very low continuation rate for secondary education and also a low TVET choice rate. There are a variety of reasons for these figures with cost, access and an perception of limited added value of further education (presumably both academic and TVET streams) being the main factors.

The problems with insufficient numbers of students are also evident in **inadequate or declining school enrolments.** Up until the commencement of 2013, some of the 22 SVS in Basie had failed to attract any full-time TVET students at all, with only 18 of these schools managing to enroll the minimum number of students. Some other schools fail to have a minimum total number of enrolled students to justify their registration. Again, the reasons for this are complex, but it has a lot to do with the quality and relevance of the school's programs.[26]

[24] HSSSB 2013 data: more detail is currently unavailable on the cited figures and profile of required skills

[25] Education Bureau interview

[26] Interviews with TVET stakeholders in Baise

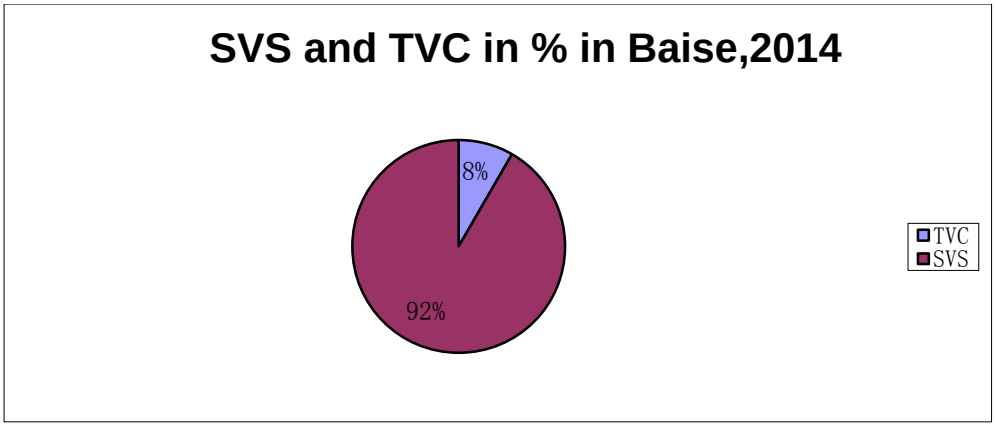
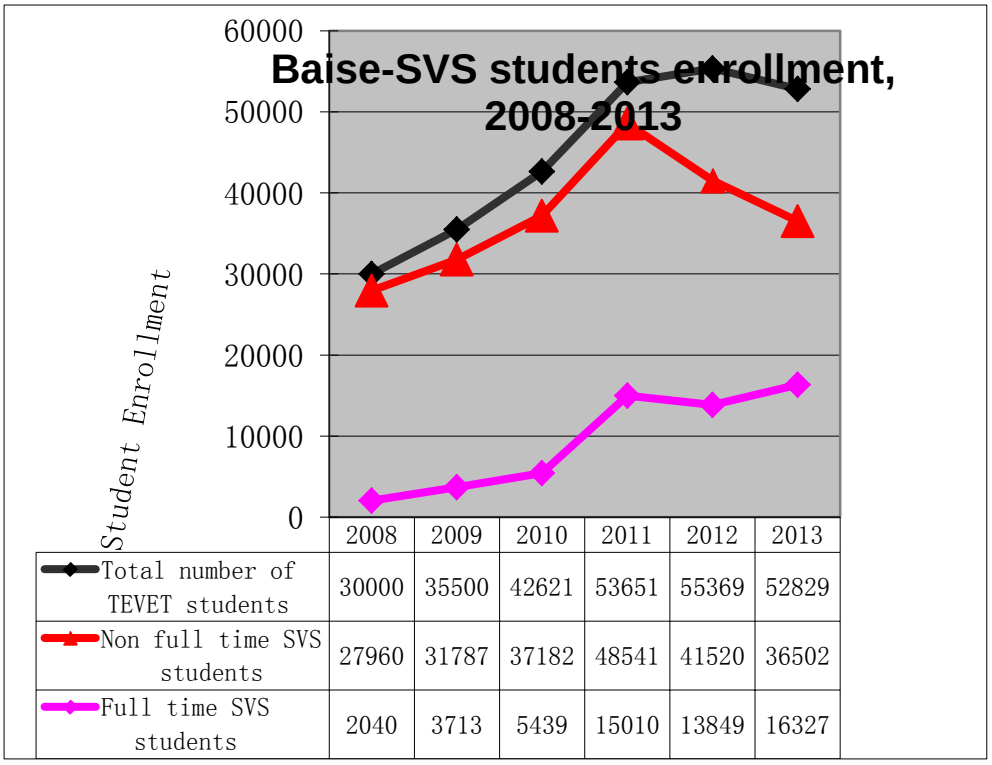


Table 5.3: Proportion of students enrolled in VC and SVS programs in Baise in 2014

As Table 5.3 indicates (by implication), many students do not continue their TVET courses after completing SVS level programs. The graph does disguise the fact that 5% of students from SVS are able to progress directly to BU, thus "bypassing" the VC level[27]. However, the graph still indicates a concern that many students are not choosing to take technicians' and lower end technologists' courses which is where the demand (i.e. job vacancies) is highest in the priority sector industries.

Table 5.4 indicates a decline in SVS student enrolments in Baise, particularly since the peak in 2012. The main reason for this is the decline in non-full time student enrolments.



	2008	2009	2010	2011	2012	2013
Total number of TEVET students	30000	35500	42621	53651	55369	52829
Non full time SVS students	27960	31787	37182	48541	41520	36502
Full time SVS students	2040	3713	5439	15010	13849	16327

Source: *Baise Yearbook of Statistics for Education,* 2014

[27] It is anticipated that this number will be increased to allow 15% of students to progress directly to undergraduate courses

Table 5.4: SVS student enrolments in Baise 2008 - 2013

Full-time SVS students in Baise were on a steady increase until 2011 when a slight drop occurred: the same situation applied for part-time students. Non full-time student numbers dropped sharply after a peak in 2011 of 48 541 students to 36 502 students in 2013 – a 25% decline in numbers. The main reason for this is assumed to be the drop in the number of migrant workers seeking training through subsidised courses run by SVSs in Baise. This warrants close monitoring given the continued focus on migrant workers as a supply stream for skills development in priority sectors.

5.4 Teachers in TVET in Baise

A major challenge for Baise is its **difficulty in recruiting skilled TVET teaching staff**. This is particularly the case in trying to attract teachers it needs from other parts of China. Baise is located in a less developed area in Guangxi, where economic development, as well as personal incomes is much lower than other areas – making it an unattractive proposition for teachers from other areas. As a result, Baise is left with little choice other than to develop its own local human resources. At present, while Baise has about 70% of its primary school graduates going to high schools, only about 20% of its high school graduates continue their education into a university or college. The Baise local government has set a minimum rate of 40% that VC graduates must go to a university, primarily to a TVET university[28]. This is a difficult policy to enforce without extra incentives and support.

Restricted by related government policies, Baise does not have sufficient teachers to fill the vacant job positions. Problems include a lack of specialised teachers for priority area courses, poor professional experience and thus insufficient dual qualification teachers, too few key *leadership* teachers and insufficient senior TVET teachers. These problems are evident in most TVET institutions in Baise. At Baise University, dually qualified teachers account for only 14.5% percent of all BU full-time teaching staff. These problems are further complicated by the fact that students fail to learn the professional skills they are supposed to learn even when willing to go to school. The underdevelopment of TVET and the other outlined contributing factors have led to experienced and well qualified teachers preferring other more developed areas, like Nanning.

5.4.1 BU Teachers' Survey

A survey, requesting information about teachers, curriculum and professional development opportunities was issued to BU staff as part of the information gathering for the sector assessment. This survey covered 110 teachers at BU, BVC or BVS levels, accounting for 21.5% of the total teaching staff. The data are supplemented in some instances by information from the BU baseline survey, field trip visits and small group and individual interviews. A sample of the survey results follows, with the main summary included as *Appendix Two*.

1. Background Information about BU teachers.

Table 5.6: Total teacher numbers

[28] Guangxi Education Department

	2012	2013	2014
Teacher numbers	427	507	512
Dual Qualification Holders			74 = 14.5%

As Table 5.5 indicates, in 2014 BU has a total number of 512 teachers (including 100 part time teachers from outside BU). Dual Qualification teachers at BU number 74 persons, accounting for 14.5% of the total teachers. The reason for this low number of dual qualified teachers is due primarily to BU being an academic university until the recent decision to become a TVET-applicable university. This has placed great pressure on the university to rapidly increase the number of dual qualified teachers given the different requirements of TVET instruction.

This is not an unusual situation. It is anticipated that many of the 600 universities that have been requested to make the transition to TVET applicable universities will have low numbers of dual qualified teachers (See *Appendix Three* for data on some of the 19 Guangxi universities). Having dual qualification status was not an important requirement while the university was operating as an academic university. However, given the changed nature of the curriculum (competency-based and industry driven) and the courses now being offered at different levels (SVS and VC courses are primarily TVET courses), this requires staff to have the necessary industry experience and awareness of industry standards.

	College Diploma	Bachelor's degree	Master's degree	PhD	Total
2012	3	205	210	9	427
2013	3	218	272	14	507
2014	3	218	277	14	512

Source: BU Teaching Affairs 2014

Table 5.7: Teachers' academic background at BU (includes BVC and BVS)

Table 5.7 illustrates the comparatively high levels of teacher qualifications at BU. In 2014, 3 teachers have a College Diploma, accounting for 0.6%: 218 people have a graduate (Bachelor's) background accounting for 42.6%: 277 teachers have Master's degrees (54.1%): and 14 teachers have a PhD (2.75%). These figures indicate a group of teachers who are very well-qualified in **academic** terms. However, qualifications are not always linked to current skill needs and there is a lack of relevant and recent industry experience in some priority sectors. This is evident in the low numbers of dual qualified teachers in many TVET institutions. For instance, at BU, only 14.5% of teachers have dual qualifications, indicating a serious shortfall in industry experience – an essential prerequisite for credible TVET teaching.

The teacher survey conducted at BU (details follow) provided a number of important issues for teacher upgrading. One important issue that was raised by teachers in survey responses and in interviews was the number of them who are teaching outside their major areas. Table 5.8 indicates the majors studied by teachers (2014 staff at BU) in their undergraduate programs.

	Economics	Law	Education	Arts	Science	Tech-nology	Manage-ment	Fine Arts	Total
2014	24	69	85	108	60	100	27	39	512

Source: BU Teaching Affairs, 2014 **Table 5.8: BU Teachers' Majors**

The predominance of teachers with Arts/Fine Arts backgrounds indicates difficulties in attracting more teachers with Science/Technology majors, which are supposed to be the main focuses for TVET applicable universities.

The work experience background of teachers in a relevant industry is an important element for ensuring that knowledge of workplace standards and processes are taught to students through coursework and practical sessions. Table 5.9 provides an analysis of the extent of BU teachers' industry backgrounds at the time of recruitment.

Table 5.9: Work background of BU teachers 2010 - 2014

	Background					
2010-2014	(%) Teachers hired with industrial experience	10	(%) Teachers hired directly from industries	0	(%) Teachers hired directly from University as graduates	90

BU Teachers' Survey (project administered), 2014

From 2010 to 2014, only 10% of all BU teachers recruited had some industrial work experience. BU recruited 90% of teachers directly from universities i.e. they were new graduates. No teachers who came directly from industries were employed by BU. This would appear to indicate the shortage of suitably qualified teachers who also have relevant industry experience.

- ***Professional development of teachers***

The advent of 600 new *TVET applicable* universities will require many teachers to gain new teaching skills **so that they can deliver TVET courses** that need a different learning approach i.e. competency-based instruction and assessment. This suggests a training/professional development program on a massive scale as providers try to meet industry demands for well-prepared graduates to enter the workforce. The current professional development program provided by BU for teaching staff is outlined as a summary in Table 5.10.

Table 5.10: Teacher In-service in 2013

Training Content	Training Hours (provided by BU staff)	Trainees number	Location
Lecture on applied science for teaching	4 hours	375	On BU campus
Seminar on improving teachers teaching	24	6	Nanning
Distance Teaching Training	Average 1,135 hours	200	On-line learning
Lecture on effective teaching and teaching arts	4	376	In BU campus
Lecture on university teachers lesson plans designs and preparation	4	376	On BU campus
Lecture on ideological education	4	376	On Campus
Lecture on classroom instruction	4	376	On campus
Training for entry college teachers	48	55	In BU

Source: BU Teaching Affairs

In terms of training content in Table 5.10:

- four training sessions were held on teaching skills and techniques with all teachers participating in them;
- one ideological training session was held with all teachers attending;
- 200 teachers attended course specific training;
- 55 new teachers attended an induction program. While all teachers must attend ideological training and 6 received special course related training in Nanning. All other training sessions were held on BU campus

General teaching skill training was provided for most teachers. However, the conclusion of the surveyed teachers was that most of the teaching hours and the training content had very little relevance to TVET, with more of a focus on other less important topics.

Training needs of teachers

A series of questions in the *BU Teachers' Survey* related to the needs of teachers for training. This was assessed asking a series of questions, such as:

Question 1: What are the key problems confronting you and your colleagues in your teaching?

Question 2: What content knowledge do you need the most?

Question 3: What is your comment on the professional development you received (from BU)?

Question 4: What are the most challenging issues you encounter in your daily teaching?

Question 5: What professional development do you find the most useful in your teaching?

Question 6: What do you think is the most urgent requirement if your teaching ability is to be further improved?

The full set of responses to the questions is provided in the summary report included as *Appendix Two*. However the following summary of recommendations (paraphrased) based on the teachers' responses, is revealing of their stated professional development needs:

5.4.2 Recommendations based on BU Teacher Survey responses regarding PD needs of BU teachers:

The following responses are a summary of the main points made by teachers in their responses to the previous 6 questions:

1. More training is needed on the rationale and operation (actual teaching) of applicable TVET: "I need to know what it is before I can teach it." There is also a need to change the present mindset and views among teachers about TVET.

2. Training is needed on competency-based teaching skills to improve teachers' instructional skills;

3. Training is needed for teachers to better understand the core courses in pilot majors;

4. Management training is needed for administrative staff to assist them to improve their skills in organization and coordination needed for the MLT system;

5. Arrangements should be made for teachers to have some structured industry experience (e.g. observations and job placements) in industry: this need includes both core and special skill areas.

What these responses indicate is that BU, in it is transition to a TVET applicable university, needs to spend considerable time, effort and funds in supporting teachers to make the changes required in curriculum delivery and pedagogy. The focus needs to be on developing the TVET building blocks and their application to the MLT system and also to the delivery of priority sector programs. The capacity building components of the TVET Reform project assume great importance in providing the training and support for the professional development that the teachers have declared they need.

Baise City (and County) has limited TVET options as it has only two VCs and one undergraduate university program (Baise University) as well as 22 secondary vocational schools. In 2013 Baise had 19 918 secondary vocational schools students, 400+ VC students and 8 000+ undergraduates[29]. The *Action Plan for Developing TVET Education in Baise* projects that by 2015 enrolled SVS students and enrolled VC students will increase to 58 000 and 8 000 respectively. The current gap between the present educational situation and the expected targets is a large one and the increased enrolments are unlikely to be achieved.

Many of the economic and social issues highlighted earlier in this section also apply to Baise and the provincial and local governments' use of TVET as a strategy to address them.

[29] MoE data

However, based on Baise's geographic position and specific context, Baise's *Five-Year TVET Action Plan* released in 2012 lists the additional specific targets:

- Consolidate municipal TVET resources to develop central models:
    - Set up Baise TVET Centre as a TVET model to undertake research and training;
    - Establish a vocational training park centred on Baise TVET Centre
- Provide core specialisations that are well-structured and contribute to the economic development and industrial upgrading of Baise:
    - Design specialisations serving location-based economic development within Guangxi/Baise: i) Targeting the industrial development of Youjiang District; non-ferrous metal melting and processing; digital control and applications; mould design and manufacturing; computer applications; machinery processing; electronic appliance application; automobile applications and maintenance. Ii) Targeting northern poor areas as markets for fruit and vegetables; providing services for tourism; paper pulping and papermaking; agricultural products processing; and iii) Targeting southern border areas (potential for regional cooperation) for ethnic handicrafts, tourism, planting and breeding, garden and architecture, marketing, and agricultural economics management;
    - Formulate 10 demonstrative secondary vocational majors that are recognized by Guangxi.
    - Develop Baise University as a regional training centre, and research centre on economic growth for ethnic groups, with a priority on tourism and management, financial management, engineering management, marketing, international economics and trade.
- Poverty reduction initiatives in the Baise plan include:
    - A project entitled "Alleviate Poverty by preparing the poor with TVET to find a job in advanced cities of Guangxi or abroad" and "relocating villagers"; so far, most of Baise's outreach programs are based on teaching Chinese languages abroad.
    - Education for girls is concerned with increasing the participation of girls from impoverished families or ethnic background in TVET, not only to equip them with employable skills, but also to foster values of education among girls to break the inter-generational effects of poverty;
    - Baichuan Inspiration class ("Baichuan Lizhi ban") created by Tiandong Vocational & Technical Institute (a demonstrative secondary TVET school of Guangxi) in collaboration with Guangdong Baichuan Charity Foundation, and Female Inspiration Class ("Jinguo Lizhi ban") created by Guangxi Youjiang Ethnic Business School, each year helped approximately 900 students from impoverished families to receive secondary TVET;

Rural-urban migration poses a major challenge for Baise in terms of improving the livelihoods of migrants and the balanced development of the rural and urban areas, which require a more diversified and dynamic TVET system.

5.5 The three institutional levels of the MLT system in Baise

5.5.1 Baise University: background and assessment of performance in preparation for a MLT system

Baise University (BU) was approved by the MoE (Guangxi Province) as a full-time integrated undergraduate institute for local vocational education. The University has two campuses:

Donghe (occupying 217 mu/0.145 km^2) and Chengbi (1698 mu/1.082 km^2) with a total area of 1,915 mu (1.277km^2). Its 150,000 m^2-dorm area can accommodate 13,600 students. It possesses 10 departments with 30 undergraduate (UG) specialties, 37 vocational college (VC) programs, 7 secondary vocational (SVS) specialties, which cover 8 disciplines such as Economics, Law, Education, Literature, Science, Engineering, Management Science, and Art. The MLT system linking the different levels of courses will provide a much more coherent, better connected and equitable system, with more opportunities for students to progress through TVET learning pathways.

Baise University used to be a normal college. In the last decade, it became a college to offer both a 3-year post-secondary associate degree program, *dazhuan* as in Chinese, and 4-year university degree program, *Benke* as in Chinese. During the period of the *Twelfth Five Year Plan*, Baise University has been making efforts to consolidate its status as a TVET applicable university with an emphasis on applying science and technology in the workplace. Its staff has started to develop a more regional focus for their courses, with a small entrée developed through providing language programs in Thailand. Much more is possible and this will be a future focus for BU through seeking further education and training links in GMS/ASEAN countries. BU has also placed an emphasis on building its capacity to graduate more skilled students for the *local* labour market.

BU has commenced curriculum reforms with the dual purpose of building its capacity to achieve higher education status as well as addressing the national goals for TVET reform. The university sees its future in offering education programs at higher TVET levels through the vehicle of the MLT system. BU also intends to define itself as a community college, serving the local community and neighboring GMS and ASEAN member countries. Baise University intends to open up access for students, allowing access from SVS to VC and giving access to its 4-year university program. The MLT system is also considering internal student transfers between majors and departments. These are key strategies to re-position and re-define BU's role in a transformed TVET system.

5.5.2 Baise Vocational College (BVC)

BVC is the pivotal level of the MLT system because it serves as the receival point for students entering post-secondary TVET; it provides extended training in TVET majors: it includes a significant amount of workplace training and experiential learning; and it is both an endpoint for students leaving for employment and a staging post for students seeking higher qualifications – primarily in undergraduate courses. BVC is subsumed within the BU campus which is both an advantage and a disadvantage. BVC programs need to have their own standing and to be presented as an attractive option for students wishing to become technicians and achieve the early training to become a technologist through further education. The main advantage for BVC is its inclusion in a MLT system that should allow students more options and access in both TVET and general education. The plans for more integration between courses and levels of TVET will enhance the importance of BVC in its pivotal role of preparing students with high demand and medium to high level skills.

In 2011, 2012 and 2013 BVC graduates achieved average higher levels of employment than in Guangxi Province and in the remainder of the PRC (see Table 6.2). Average starting level salaries were also equivalent to BU graduates (i.e. RMB 2000)[30]. Nevertheless, the analysis of BVC courses reveals difficulties in attracting students to some courses, many low demand

[30] BU data based on Mycos survey

courses and unsubscribed courses. The challenge for BVC in its pivotal role in the MLT system is to provide both excellent stand-alone high demand courses, as well as serving as an effective bridge between SVS and UG levels through learning pathways that enhance students' employment and career options.

5.5.3 Baise Vocational School (BVS) is an independent secondary vocational school registered by the Educational Department of Guangxi Zhuang Autonomous Region. It is sponsored by BU and administered by Baise Education Bureau. It is also registered as a vocational training institute by HRSSB and Baise Finance Bureau jointly. Relying on BU for teaching staff, BVS is seeking to have 7 secondary vocational specialties, including pre-school education, electromechanical technology applications, music, computer application, e-commerce, accounting, welding technology application. It currently offers only pre-school education and computer science. BVS delivers 14 adult education (migrant workers) training programs (short courses) including preliminary skills development for job positions as turners, welders, maintenance electricians, household appliances repairmen, chemical inspection workers, food inspection workers and computer network administrators. The school enrolls students from the 12 counties of Baise. BVS currently enrolls less than 400 students (this figure is disputed) and continues to have difficulty in attracting students and staff members to the school. The school has a number of sponsorship arrangements in place (e.g. Foxconn Group, Skyworth Group, Midea Group, Baise Human Resources Market and Guangzhou Human Resources Market) which are linked to finding employment for students.

5.6 The need to upgrade teachers' skills <u>at all levels</u> of the MLT system

One risk associated with a MLT system developed under the administration of a university is that the focus will be primarily on the undergraduate programs i.e. the traditional course offerings of the university. Most of the current teachers joined BU when it was an academic university. They had no expectations of the plans for the transition to a TVET applicable university. In fact, some teachers are clearly unhappy with the change of direction and the need to develop new skills and to teach at different levels of a TVET (rather than an academic) program.

Some BU teachers already teach at different levels of the MLT system. For instance, there is no teaching staff appointed to BVS: the BVS are all administration staff managing the adult education (migrant worker) program. All teaching at BVS is provided by current BU (academic) staff members or other part time teachers. There is a danger under this situation that the SVS level of the MLT system is marginalized or regarded as a tack-on to other levels. The VC level is currently undersubscribed with students, but if recruitment strategies are successful, more teachers will be required to teach within this level.

The SVS and VC levels of the MLT system, plus the early years of undergraduate courses (in particular) will require teachers who both understand and can use competency-based instruction and assessment methods **across levels.** It will also be important for teachers to understand what precedes and what follows their own inputs to courses. The central idea of linked learning outcomes driving a MLT system depends on teachers who can link course content across levels.

The BU Teacher Survey reveals teachers who want much more understanding and professional support to develop appropriate teaching methods and student support strategies in TVET applicable education and training. This support also needs to be provided within the context of an MLT system that promotes the idea of a seamless education across levels of TVET. This issue needs careful management as it is asking a lot of teachers to

acquire understanding of an MLT system requiring teaching at (or the awareness of) different levels: the competency-based approach which changes instructional and assessment practices: and the application of all of this to reorganized content in priority sector courses and programs.

5.7 Main project approach to the capacity building of teachers

There are a number of key strategies that are included in the project to manage the major changes signaled above and these are outlined in the Strategies Section, an Appendix of the PAM. However, it is worth reiterating that activities have been designed to support a staged approach to implementation. This suggests a carefully staged approach that focuses on different phases of the capacity building (professional development) program:

1) Develop the important TVET knowledge and skills required to maximise the use of a MLT system i.e. the levels, the linkages, learning pathways, improved access, etc.;
2) Demonstrate the MLT system in operation: the building blocks that are necessary for an effective and integrated TVET system to work: competency-based curriculum, instruction and assessment: school-industry partnerships: the staff's role in this;
3) The MLT system's application to the chosen priority sectors' majors and courses e.g. aluminium processing or pre-school education: the sequence of learning outcomes and the packaging of the content.

6.0 Analysis of BU, BVC and BVS Programs[31]

The three main levels of BU courses are analysed through the data gathering and analysis: i.e. Undergraduate (UG), Vocational College (VC) and Secondary Vocational School (SVS) courses.

6.1. BU undergraduate programs and students

BU currently offers 34 undergraduate programs in 8 Departments: Economics, Law, Education, Liberal Arts, Science, Technology, Management and Fine Arts, with a total enrolment of 8,054 students, with an average of 237 students in each program. The enrolment breakdown by departments and programs is indicated in Table 6.1:

Table 6.1: ***Undergraduate curriculum and student enrolment, including adult undergraduate education***

Departments	Matching Programs	Current students	
		2012	2013
Economics	International business and trade	267	261

[31] This analysis is based on the available BU data, the BU baseline survey; and site visits and interviews. A total of 110 BU teachers were surveyed, accounting for 21.5% of all BU teachers (including SVS, VC and undergraduate levels).

Law	Political and ideological education	179	284
Education	1. Humanity Education	53	140
	2.Pre-school Education	130	145
	3. Elementary School Education	136	216
	4. Physical Education (PE)	312	361
	5. P.E. Guidance and Management	101	113
Literature and arts	1. Chinese language and literature	484	581
	2. Chinese as a second language	169	175
	3. English language	487	497
	4. Thai language	101	135
Science	1. Maths and Applications	276	294
	2. Physics	109	115
	3. Chemistry	148	165
	4. Biology and Technology	203	269
Technology	1. Materials Modelling and Control Engineering	36	74
	2. Material Chemistry	82	134
	3. Metal material engineering	238	207
	4. Electrical Engineering and Automation	88	145
	5. E-information engineering	310	320
	6. Communication engineering	79	125
	7.Computer science and technology	380	404
	8. Internet engineering	0	83
	9.Chemical engineering and techniques	327	338
	10. food science and engineering	40	80
Management	1. Project management	649	687

	2. Project costing	0	107
	3. Marketing	199	201
	4.Accounting management	466	499
	5. Tourism management	303	284
Fine Arts	1. Music and performance	198	205
	2. Visual communication and designing	0	45
	3. Environmental design	0	48
	4. Product designs	397	317
Total		**6947**	**8054**

Source: BU data

BU has had no problem in enrolling enough students for all the listed programs, with 14 of them (41.2%) exceeding the average student numbers. These 14 programs are Project Management (687 students), Chinese language and Literature (581 students), Accounting management (499 students), English language (497 students), Computer science and Technology (404 students), Physical Education (317 students), Maths and Applications (294 students), Political and Ideological Education (284 students), Tourism (284 students), Biological Technology (269 students), International Business and Trade (261 students).

While these programs indicate strong market competitiveness by BU, it should be noted that these programs are also commonly offered in BU's counterparts in Guangxi. How to avoid an overlap of programs is a focal consideration if sustainable market edge is to be maintained in the process of capacity building.

6.1.2 BU undergraduate programs that supply graduates for the four Baise key industries

BU has tried to emphasise through its programs and majors that the development of a science and technology-based undergraduate education must be responsive to the changes in local economic development, as indicated in Table 6.2:

Table 6.2: BU undergraduate programs that match four high demand industries in Baise

The four focal industries	Matching Programs	Current students
Aluminium Processing	1. Metal Material Engineering	207
	2. Material Chemistry	134
	3. Chemical engineering and techniques	338
	4. Materials Modelling and Control Engineering	74

	5. Electrical Engineering and Automation	145
Agriculture	6. Biology and Technology	269
	7. food science and engineering	80
Tourism	8. Tourism management	284
	9. Music and performance in orientation of folklore culture and arts	205
	10. Product designs in orientation of folklore crafts design and development	317
	11. English language	497
	12. Thai language	135
	13. Chinese as a second language	175
Engineering Management	14. Marketing	201
	15. International business and trade	261
	16. Internet engineering	83
	17. Accounting management	499
Total		**3904**

Source: BU data

Analysis: Off all undergraduate programs offered in BU, 17 are responsive to the four high demand industries in Baise, accounting for 50% of all programs. Current student enrolments in these programs are 3,904, accounting for 48.5% of all BU undergraduates. This indicates that BU does fairly well in planning a curriculum and student enrolment that is responsive to local industry development.

6.1.3: Graduate employment

Table 6.3 provides a breakdown of BU graduates (Bachelor's level) employment rates, employment locations, the match between major study areas and their initial jobs and their average starting pay for over the past three years.

	Employ-ment rate	**% of employment in Guangxi**	**% of employment outside Guangxi**	**Major-job matching**	**Average starting pay**
2013	93.86%	79.29%	20.71%	49.80%	2000
2012	92.80%	80.80%	19.20%	48.50%	2000
2011	92.31%	85.88%	14.12%	45.56%	2000

Source: BU data

Table 6.3 BU: Undergraduate level graduate employment 2011-2013

As indicated in the data for the past three years, BU enjoys a stable and high level of graduate employment. The employment rate for 2013 was as high as 93.86% and almost 80 % of these graduates found their (initial) jobs in Guangxi. A 6% increase between 2011 and 2013 in graduates finding work outside of Guangxi warrants monitoring, although this may not be significant. However, of more concern is that lower than 50% of the employed students could match what they had learned through their major study area to their initial jobs. Based on this analysis, consideration needs to be given to the following:

- Programs need to be further readjusted that are more responsive to regional and local industries;
- Present programs need to have a better and clearer positioning with employers;
- Higher graduate employment quality needs to be addressed that will showcase BU's brand majors, quality majors and featured majors

Table 6.4: Graduate Employment data for BU, Guangxi and other parts of China for 2011-2013

Year	UG Employment			VC Employment			SVS Employment		
	BU	In Guangxi	In Other Parts of China	BU	In Guangxi	In Other Parts of China	BU	In Guangxi	In Other Parts of China
2011	92.31%	89.98%	90.8%	93.90%	89.98%	89.6%	96.7%	97.16%	96.71%
2012	92.80%	90%	91.5%	94.33%	92.5%	90.4%	94.3%	97%	96.85%
2013	93.86%	86.3%	91.8%	93.04%	91.5%	90.9%	95%	97.37%	96.81%

Sources: Various including Employment Reports on University Students (Class of 2013) in China: Report on the development and employment of Secondary Vocational Students in China (2013) and various newspaper reports

Table 6.4 reveals that BU graduates (at UG, VC and SVS levels) compare favourably with those in other Guangxi institutions as well as in other parts (provinces) of China in achieving their initial job placements. There is no statistical difference in any of the results. The unreliability of these results has been commented on in ADB reviews (e.g. Hunan, 2012), given that they often rely on self-reporting at the SVS and UG levels. What this does highlight is the importance of good student employment data and there are several activities planned for inclusion in the Baise project to address this e.g. tracer studies, industry surveys that contribute to an Employment information system for students.

6.2: Analysis of BVC's programs

6.2.1: Current BVC programs and students

At present, BVC offers 38 programs in 13 departments in Agriculture, Biology and Medicine, Materials and energy, Civil work, Manufacturing, E-information, Light textiles and food, Finance and accounting, Tourism and hospitality, Public administration, Culture and Education, Arts design and Media communications and Law. Student numbers in 2013 were 2 052 as shown in Table 6.5:

Table 6.5: Full time BVC programs and students

Departments	Matching Programs	Current students	
		2012	2013
Agriculture	Tea ceremony	0	0
Biology and medicine	1. Applied Chemical Engineering and technology	26	0
	2. Industrial analysis and testing	32	13
Materials and energy	Material engineering and technology	64	25
Civil work	1. Construction engineering and management	98	140
	2. Project costing	0	48
	3.Real estate and property management	0	18
Manufacturing	1. Modelling designs and production	11	10
	2. Electrical and Mechanical integration techniques	39	18
E-information	1. Computer application and technology	13	12
	2.Computer and network technology	0	0
	3. Computer and multi- media technology	0	0
	4. E-information engineering and technology	59	49
	5. Communication technology	26	0
Light textiles and food	Food nutrition and testing	40	19
Finance and	1. Insurance	23	49

accounting	2. Computerised accounting	273	254
	3. International business	54	42
	4. Investment promotion and management	0	0
	5. Procurement sources and management	0	0
Tourism and hospitality	1.Tourism and management	21	12
	1. Hotel service and management	0	19
Public administration,	1. Social work	0	0
	2.Housekeeping service and management	28	14
Culture and Education	1. Chinese language	181	231
	2. Applied English	0	0
	2. Office secretary	20	0
	3. Applied Vietnamese	14	0
	5. English and education	135	111
	6. Musical education	0	0
	7. Fine arts education	0	0
	8. PE Education	0	0
	9.Pre-school education	451	543
	10.Elementary school education (two year program)	0	100
Arts designing and media communications	1.General liberal arts education	285	243
	2. News editing and making	70	36
Law	Law secretary	72	46
Total		**2035**	**2052**

Source: BU data

Analysis: Excluding the 10 programs that have no current students, an average of 73 students is enrolled in VC programs, indicating a very small enrolment and raising viability issues.

Of the programs, the top 7 in terms of student enrolment are Pre-school education (543 students), Computerised accounting (254 students), General liberal arts education (243 students), Chinese language (231 students), Construction engineering and management (140 students), English and education (111 students) and Elementary school education (100 students). As was the case with BU's undergraduate programs, these 7 programs have a market edge in BU, but they are also the programs found in other VCs in Guangxi. Consideration needs to be given to avoiding repeated programs and to maintaining a market edge through more high demand (and different) courses.

Nine VC level programs have an enrolment lower than 20 students, accounting for 2.37 % of students. These programs are Industrial analysis and testing (13 students), Real estate and property management (18 students), Modelling designs and production (10 students), Electrical and Mechanical integration techniques (18 students), Computer application and technology (12 students), Food nutrition and testing (19), Tourism and management (12 students), Hotel service and management (19 students), Housekeeping service and management (14 students).

Ten programs have had no student enrolments in two consecutive years, accounting for 26.3% of the total programs. They are: Tea ceremony, Computer and network technology, Computer and multi-media technology, Investment promotion and management, Procurement sources and management, Social work, Applied English, Musical education, Fine arts education and Physical Education.

These undersubscribed VC courses indicate that BU should rationalize their program offerings to those that are more responsive to market needs. This requires better labour market information, current industry sector plans and forecasting (e.g. using signalling theory) of market trends as a basis for cancelling non- performing programs. Current well-subscribed programs that are leading to sustainable jobs need to be further strengthened.

6.2.2 Market responsiveness in the BVC programs

Table 6.6 shows how responsive the present BVC level programs are to local key industries.

Table 6.6: **BVC level programs that match four high demand industries in Baise**

The Four Base Industries in Baise	Matching TVC Programs	Current Students
Aluminium Processing	1. Material engineering and technology	25
	2. Industrial analysis and testing	13
	3. Modelling designs and production	10
Agriculture	1. Tea ceremony	No enrolment
	2. Food nutrition and testing	19

Tourism	1. Tourism and management	12
	2. Hotel service and management	19
Trade and Logistics	1. Investment promotion and management	No enrolment
	2. Procurement sources and management	No enrolment
	3. International business	42
	4. Insurance	49
Total		**189**

Source: BU data

Analysis: Eleven of the 38 BVC level programs are linked to and presumably providing skills required by the four base industries in Baise. These 11 programs only account for 28.9 % of the total BVC programs. The total student enrolment in the 11 programs is 189, accounting for only 9.2% of the students. There is a danger that the low student enrolments may lead to these programs being cut, in spite of their relevance to the current high skill demands of local industries. There is a major case for seeking industry support in promoting the programs that will lead to meeting demand. BVC also has an important marketing role in attracting students to enrol in these courses, based mainly on the promise of employment linked to students' majors' study on graduation.

6.2.3. BVC Graduate Employment: Table 6.7 shows employment for BVC graduates over the last three years:

	Employment Rate (%)	**(%) Employed in Guangxi**	**(%) Employed outside Guangxi**	**(%) Matching of Learning to Job**	**Average starting pay(RMB per month)**
2013	93.04%	97.33%	2.67%	60.55%	2000
2012	94.33%	93.78%	6.22%	62.15%	2000
2011	93.90%	95.68%	4.32%	55.55%	2000

Source: BU data

Table 6.7: BVC graduate employment, 2011-2012

Analysis: An average employment rate of 93.7% was achieved for BVC graduates over the last three years, with 90 % of these graduates locally employed in Guangxi. Almost 60 percent of these graduates matched their majors to their initial jobs, 1% higher than for

undergraduate students. Starting salaries are also at the same level as for undergraduates[32]. This indicates that BVC graduates are in demand from industry: a strong justification for BU to further develop its VC level of education.

6.3 Analysis of Baise Secondary Vocational School (BVS) programs

6.3.1. BVS Curriculum and its majors

Guangxi Department of Education released a document in 2013 entitled *Directive on Further Optimizing and Readjusting Current Curriculum among SVS in Guangxi*. Based on the minimum qualification requirements outlined in this document, only two BVS current programs meet these requirements. These two programs are Pre-school Education and Music. In 2014, Guangxi Department of Education released another document entitled *Directive on New Programs Offered in SVS in Guangxi*. In compliance with this Directive, BVS offered two more programs: Star-rated Hotel Operation and Management and Marketing.

At present, the BU owned BVS offers five secondary vocational programs that enrol a total of 321 students, as indicated in Table 6.8:

Table 6.8: BVS programs and Full time students

Department	Student enrolment			
	Admitted in 2011	**Admitted in 2012**	**Admitted in 2013**	**Current students in 2014**
1. Pre-school Education	121	93	84	298
2. Computer science	23			23
3. Music				No Enrolment
4. Star-rated Hotel Operation and Management				No Enrolment
4. Marketing				No Enrolment
Total				**321**

Source: BU data

Analysis:

BVS needs to increase its present enrolment to 1 200, the minimum qualification requirement for a SVS in China. The two reasons behind this are 1) BVS will justify its establishment by maintaining the minimum enrolment requirement, and BVS will provide a student reserve for future students in BU at both VC and UG levels.

[32] BU data

6.3.2 Market responsiveness in the BVS programs

Three of the programs for which BVS has received approval are responsive to the four base industries in Baise, but there are no enrolments at all in these programs, as noted in Table 6.9:

Table 6.9: BVS programs responsiveness to the four base industries in Baise

Industries	Matching Programs	Current Students in 2014
Aluminium Processing	No matches	
Agriculture	No matches	
Tourism	1. Star-rated Hotel Operation and Management	No Enrolments
	2. Music	No Enrolments
Trade and Logistics	Marketing	No Enrolments
Total		**0**

Source: BU data

Analysis:

There are a number of key factors why BVS is very weak in its programs and these have been discussed previously (e.g. teaching quality, poor facilities and equipment, inability to attract students). Curriculum development provides a major opportunity for BVS to attract students. Curriculum leading to courses that are responsive to local market needs should benefit BVS through increased student enrolments and its capacity to serve the local economy. It will also be important to use the curriculum development opportunities provided by the ADB project to build courses at the SVS level that link to both VC and undergraduate courses.

6.3.2 BVS Graduate Employment

Table 6.10 shows graduate employment from BVS over the past three years.

Table 6.10: BVS graduate employment 2011-2013

	Employ-ment Rate	Employed in Guangxi	Employed outside Guangxi	Matching of Major to Job	Average starting pay (RMB)
2013	95%	75%	25%	80%	1500
2012	94.3%	75.47%	24.53%	75%	1500

2011	96.7%	40.54%	59.46%	88%	1500

Source: BU data

Analysis:

An average rate of 95.3% has been achieved by BVS in its graduate employment over the last three years. Graduates have found their jobs within Guangxi at a rate of over 70% since 2012, with a major - job matching rate as high as 80%, a rate higher than both BVC and undergraduate students. This good graduate employment rate is heavily influenced by the BVS focus on a pre-school education major, where almost 100% of graduates will receive a job. However, it is a feature that BU should publicise in further developing its SVS program.

7.0 Analysis of BU Curriculum Development[33] and Instruction

BU has been engaged in exploring how to produce graduates from an *applied science and technology-based curriculum*. Up until 2014, this applied curriculum has been developed in 34 undergraduate majors. BU participants in this process include members of the BU Education Guidance Committee, the senior administrators (including the President, Deans, the Head of the Teaching sector), teachers and instructors, plus off-campus experts, including BU's contacts from industry associations, business and enterprises, senior managers, and experts from government. On occasions, students are also involved.

7.1 The current approach to curriculum development: Prior to decision making, investigations are made into related industries and business on their needs for job skills and requirements. Advice is sought from these employers, who are also asked to participate in debate and discussion on proposed programs

Findings: It is considered by BU staff that their application of a science based curriculum matches what is required of a TVET curriculum. However the BU survey reveals there is room for improvement, particularly in the integration of academic learning and hands-on training that is student-centred. BU still does not have sufficient partnerships or work-based training resources off campus for its students to apply the learning to actual jobs.

Analysis: While making an assessment of its curriculum, BU usually merely confines this to the requirements of academic learning and its application (recall) in examinations. The reviews often fail to take into account the requirements of specific occupational positions for knowledge and skills demonstration by students as part of assessment.

BU tries to learn and understand what knowledge and skills are really needed and required in industries before making any changes to its programs. However BU often fails to find a better link between its analysis and the required delivery of the programs, leading to a lack of graduate competitiveness in some of its programs.

7.2 How an applied science-based[34] curriculum is perceived by BU staff

[33] BU Teachers' Survey supplemented by BU data, questionnaires and interviews in March 2014

[34] BU's transition to a TVET applicable university prompted the development of "science-based curriculum"

Findings: 13 BU Departments were sampled in the survey, with one questionnaire randomly picked from these Departments as feedback. 12 teachers responded to how an applied science based undergraduate curriculum should be developed as follows:

- The curriculum should ensure both systematic academic learning and a featured application by the students;
- The curriculum must be application-focused;
- The curriculum design should feature more opportunities for applications by students;
- Train the students more on their employability;
- Emphasise more opportunities for students to have hands-on training;
- Class instruction should have more hours of field training;
- The curriculum is still limited in depth and width;
- The curriculum must be more responsive to market needs;
- Theory should be closely related to application so the students will have more time to actually use knowledge and skills rather than in mere academic learning.
- The curriculum needs to focus on training students' competence;
- Focus on skills training;
- The curriculum needs to be responsive to industry's needs with a focus on skills that will be learned through task-based modules;

Analysis: BU teachers realize how important an application-based curriculum is, but they seem to know little about competency-based curriculum. It appears that this is primarily because they have not had the professional development opportunities needed to acquire the skills they recognise as important in making the learning programs more relevant for students.

7.3. How BU teachers perceive classroom instruction in applying science-based curriculum

Findings: 13 BU Departments were sampled in the survey, with one questionnaire randomly picked from these Departments as feedback. 12 teachers responded to how classroom instruction for applied science-based curriculum should be conducted:

- It needs to be application-focused;
- A proper breakdown should be made between academic learning and practice, with the latter at dominance;
- Academic learning should be spontaneous with application;
- Classroom instruction needs to be diversified and varied instead of confined to mere classroom teaching. Teaching needs to focus on what students can do instead of mere (book) learning;
- More debates and discussions are needed in classroom teaching;
- Focus on application;
- Doing is more important than (passive) learning;
- Student-focused with the teacher as a guidance;
- Classroom teaching needs to be combined with experiments among students and more job placements and internship;
- Small group teaching and one-on-one teaching;
- Field training needs to have a large share of the teaching hours;

Analysis: Most of the teachers know more practical training is needed but lack the skills to achieve this.

7.4. How student assessment is perceived by teachers at BU

At BU, in common with other universities in China, students are assessed for their learning performance mainly by two forms of examinations: the 100 score-based exams on mandatory subjects call *Kaoshi* and the Fail-Pass-Excellent-based exams on other non-mandatory subjects called *Kaocha*. These main examinations use a variety of assessment methods, including closed book tests and open book tests where students can check (or not check) their textbooks for reference, pen and paper-based tests, computerized test, tests on the spot, essays and thesis, work design and display. The final test results are composed of a 30/70% breakdown, with a student's daily performance accounting for 30% and the test score accounting for 70 %. The daily performance is assessed by how a student completes home assignments or experiments, classroom discipline, roll calls, classroom debates and discussion, classroom notes taking, responses to teachers' questions, after class note taking and others. In addition, students are also assessed against industrial involvement that features assessment from both the involved industries where the students are having a job placement or internship by attending teachers. This latter assessment counts heavily for a student's overall assessment.

Findings: 13 BU Departments were sampled in the survey, with one questionnaire randomly picked from these Departments as feedback. 12 teachers responded to how curriculum assessment is perceived:

- Assessment should be hands-on and competence-based;
- Competence-based;
- Students can do it;
- Assessment needs to be focused on how a student can apply what they have learned;
- Assessment focused on skills;
- More assessment on how students can apply what they learn;
- Diversified ways for assessment;
- Application is more important than academic learning;
- Combine theory with practice;
- Assessment on practical application;
- Practical skills more important;
- Assessment on how learning is carried out

Analysis: Teachers in most cases assess their students on academic learning and application and skills, but they fail to do it in terms of occupational competence.

BU demonstrates a diversified form of performance assessment. However, competency-based assessment is not featured regularly as an important element of the assessment. The National occupational certificate accreditation is not duly applied as well at undergraduate level[35].

7.5. How BU has reformed its classrooms to include different instructional modes and methods

[35] The BU administration did not see any added value in the assessment improving employment opportunities of graduates

Findings: BU claims that its classroom instruction varies in both modes and methods, such as participative learning, situational learning, case studies, targeted-guided learning, discovery learning, role play learning and other methods can be found in the classrooms.

Analysis: While there is increasing emphasis on varied instructional practices to engage students in learning, there is a need for a competency-based approach to be central to these modes and methods.

7.6. Computerized Instruction

Findings in response to the question: *Where do you see in BU majors the application of computerized teaching resources like simulated teaching or learning online?* Respondents in most cases said almost all majors in BU are using multi-media as a teaching tool. Simulated teaching was reported in Chemical Engineering and Arts. Teaching software of various sorts is evident in most of the other majors, such as Engineering Management, Project Costing, Finance and Accounting, Marketing, Tourism Service and Management, Pre-school Education (limited to undergraduate and VC programs only), Elementary School Education(also limited to undergraduate and VC programs only), Computer Science and Technology. Computerized teaching resources in some majors include Simulated Chemical Technique Lab, Engineering CAD, Project Costing software, Accounting software, e-commerce software, tourism software, e-library, e-periodics, e-learning, Multi-media based Power Point, CD and others.

Analysis: BU is well-equipped with computer-based teaching and resources. This will be further enhanced by the new campus facilities and equipment.

7.7. On-line Learning and Resources

Findings: In response to the question: *What kind of learning can you do online and who developed these resources, or do you simply download them from other resources online?* Answers regarding online learning ranged from BU's internet courses that feature top quality courses, to various online study databases developed by commercial e-learning databanks and publishing houses in China, e.g. New Oriental, the Foreign Language learning Resources Databank, and others. In short, most teachers download or purchase resources online, and only a small part of them are developed by BU itself.

Analysis: Learning teaching resources available in BU are limited to internal use only. BU has not developed any TVET and training resources available and accessible by the community.

7.8 Curriculum development of linked courses in priority areas: the MLT system in action

To provide a more responsive system to industry's demand for particular skills and knowledge requires a TVET system to develop means for greater learner access (i.e. movement between levels, plus easier exit and re-entry procedures) and clear learning pathways for students to map their progress and careers. This means using elements such as modular curriculum, credit systems, RPL and clear learning outcomes to facilitate student progress through the different levels of learning.

One of the key features of an integrated MLT system is the use of curriculum development as the primary means of linking different levels of the system. This is achieved by developing a sequence of learning outcomes (based on competency standards) that are then used to

develop courses in majors at different levels of the MLT system i.e. SVS, VC and UG levels. The learning outcomes provide the *glue* that binds the levels of the MLT system together.

A major feature of the Baise project is the development (and linkage) of courses in 15 different majors in the seven (5 initial and 2 emerging) priority areas. The work will provide exemplars of courses and learning pathways that can then be used as the basis for further curriculum reform at BU. An overview of the planned course development in selected majors and agreed priority areas follows as Table 7.1

Table 7.1: BU TVET Project Activities at Different Levels

Industrial Sectors	**Matching Majors (Major Groups)**	**Levels**			**Remarks**
		Undergraduate	**VC**	**SVS**	
Aluminium Processing	Material Chemistry	**√**			
	Metal Material Engineering	**√**	**√**	**√**	
	Material Modelling & Control Engineering	√			
Pre-school Education	Pre-school	**√**	**√**	**√**	
Engineering Manage-ment	Engineering Management	**√**	**√**	**√**	
	Project Cost Estimates	**√**	**√**	**√**	
	Accounting and Financial Management	√	√		
Agriculture/ Bio-Technology, Food Engineering /Facility-based Agriculture	Bio Technology	√			
	Food Science and Engineering	√			
	Facility-based Agriculture and Engineering	√			
Design	Product Design	√	√		
	Environmental Design	√	√		
	Visual Communication Design	√	√		
	Garment and Costume Design	√	√		
Tourism and Hospitality	Tourism Management		√		Focus on VC

Logistics		√			Modular Course- further study needed

Source: Project team and BU agreement, May 2014

8.0 Quality Assurance System

Findings: An internal quality assurance system for teaching (IQAST) has been established at BU. Some measures developed to assure quality include:

- *BU Quality Standards and Assessment Methods for Various Teaching Phases;*
- *BU Measures to Check Routine Teaching*

Both sets of procedures were established under the leadership of the Office of Teaching Affairs. Full-time staff members are in a good position to monitor teaching quality. In addition, a teaching monitoring team was set up and teams of students provided feedback on teachers' teaching. Routine management is well performed where each teaching unit does self-checking, combined with a sampling check from top management.

Quality assurance is achieved in the following six ways through the following procedures ("ingredients"): Standards established, Special Executing Committee formed, Full-time staff appointed, Monitoring and Analysis of performance undertaken, Feedback available, and continued improvement sustained. BU management staff will occasionally sit in classes in a review role. Administrators at different levels also try to keep well-informed by going to the classrooms or by seeking teachers' opinions and suggestions at meetings. Revisions and improvement are made based on this feedback. Similar measures and steps are also found in BVS.

Analysis: The internal quality assurance arrangements that are in place in BU work well. However, there are other QA procedures that will assume more importance with the introduction of an MLT system, especially one that is using a competency based approach for the design and delivery of courses. For example, an internal and external verification system for teachers' observations of student performance, as the basis for the assessment system, needs QA policy and processes to support it. BU would also benefit from a more comprehensive qualifications validation process that involves industry in approving the justification, relevance, content and level of courses leading to qualifications.

9.0 Future directions in the economic development of Baise[36]

At present, Baise is still positioned in a preliminary or initial phase of industrialisation that relies heavily on a combination of national and provincial state investment as it tries to change itself from a traditional farming to an industrial region. Baise's multiple goals for industrial expansion include:

- building Baise into a green ecological Aluminium processing industrial base in China;

[36] Information drawn mainly from Baise's *12th Five Year Plan* and *Five Year TVET Action Plan 2012 -2016*

- metal material manufacturing and engineering management;
- an agricultural base featuring commercial as well as horticulture sub-tropical fruit and vegetables;
- a tourism destination featuring the history of the Communist Party of China; and
- as a hub for trade and logistics that extends into regional GMS areas

In spite of its envisioned goals, Baise at present still finds itself at a preliminary stage of development which is hampered by a lack of technicians and technologists for its key industries in Aluminium, agriculture, tourism and hospitality, logistics and border trades with other Southeast Asian countries.

9.1 Priority industries in the Baise region

Four main industries have been cited in national and local[37] (and ADB) reports as providing the greatest potential for providing economic and social benefits for the Baise region. A brief synopsis follows of the four industries plus comments on cross border trade that is linked particularly to tourism and logistics.

- **Agriculture**

China is making a major effort to move from its present subsistence based agriculture to one that is commercially based. In this context Baise is listed as one of China's pilot bases for agricultural production on an unprecedented scale. About 300 000 hectares of farmlands in the Tiandong and Tianyang Counties and Youjiang District (under Baise's jurisdiction) have been accredited as arable lands that are chemicals, pesticides, and pollution free and suitable for growing organic vegetables. These three areas are China's projected sites for provision of vegetables and fruits, primarily for export to the Northern provinces. So far, about 104,600 hectare of lands has been developed for vegetable production, which is expected to increase to 233,000 hectare by 2015.

However, limiting this development is the fact that Baise has an acute shortage of a skilled workforce in commercial agricultural production to assure that these vegetables are of top quality and properly harvested, stored and transported. Skill needs are particularly required in occupations related to food processing and food safety.

- **Aluminium Processing**

Baise is well-known for its aluminium resources, which are largely composed of *green ecological* aluminium. Aluminium production accounts for 50% of the total annual industrial outputs in Baise. It is anticipated that this "pillar" industry is likely to remain dominant in Baise's economy for the next two decades. Aluminium resources, however, are currently focused more in alumina rather than in electrolytic aluminium products that require a strong

[37] *Mid-term and Long-term Programs for Labor Force Development (2010-2020)*

processing capability. Baise is trying to change itself from a raw materials provider to a value-added producer by setting up industrial value chains and processing plants that are capable of producing sophisticated aluminium products, e.g. for the air industry.
Baise has encountered several major difficulties in achieving such a transformation with the first being the industry's inability to attract the essential aluminium processing expertise. Most experts are concentrated in research institutes a distance from Baise in eastern Shandong and Liaoning Provinces, or in neighbouring Guizhou Province or in other non-ferrous metal departments in Guangxi University. The crucial step in progressing aluminium processing industries will be to obtain support from these research institutes and universities and to convert academic research into commercial applications.
In addition, the workforce in the aluminium industry is shrinking in its demand for skilled employees. China Aluminium Corporation, with its Guangxi Branch stationed in Baise, had a staff of 6 400, with 5 200 workers in 2013. However during 2013, the Corporation recruited only 25 employees, had 300 employees retire and anticipates another 1 600 jobs will be cut in the future.

- **Tourism and Hospitality Services**

Tourism has the potential to become a major service industry focused on Baise. As a tourism destination, Baise can offer a diversified service, ranging from health and vacation tours, leisure tours, and other sightseeing tours. Baise considers that through boosting its tourism, downstream industries in restaurants, hotels, transportation, recreation, shopping will also grow creating more employment. Recently, Baise resumed its air route to Guangzhou in SE China, opened one route to Guilin, a world-renowned tourism destination in Guangxi, and is trying to open direct flights to Shanghai and Beijing. It is anticipated that the increased passengers' profile will be composed of 40% businessmen and 60% tourists, raising local consumption.

In its current *Five year plan 2012-2016* Baise intends to connect ten of its counties with expressways and to build its Jinxi Valley, Baise Rebellion Memorial as another tourist attraction, plus establishing more four star-rated hotels. Once achieved, these projects should significantly contribute to the economic development in Baise.

However, Baise is constrained in its efforts in Tourism through the lack of a skilled and stable labour force. The hospitality industry experiences high staff turnover problems (not unique to Baise). Efforts are required to both train and retain skilled workers in most aspects of the plan for an expanded hospitality and tourism industry in Baise.

- **Logistics**

Baise has a further potential "pillar" industry in Logistics which is currently poorly developed but will rapidly expand if other industries experience growth within the region. Logistics is

critical for the plans to expand the agriculture industry and for border trade, tourism and aluminium industries to become fully developed.

- **Cross-border Trade**

Baise County shares a 360.5 kilometre border with Vietnam. Baise also has three border ports in Pingmeng, Longbang and Yuexu that are integral for expanding cross-border trade and investment opportunities. While Baise lags slightly behind neighbouring Yunnan Province in border trade, it is geographically well-positioned to develop and greatly increase its share of this trade. This would embrace a variety of activities, including the opportunities for Baise to develop as an education and training hub. The need for TVET services in the region has been well-documented in GMS and ADB reports over the past five years[38].

In conclusion, the envisioned key industries in Baise are still in their preliminary stages of development and are not yet generating a strong demand for skills in the workforce. It is anticipated that this will change, particularly in the need for a supply of technicians, technologists and managers in the industries mentioned above. As stipulated in its *Mid-term and Long-term Programs for Labour Force Development (2010-2020)*, Baise is aiming to become an important centre in western Guangxi Province. This requires the development of a skilled labor force and a labor force reserve for Aluminium processing, agriculture (food processing and food safety) and modern service industries. According to the *Programs* report cited above, the total labor force will increase from the present 169 100 to 314 400 by 2016 with an annual net increase of 100 900. The TVET system in Baise needs to prepare for this future demand through gearing supply to meet the projected requirements.

9.2 The capacity of BU to provide high demand knowledge and skills for industry

BU currently offers a variety of specializations in economics, law, education, liberal arts, science, technology, management, fine arts that embrace 35 undergraduate programs and 36 vocational college programs. Of these programs, BU is stronger than its counterparts within Guangxi in languages and language application, BU's key programs. In addition, metal material engineering, tourism and hospitality management and biological technology are also strengths. BU was one of the first universities approved by Guangxi government as a Teachers Training base. BU is also a key base for educational research in Guangxi.

Currently BU has a major in Agriculture only at the undergraduate level but this can be expanded to other levels (SVS and VC). Many agricultural experiments are being carried out by institutes like China's subtropical plants research institute, Guangxi Agricultural Science Research Institute along the Youjiang Valley in Baise. As the base for providing vegetables and fruits for China's north (e.g. mangoes, litchi, tomato, eggplants and other chemical and

[38] For example, the *Guangxi TVET Reform Project* 2013

pesticide free produce) Baise desperately needs expertise and skilled labour in packaging of fresh vegetables for transportation, new agricultural produce food safety testing procedures, fruits and flowers. There is a need for management skills based on new and hi-tech industries, as well as expertise in aquaculture and pig-raising. Food safety experts are also in high demand. BU does not currently meet these demands for expertise in the identified areas.

BU has a sound foundation with a developing capacity for the training of the required labor force in priority sectors. Through the ADB-funded TVET project, based at BU, support is tangible for BU to further build capacity and to develop its featured programs. The following recommendations are provided, based on the analysis of future economic needs:

- BU needs to be strongly supported in its aim to become a TVET Teachers Training centre to help build the capacity of the teaching workforce in the Baise area (initially). This particularly applies to the preparation and ongoing professional development of TVET teachers. This will require approval of BU as an accredited centre for teacher training. It will also require agreements that facilitate funding to be used as operating capital by the proposed Centre. For example, the current training subsidies provided to TVET institutions could be directed or used by the Centre to support teacher upgrading programs.
- As part of its overall capacity building, BU needs targeted support in its current and future high demand programs in metal material engineering, tourism, logistics and promotion of border trade that are closely related to the expansion of the local economy; and
- Projects like Chinese language education in BU need to be given more support as a means of leveraging more regional cooperation opportunities.

More detailed coverage of the economic directions for Baise and the review of priority industry areas are provided as part of the *School-Industry Partnership* section of the project's *Draft Final Report.*

10.0 School Industry partnerships

A brief review of BU's school-industry partnerships is included, based on several questions in the BU Teachers' Survey that has featured in other parts of the sector assessment. The information has also been supplemented by several local site visits and interviews with BU staff and other stakeholders. Completed surveys were received from 110 teachers, accounting for 21.5% of all BU teachers.

10.1 University/industry partnerships: domestic partnerships

BU has adopted a wide range of approaches in an attempt to get more industry involvement in its programs. In summary this includes:

- Development of strategies to attract industries and enterprises in both the local Baise area and in other parts of China, particularly the more developed coastal areas, in an attempt to enhance school/industry cooperation. Delegations to these areas have been led by the BU President and other Department Heads with a focus on partnership development and graduate employment. BU's open-door policy for cooperation and partnership is also endorsed by its considerable efforts to impress potential business partners by welcoming and arranging visits to its campus by enterprises;

- Curriculum development involves industries. Attempts have been made by BU to involve industries in the process of developing and/or revising curriculum, teaching programs and plans. Recent examples (2013) were cited to demonstrate attempts by BU at industry involvement in curriculum;

- Administrators at different Department levels are given opportunities and encouragement to seek their own cooperation arrangements with enterprise that best suit their programs. One example is in the Department of Maths and Computer Communications where contacts were made and established with an IT company in Shenzhen in the coastal Guangdong Province for possible cooperation.

Analysis: BU realizes the importance of university/business partnership and has made great efforts in this aspect.

Recommendations:

- BU needs a better policy platform that it can use with stakeholders (including Baise government) to develop school/business partnerships;
- BU needs to promote common interests and mutual benefits for potential enterprise partners to encourage more cooperation in more activities (especially governance and quality assurance areas);
- More incentives are provided by BU for all Departments to establish links with enterprises;
- BU raises more awareness among its teachers and students on the need for and value of cooperation with enterprises.

10.2: Cooperation established by BU Departments (Majors)

While there has been considerable activity by BU leadership and individual Departmental Heads to engage industry in BU programs, there are still coordination issues that require attention. The following table (Table 10.1) lists the Departments (Majors) that have established links with enterprises and shows whether a Coordination Committee (or equivalent body) has been established, at the Departmental level.

Majors that have industrial involvement	Coordination Committee established

Communication Engineering	None
Tourism Service and Management	None
Electronics and Information Engineering	None
Project Costing	None
Insurance	None

Source: BU Teachers' Survey, March/April, 2014

Table 10.1: BU majors with Industry links: coordination arrangements

Analysis: BU has five majors that are involved with industries in curriculum development. However a coordinating committee or similar body is missing in all cases. The establishment of Leading Groups, proposed as activities in the ADB Project, include recommendations for representation of industry at the institutional, faculty and major levels. The current situation of limited (or no) coordination needs addressing to provide better and more consistent engagement of industry.

1.3: Present forms of cooperation

Current forms of cooperation between BU and enterprises include:

- Invitations to business representatives to deliver lectures and seminars on campus;
- providing space for businesses to display their facilities/equipment/software to provide information for students as prospective employees;
- providing students and teachers with opportunities for field training on campus, or in job placements or site observations;
- students' internships leading to recruitment of students who show excellent performance during their internship.

Analysis: A deeper form of cooperation is possible: especially in governance, quality assurance and sponsorship areas

1.4. Modes of Cooperation

Earlier in this sector assessment, a table (*Table 3.6*) was presented that outlined the types of industry and education engagement that are usually featured in TVET cooperative arrangements. The following survey indicates a fairly limited range of different types of cooperation, falling far short of the possible types of involvement listed in Table 3.6. While teachers may not be aware of the full extent of industry cooperation that is occurring, it is still important to provide more information to increase staff awareness and gain support for these arrangements. Table 10.2 provides teachers' views on the current modes of cooperation that exist with BU industry partners.

Modes	Order-placed training by industries with BU: Field training: off-campus activities: student job placements		
Signed Cooperative Agreements (number)	65	Estimation of the % of the agreements that work	50%
(Response to the Questionnaire) **Please list the most likely cooperation for BU**	Order-placed training, and Field training		

Source: BU Teachers' Survey, March/April, 2014

Table 10.2 Modes of cooperation between BU and industries

Analysis: More diversification of modes of cooperation need to be established and supported by policy and guidelines.

10.3 Cooperation between BU and International Counterparts

BU has made a small but promising start to developing international arrangements for the delivery of education and training programs. This receives much fuller coverage in the section on Regional Cooperation in the Draft Final Report. One question relating to regional cooperation was included in the Teacher Survey and the information is presented in Table 10.3.

International Partners	**Current:** Cooperation established with Thailand, where activities include student exchanges and visits and lectures by BU teachers in Thailand.
	Question: What specific measures do you conceive in terms of international cooperation? 1. Cooperation needs to be spread to more countries in both ASEAN and other more developed Western countries 2. Cooperation needs to be more diversified that will not limit itself to student exchanges, but should also include exchanges of ideas and cultural cooperation. 3. Better teaching facilities are needed.

Source: BU Teachers' Survey, March/April, 2014

Table 10.3: Teachers' views on BU's engagement in international cooperation activities

Analysis: BU has much more potential for international cooperation activities that require training, planning, capacity building and recognition of mutual benefits for both partners. As a preliminary activity for supporting regional cooperation activities, the project will provide training for a small management team to be engaged in developing regional (GMS/ASEAN) opportunities. There is also support for research into regional cooperation as part of the project.

10.4 Social TVET Training support

BU has a stated aim[39] to become a Community College for Baise, providing resources to support social training activities that also contribute to and support the economic restructuring that is occurring. TVET training at the different levels of the MLT system are particularly relevant to supporting the social needs of migrant workers, ex-army personnel and the broader community who have had widely different experiences with formal education. The training includes government subsidised schemes, fee paying courses and also free services which are part of BU's stated responsibility to the Baise community. A brief overview of the current situation is provided in Table 10.4.

Training level	**Training recipients**		Total Annual Training
	For Industries and Enterprises	For Other Trainees (migrant workers, ex-army, community)	
	0	0	0
Training at the Undergraduates level	For Industries and Enterprises	For Other Trainees	Total Annual Training
	0	0	0
Training at the VC level	For Industries and Enterprises	For Other Trainees	Total Annual Training
	0	0	0
Training at the SVS level	For Industries and Enterprises	For Other Trainees (migrant worker programs only)	Total Annual Training
		761	761

Source: BU Teachers' Survey, March/April, 2014

Table 10.4: Summary of Social TVET Training by BU in 2013

Analysis: BU has much more potential to deliver a variety of training (including government subsidized and fee paying courses as well as free community services) at different levels of the MLT system. Except for the training provided for migrant workers conducted by BVS, there is no other training occurring.[40] The current project places great store in linking the

[39] BU Strategic Plan, 2013

[40] Teachers may not be aware of the full range of training. However, it is also an issue if there is other training happening but staff members are not aware of it.

training provided for migrant workers to more formal courses and education structures, to enhance social training opportunities.

APPENDICES

1. MLT system

2. Baise Teachers Survey

3. Majors of the 19 designated TVET applicable universities in Baise

4. Analysis of BU programs

Appendix One: Multilevel TVET system: design, development and implementation

1.0 Introduction

The PRC aims to establish a world-class modern TVET system that is relevant, connective, and multi-dimensional[41]. Although agreement has not yet been reached on the precise definition of such a TVET system, there is strong consensus among PRC policy-makers that a key component of the new TVET system will be a well-structured and better-coordinated "multi-level TVET" (MLT) subsystem, which exhibits the following characteristics:

- *responds to the PRC's future economic and social development needs, as well as regional and international trends;*
- *caters for and promotes lifelong learning;*
- *provides learning pathways and fosters career development opportunities;*
- *blends vocational training and academic education; and*
- *articulates and "ladderises" levels of TVET.*

For the purposes of this document and the work to establish a MLT system in the Guangxi-Baise TVET reform project, this description above can be considered as **a working definition**.

Under the PRC's present TVET system, many parents and youth view TVET to be a dead end option, with no pathway to an academic degree. Moreover, even within the TVET system, programs at different levels are often disjointed and not of equivalent difficulty (in terms of the knowledge, skills and competence required for their completion). Curriculum and competencies targeted at different levels are not aligned and (for example) graduates of secondary vocational schools have very limited entry to vocational colleges or to university undergraduate programs[42].

Having an agreed model of *a Multilevel TVET (MLT) System* for the Guanxi-Baise project is important to creating common understanding of what this term means, especially in practice. Probably the best way to do this is to consider other international TVET systems and their approaches to creating a *multilevel TVET system*. It is also important to acknowledge that many TVET systems do not use this specific term. For example, *Qualifications Framework* is a much more common term[43]. Sometimes the term "mutual

[41] Policy statement by PRC Vice-Premier Liu Yandong to the Third International Congress on Technical and Vocational Education and Training in Shanghai on March 2012.

[42] Five per cent of students (maximum) are permitted to progress from an SVS to a n undergraduate university program. This is to be increased to 15% next year.

[43] It is estimated that approximately 120 countries have a NQF in place or in development

recognition framework" is referred to, but this applies more to agreements between different countries. A brief exploration of some examples of international practice follows.

MLT System: drawing from international practice

There are a number of ways of viewing a MLT system. The first thing to note about the Baise-Guangxi MLT is that it is established as a *formal* institutional-based TVET system rather than a non-formal[44] or informal[45] approach to learning. The focus is on student learning in a formal hierarchy of TVET institutions i.e. Secondary Vocational Schools (SVS), Vocational Colleges (VC) and Baise University's (BU) undergraduate program in TVET. While the system may (and should) embrace non-formal and informal learning, the MLT is formally based on institutional learning, with opportunities provided (usually) to practice skills in formally arranged workplace learning e.g. work experience programs and internships.

2.0 Using institutional levels to define a MLT

One way of defining the MLT is to focus on levels (e.g. SVS, VC and University) of education provided by training institutes. This describes a form of hierarchy from lower to higher levels. However, it is a very broad and rather limited way to describe what should actually happen both within and across the linked institutions. As *Figure* 1 indicates, the institutes provide the opportunity to link courses across institutes, but it provides no information on qualifications or course progression or *levels* within the institutes. The Migrant Worker short courses are different than the qualifications offered in the three institutes, but they are included to show that they could be linked i.e. completing a short course should allow access to further learning in one or more formal TVET institutes.

[44] Non-formal learning - any organised educational activity outside the established formal system

[45] Informal learning – the acquisition of attitudes, values, skills and knowledge from daily experience and the educational influences and resources in the environment

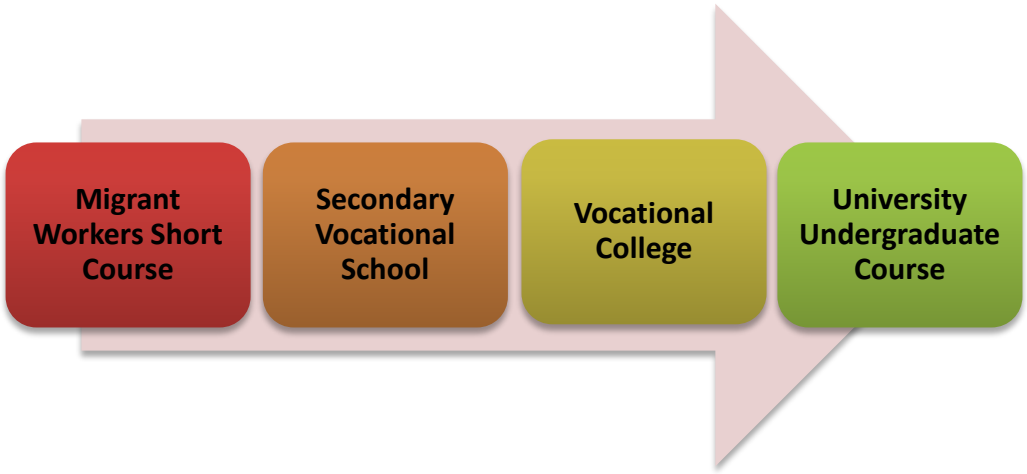


Figure 1: Institutional linkages in a TVET system

3.0 Using Occupational levels to define a MLT

Another possible way of defining a MLT is to use occupational levels e.g. artisan, craftsman, technician, technologist and manager – as required and defined by industry. The *International Standard Classification of Occupations (ISCO)*, developed by the International Labour Organisation (ILO) is a tool for organizing jobs (more than 600 of them) into a clearly defined set of (hierarchical) groups according to the tasks and duties undertaken in the job. Its main aims are to provide:

- a basis for the international reporting, comparison and exchange of statistical and administrative data about occupations;
- a model for the development of national and regional classifications of occupations; and
- a system that can be used directly in countries that have not developed their own national classifications.

An updated ISCO was adopted in December 2007 and is known as ISCO-08. Many countries have updated their national classification of occupations, either based on ISCO-08 or to improve alignment with the new international statistical standard. However, this system provides little assistance to understanding the different levels of qualifications within and across different departments in individual institutions and the learning links across institutions.

***4.0 Using Qualification levels to define a MLT: the development of a Qualifications Framework* (QF)**

A third way to define a Multilevel TVET system is to use a hierarchy of qualifications to define the complexity of knowledge, skills and competence that is required in learning at

different levels (often described in awards such as Certificates, Diplomas and Degrees). To understand the logic behind a Qualifications Framework (QF), it is important to understand what is meant by *levels* on the framework. This concept is demonstrated in *Figure One: The concept of levels.*

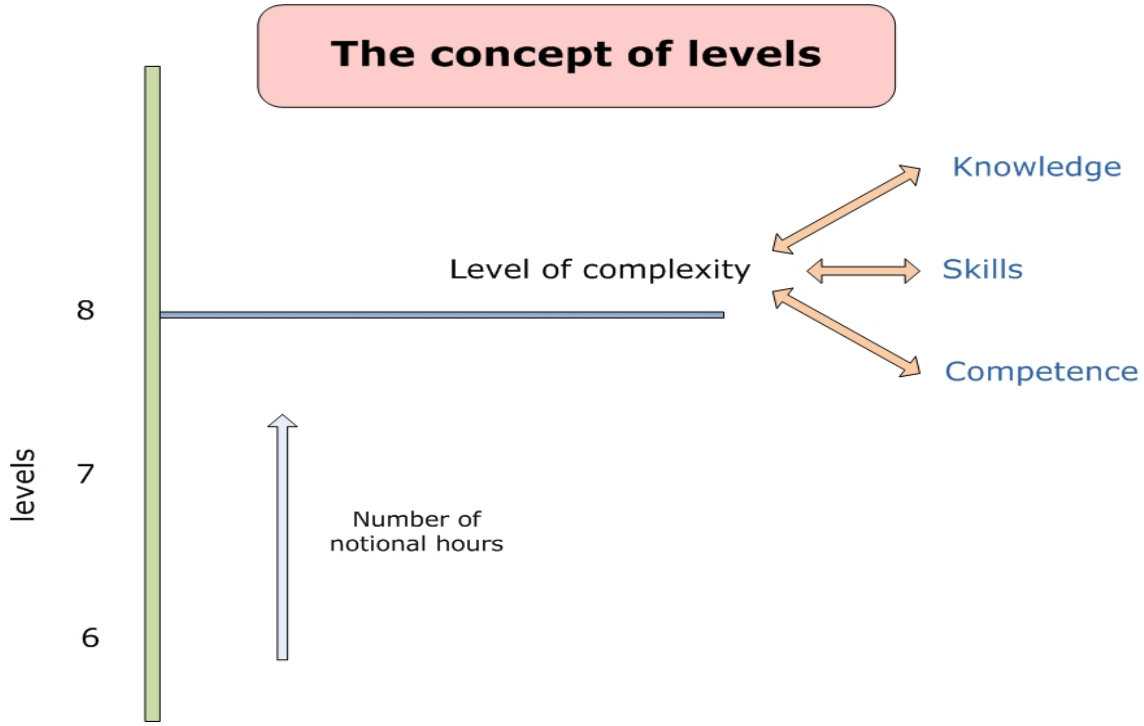


Figure Two: The concept of levels

What the diagram is suggesting is that learning is packaged into courses that require the acquisition of knowledge and skills and the demonstration of competence at increasingly more complex levels. This is usually determined by the amount of notional learning time[46] that results in levels of increasing complexity e.g. it takes more time to acquire a Bachelor of Tourism (usually 3-4 years) than a Certificate of Hospitality (usually 6-12 months). This is a simple concept, but an important one, for understanding a Qualifications Framework i.e. it is a series of levels of qualifications that contain increasingly complex knowledge and skills and the demonstration of competence in using that knowledge and skills.

Qualifications frameworks may take different forms, depending on the purpose for which they have been developed. There are three main types of QF:

- Qualifications frameworks that map only a single strand or sector of qualifications (e.g. TVET) at different levels;

[46] Notional learning time refers to the **total learning** that occurs in a course: not just the hours of classroom learning, but also the workshop time, private study, assignments, other practical sessions and informal learning.

- *Comprehensive* QFs that map qualifications from the school, TVET and higher education sectors onto the same framework; and
- *Regional* QFs that provide a reference point for a country to compare its own qualifications (i.e. at different levels) with a group of other countries.

Examples of each of these types of frameworks follow:

4.1 **A TVET Qualifications Framework**

Figure Three: Rwanda TVET Qualifications Framework

5 **1**	**TVET Foundation Level**
TVET Level	**Generic Qualification Title**
7	**Advanced Diploma**
6	**Diploma**
5	**Year 12 (Technical) School Qualification** **TVET Certificate III**
4	**TVET Certificate II**
3	**TVET Certificate I**
2	**TVET Basic Vocational Skills Level**

The Rwanda TVET QF was developed through coordination provided by the Workforce Development Authority (Ministry of Labour) and in consultation with the Ministry of Education and other major stakeholders – especially industry representatives. It includes many levels of TVET qualifications that will need to be "collapsed" (joined together) if combined with school and higher education sectors.

4.2 A comprehensive National Qualifications Framework e.g. the Australian Qualifications Framework (AQF)

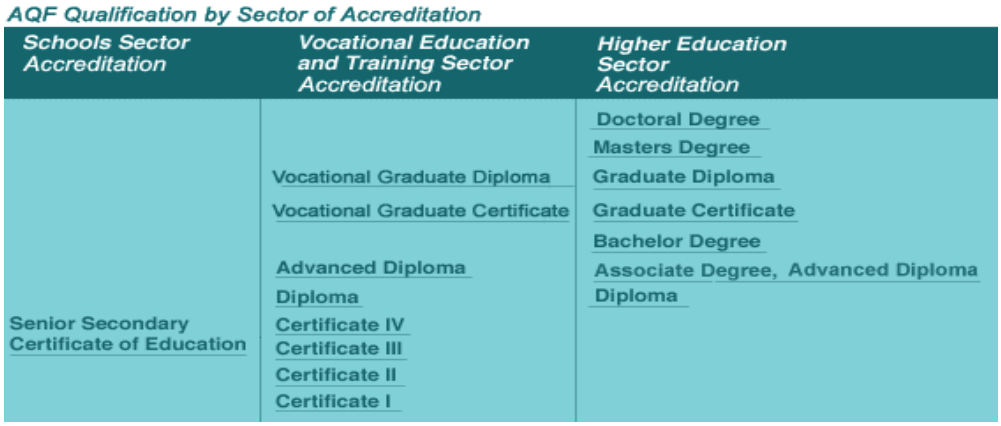


Figure Four: Australian Qualifications Framework (AQF)

The Australian QF has been revised in the past 5 years and now shows the qualifications and their relative values for the school, VET and Higher Education sectors – with separate accreditation provided by each sector. Articulation between the sectors is increasing and learning pathways have been developed to allow movement within and across sectors.

In Australia's TVET system, training Package developers are required to provide advice on qualification pathways, such as Australian Apprenticeships and TVET in Schools, within the Training Package Companion Volume Implementation Guide. Pathways advice includes:

- how one qualification links to others;
- how progression through the system occurs; and
- flexible entry and exit points – made easier through the use of a modular system

In addition, registered training organisations provide advice to students on the possible options to move between education or training programs or into employment. Learning pathways advice must be provided in relation to identified sets of skills and their relationship to a particular qualification.

4.3 A Regional Qualifications Framework, or a learning hierarchy

Level 1 – equivalent to Basic Skills/Introductory

Level 2 – equivalent to Technician/Apprentice[47]

Level 3 – equivalent to High School Diploma

Level 4 – equivalent to Year One of Degree

[47] The term *Technician* is treated differently in different contexts: it needs careful definition to ensure common understanding of its intended level of knowledge, skills and competence

Level 5 – equivalent to Associate Degree

Level 6 - equivalent to Graduate Degree

Level 7 – equivalent to Post Graduate Degree

Level 8 – equivalent to Doctorate Degree

Figure Five: European Qualifications Framework (EQF)

The EQF is the first regional framework to be developed and it provides a reference point for each of the individual European countries qualifications frameworks. A referencing body has been developed to provide the comparison of each of the individual frameworks (e.g. Scotland's SCQF) to the EQF. So while each country retains their own QF, they also have an indication of how their qualifications compare with other European countries. This is a useful tool for determining the relative value of qualifications in different levels of occupations and across national borders.

The ADB has previously been involved in some regional activity to develop and pilot a framework for mutual recognition of vocational skills in the GMS region i.e. ADB TA7275: *Agreed Framework for Mutual Recognition of Technical Skills and Qualifications in the GMS*. The aim of this work was to harmonise national HRD regulations and standards to facilitate the portability of educational skills and training qualifications across borders allowing the development of a framework for mutual recognition of technical and vocational skills in the GMS. The PRC chose not to participate in this project and unfortunately, the final report indicates limited progress was made as of 2011. The main stumbling block would appear to have been the lack of well-developed NQFs in each of the GMS countries as an important prerequisite for the development of a regional framework.

5.0 The envisioned system for MLT in the PRC

The envisioned MLT system for the PRC will clearly define and link curriculum and competencies targeted by TVET programs at different levels, while providing learning pathways that provide access for students to further study or to enter the labour market at different exit points (with the potential to return to continue TVET studies at a later date). As illustrated in *Figure Six* below, such a MLT should allow TVET students to progressively enter higher level TVET programs, while also allowing them to return to the academic education stream, through "knowledge + competency" assessment and other innovative approaches, such as linked specialisations and a mutually recognised credit system.

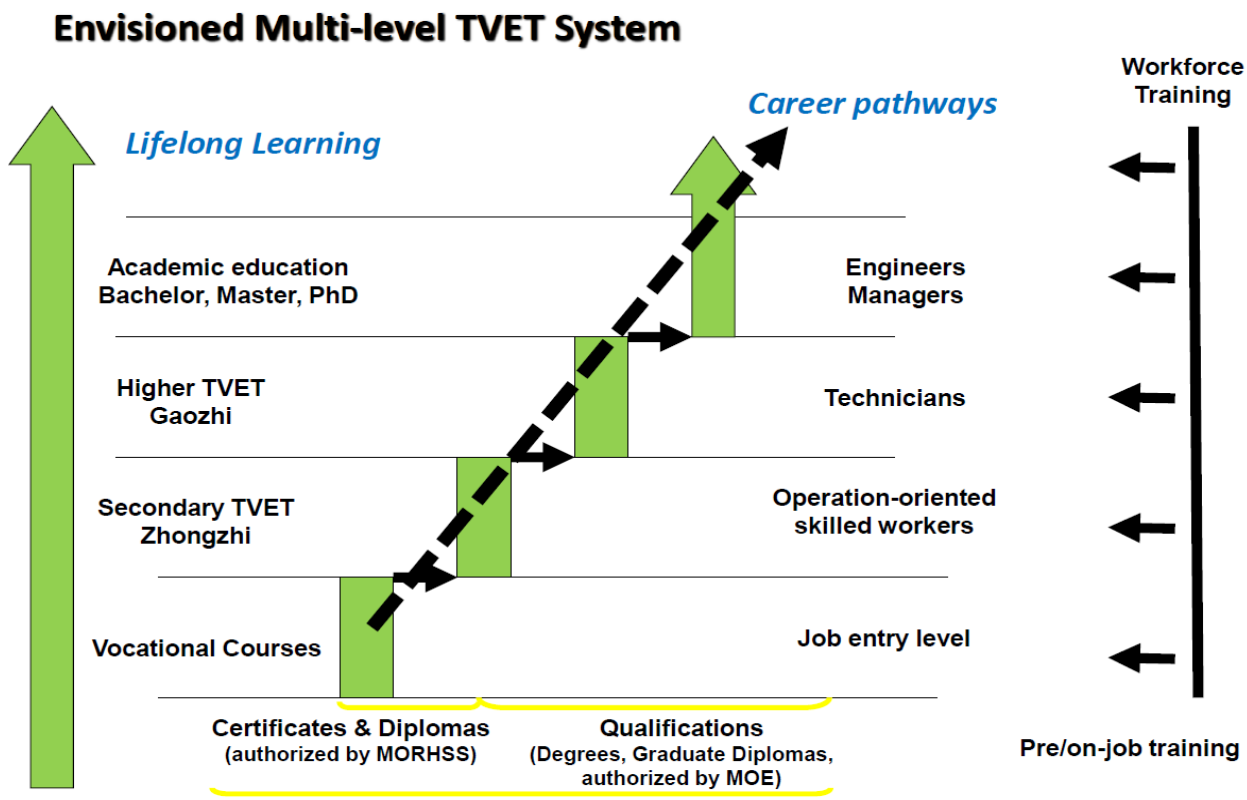


Figure Six: Envisioned Multi-level TVET System in the PRC

***Source**: Author's (Liu) depiction of proposed MLT*

5.1 Institutional dimension

As depicted on the left-hand side of Figure I, the PRC has traditionally divided TVET and post-secondary education into at least 4 tiers: (i) vocational courses, (ii) secondary TVET (*zhongzhi*), (iii) higher TVET (*gaozhi*) and (iv) Post-secondary academic education levels (including Bachelor, Masters, and PhD levels of study).

Efforts have been made to form a hierarchy across levels of education in the PRC. Examples in Shandong and Hainan are summarised by Liu (2014) [48]. As another example, in Guizhou, DOE plays an overall role in the planning and coordination between secondary and higher TVET schools in occupational targets, curriculum, teaching means, and resource allocation, to promote "3+2 model" that other provinces have been implementing. At the same time, Guizhou is exploring other models that better suit its circumstances. Firstly, Guizhou is advancing a "5-year TVET model" by identifying and developing several TVET schools to accommodate such a model. Secondly, the province is exploring a "3+4 model" (3-year secondary TVET plus 4-year undergraduate results in a Bachelor's degree) by connecting nationally identified demonstration higher TVET schools (*gaozhi*) with academic universities. To implement this model, academic universities in the province will establish application-oriented majors under the guidance of Guizhou DOE in the short term. In the mid to long

[48] Developments and Prospects for TVET and Related Regional Cooperation with Southeast Asia in the PRC, Guangxi, and Baise, revised on March 2014

term, Guizhou will accelerate the establishment and development of *application-oriented* colleges targeting secondary TVET graduates.

In addition, a TVET framework has been developed for agriculture, farmers, and rural areas to seek a harmonious and rural-urban integrated TVET, though limited information is publicly available and it is unclear to what extent this framework has been operationalized.[49] Finally, the PRC is also exploring experiences and systems in neighbouring countries including Singapore.

As a first step towards developing a MLT system, MOE revised the *Specialisation Catalogue* for secondary TVET schools in 2012[50]. The revised catalogue defines 19 specializations and 321 majors, and provides possible options on how these specialisations and majors in secondary TVET can be linked to 1,185 occupations, 720 qualifications, and 554 further education directions in higher level TVET or academic-track undergraduate education. While restricted to secondary-level TVET, the revised catalogue depicts connections across three dimensions, as elaborated below: (i) across qualifications, (ii) across institutions, and (iii) across occupations. An example is illustrated in Table I below.

Table I: An Example of Connections across the Three Dimensions

Specialization	Major	Skills	Associated Occupations	Certificates	Future Study Directions
Agriculture	Agricultural production techniques	Agricultural cultivation Pest control	Agronomic worker Crop Protection worker Agricultural Experiment worker	Agronomic worker Crop Protection worker	Higher TVET: Agricultural Techniques undergraduate: Agricultural Scientist & Engineer

Source: PRC MOE policy note

In parallel, MOHRSS has been updating the categorisation of occupations and related standards[51], as well as promoting "dual certificates" for programs which could be offered at both academic-track and TVET institutions and would equip graduates in either track with both theory and practice and provide them with both an academic-track qualification plus a vocational certificate. Such models are currently being pilot tested in many areas, such as Tianjin and Beijing (see below)

Internationally, Singapore's TVET system is quite often referred to as a comparison for the PRC. Singapore's TVET schools provide training for primary and secondary levels under the administration of a Vocational and Industrial Training Board. More specifically, while the institutes of technical education focus on training skilled and highly skilled workers, the

[49] UNESCO (2012)

[50] http://www.moe.gov.cn/publicfiles/business/htmlfiles/moe/cmsmedia/document/2010/6/doc95222.pdf

[51] As of November 2013, the PRC classifies 1,071 occupations.

http:// www.cettic.gov.cn/zyjnjd/zyjnbz/2013-12/03/content_433733.htm

polytechnics specialize in cultivating technicians and expert technicians. This is a type of institutionally based MLT.

5.2 Occupational dimension

The PRC is also trying to link the occupational dimension with an MLT system. In particular, the PRC is trying to conceptually link both TVET and academic-track higher education to a hierarchy of careers as shown on the right-hand side of *Figure Six*. At the bottom of the skill spectrum, graduates of vocational courses are expected to pursue "entry-level jobs", while at the other end of the spectrum, graduates obtaining Bachelors, Masters, or PhD degrees are expected to enter careers such as engineers or managers.

Although PRC policymakers have targeted establishment of a balanced occupational pyramid (with larger numbers of workers at lower tiers of the pyramid), there are concerns that the pyramid is actually becoming an "hourglass" i.e. with large numbers of highly educated engineers/managers and entry-level workers, but an insufficient number of mid-skilled workers. For example, qualified technicians and expert technicians account for approximately only 4% of the entire workforce in the coastal areas in 2012, according to MOE. The 2012 Catalogue attempts to address this phenomenon. It also proposes linkages to the other 2 dimensions (on qualifications and institutions, as noted above) however these linkages require further strengthening.

5.3 Qualifications dimension.

As a second dimension, the PRC government currently authorises provision of 5 levels of qualification certificates for TVET (see Table II below), which are based on the PRC's existing National Qualifications Framework. However, the certificate system is perceived as not functioning well, so that employers do not require job applicants to hold a certificate for the employment.

Table II: Qualification Certificates in the PRC

Qualification level	Title
Level I	Expert technician
Level II	Technician
Level III	Highly skilled worker
Level IV	Mid-level skilled worker
Level V	Basic skilled worker

Source: PRC MOHRSS

Two pilot programs in the PRC are described below to indicate the work occurring to define the MLT system that emphasises the qualifications dimension.

5.3.1 Beijing Education Research Institute (BERI)

One of the most exciting pilot programs to develop a MLT System in the PRC is occurring at

Beijing Education Research Institute (BERI)[52] with support from the TVET Research Department of the Education Commission (Chair). The research into MLT commenced in 2005 with piloting of the system commencing in 2011. There are 12 pilot endorsed programs and 6 "yet to be endorsed programs" being conducted at SVS, VCs, Community Colleges, Industry Training Centres, Social Training Organisations and Universities. The pilot courses from 12 main occupational groups include Biotechnology, Logistics, Tourism, Livestock and Veterinarian Management i.e. similar priorities to the Guangxi-Baise region.

The BERI MLT system has developed a draft qualifications framework (see over page) to describe the levels of the MLT. It has a similarity to some other international TVET Qualifications Frameworks which will assist, if required, with the eventual referencing of the BERI MLT system to other (regional and international) frameworks.

The main activities of the BERI project include standards and curriculum development, learning modules development and assessment. There are also established industry partnerships to support the piloting process as well as Quality Assurance arrangements in place (training organisation registration and accreditation, internal and external auditor & examiner positions)

Provincial supporting bodies for the pilot established include a MLT Leadership Group, MLT Standards Committee, MLT Grant Committee and a TVET Evaluation Committee. Eleven VCs and 1 SVS are leading the piloting and each is paired to work with a partner. One University is also piloting courses at their level of the TVET QF which means that 25 institutions in total are piloting courses.

Figure Seven: Beijing Education Research Institute draft MLT Framework

<table>
<tr><th>General/Higher Education</th><th>TVET</th><th>Institution</th></tr>
<tr><td>PhD</td><td>May be other level(s) but not yet developed</td><td></td></tr>
<tr><td>Master's</td><td>TVET Level 5+ Master of Eng.</td><td rowspan="2">Universities</td></tr>
<tr><td rowspan="4">Higher Education</td><td>TVET Level 5 Bachelor of Eng.</td></tr>
<tr><td>TVET Level 5</td><td rowspan="3">VCs</td></tr>
<tr><td>TVET Level 4</td></tr>
<tr><td>TVET Level 3</td></tr>
<tr><td rowspan="3">General High School</td><td>TVET Level 3</td><td rowspan="3">SVSs</td></tr>
<tr><td>TVET Level 2</td></tr>
<tr><td>TVET Level 1</td></tr>
<tr><td colspan="3">Prerequisite for entry: Graduation from a General Junior High School</td></tr>
</table>

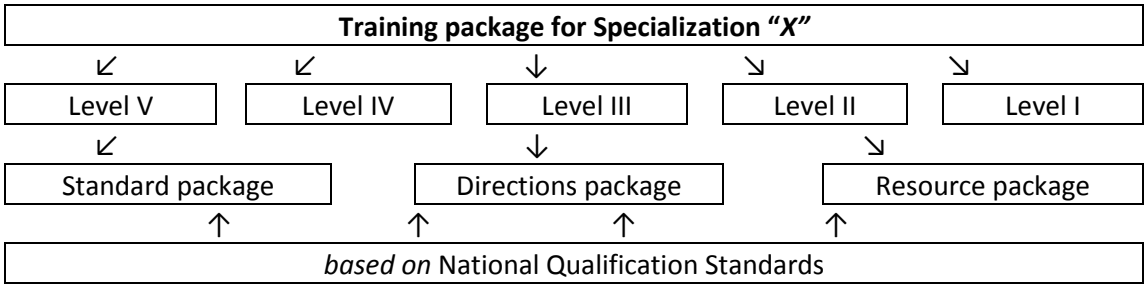
Source: Beijing Education Research Institute

[52] Leader of the support organisation: Ms Ji Li, Director of TVET Research Department, Beijing Education Research Institution

5.3.2 Tianjin pilot to develop an MLT system

As a demonstration model for developing multi-level TVET, Tianjin is pilot testing the development and promotion of training packages which promote progression through the five levels of certificates which can be integrated into TVET schools' curriculum designs. For example, training packages for twelve green specialisations have been developed and are now being tested[53].

Figure VI. Framework for the Development of Training Packages in Tianjin



Source: Tianjin DOHRS

The Tianjin pilot was partially based on Australia's experience in the development of training packages to accompany the AQF[54], as outlined earlier in Figure 4.2.

6.0 A Multilevel TVET System for Baise University and its contributory institutions

The experience and learning from the previous international and PRC-based examples will provide the basis and the springboard for the development of a multilevel TVET (MLT) system for Baise University (BU) and its contributory institutions – primarily secondary vocational schools (SVS) and vocational colleges (VCs). The institutional dimension is already a feature of BU, with an associated SVS and VC having alignment to the BU administrative arrangements. This may involve other institutional partnerships[55], with the detail remaining to be developed.

There will also be a focus on the occupational dimension mentioned as a previous section (Section 5.2). It is anticipated that the focus of the pilot programs will be based on one of the four priority industry sectors for Baise i.e. aluminium processing, agriculture, logistics and hospitality and tourism. These industries are the main priorities for the Guangxi Baise region and within each of them there is a high demand for skill development at all levels from skilled worker, technician and technologist through to managerial positions. The planned

[53] Tianjin DOHRSS, 2013

[54] For more details, refer to *Australia's Experience in Workforce Planning and Skills Provision for Green Sectors*, Liu, 2014

[55] There is a concern regarding the student numbers at the VC and SVS levels of BU: Baise Vocational School in particular has very small student numbers (N= 200). These small numbers threaten the viability of the pilot project and thus partnerships are being sought.

MLT will need to provide the courses and qualifications to deliver the high demand skills for these priority areas. This will ensure an attempt is made to address both the economic and social demands for the area.

The qualifications dimension will be the main focus of the MLT system as this will be reflected in *levels* of courses to be developed to meet industry requirements. This will also result in extensive curriculum and staff development reforms to design and deliver the courses. This will require careful planning and implementation arrangements. As experience in other places shows, there needs to be key factors built into a MLT system to ensure success for stakeholders, especially students. For example, this will require flexibility in entry and exit levels of courses, a focus on life-long learning, clear learning pathways and other factors (e.g. credit transfer and recognition of prior learning) that enable, rather than limit or inhibit, learner progress. The centrepiece of a qualifications system is a Qualifications Framework (QF). In the project, a TVET QF will need to provide the direction for the qualifications design at different levels of complexity for the development of knowledge, skills and competence.

While this is an ambitious undertaking, it has the advantage of building on previous work: particularly the work that has already commenced in the PRC. Other countries have also been down similar pathways and there is valuable learning from their experiences. The PRC has the advantage of being able to choose from a wide variety of experience in developing its own QF.

There is a further dimension to the Guangxi-Baise project that adds exciting possibilities. Baise is the gateway to the GMS and is therefore well-positioned to develop regional opportunities and links that provide economic and social benefits. The MLT system is both a key product and service in the plans to enhance regional cooperation. It potentially provides substantial benefits for the education and training system, but also has links into many other spheres of both government and private activity. The challenge remains then to provide the expertise and support of all stakeholder groups to make this vision a reality.

Appendix TWO: Analysis of BU Teachers Survey: March – April 2014

This survey covered 110 teachers in BU, which accounts for 21.5% of the total teaching staff. The data are collected from the BU baseline survey, a teachers' survey, field trip studies and interviews.

1. Background Information about BU teachers.

1.1. Total number of teachers in BU

Table 1: Total teacher numbers

Distribution of teachers in BU	2012	2013	2014
Teacher numbers	427	507	512
Dual Qualification Holders			74 = 14.5%

Source: BU data

In 2014, BU has a total number of 512 teachers, including 100 part time teachers from outside BU. Dual Qualification teachers at BU number 74 persons, accounting for 14.5%. The reason for this low number of dual qualified teachers is due primarily to BU being an academic university until the recent decision to become a TVET-applicable university. This has placed great pressure on the university to rapidly increase the number of dual qualified teachers.

This is not an unusual situation. It is anticipated that many of the 600 universities that have been requested to make the transition to TVET applicable universities will have very low numbers of dual qualified teachers. It has not been an important requirement while a university was operating as an academic university. However, given the changed nature of the curriculum (competency-based and industry driven) and the courses that will be offered at different levels, this focuses on staff having the necessary industry experience and awareness of industry standards.

1.2. Teachers Age Range

	＜30	**31-40**	**41-50**	**51-60**	**>60**	**Total**
2012	122	172	111	21	1	427
2013	142	194	124	42	5	507
2014	122	209	127	49	5	512

Source: BU data

Table 2: Age range of teachers

In 2014, 122 of all BU teachers are aged below 30 years, accounting for 23.8 %; 209 teachers range between 31-40 years old, accounting 40.8%;127 range between 41-50, accounting for 24.5%; 49 teachers are aged between 51-60, accounting for 9.6%; 5 teachers aged over 60 years old, accounting for 1 %. The age range of teachers in the >30 and 31-40 years ranges dominate, accounting for more than 63 %+ of all teachers: this is a comparatively young group of teachers.

1.3. Teachers' academic titles

Table 3: Academic Title Formation

	New Teachers	Junior (Assoc. Lecturer) (1 year+ experience)	Middle (Lecturer) (5 years + experience	Associate Professor	Professor	Total
2012	110	57	172	71	17	427
2013	129	53	208	90	27	507
2014	109	54	219	99	31	512

In 2014, 109 teachers have no academic title of any sort, indicating that they are new graduates and accounting for 21.3%; 54 teachers hold a junior title, accounting for 10.5%; 219 teachers hold a middle title, accounting for 42.8%; 99 persons hold an associate professor title, accounting for 19.3%, with 31 persons being professors, accounting for 6.1%

From 2013 to 2014, the non-title holders were reduced by 20 persons: middle-title holders increased by 11 persons: 9 more teachers received an associate professor title and 4 more professors were added. While this shows an increasing trend in title holders it says nothing about the increase in necessary TVET knowledge, skills and industry experience.

The other interesting feature of the data in Table 3 is the large number of new teachers recruited in 2012 - 2014 – almost 340 teachers. While there has been a growth rate in the staff numbers over this time, it is the injection of many new staff, most of whom are university graduates, that is a potentially worrying trend. Few of the new staff will be dual qualified teachers and many lack knowledge of TVET and the differences required in instructional delivery and assessment. This underlines the need for thorough and ongoing staff development programs that both develop new skills and allow re-training for more experienced staff.

1.4. Teachers academic background

Table 4: Academic Background

	College Diploma	Bachelor's degree	Master's degree	PhD	Total
2012	3	205	210	9	427
2013	3	218	272	14	507
2014	3	218	277	14	512

In 2014, 3 teachers have a College Diploma, accounting for 0.6%: 218 people have a graduate (Bachelor's) background accounting for 42.6%: Masters see 277 teachers, accounting for 54.1% and 14 teachers have a PhD education, which accounts for 2.75%. These figures indicate a group of teachers who are very well-qualified in **academic** terms. However, only 14.5% of them have dual qualifications, indicating a serious shortfall in industry experience – the most important prerequisite for TVET teaching.

1.5. Teachers' Majors Background

Table 5: Teachers' Majors

	Economics	Law	Education	Arts	Science	Technology	Manage-ment	Fine Arts	Total
2014	24	69	85	108	60	100	27	39	512

The predominance of teachers with Arts/Fine Arts backgrounds may indicate difficulties in attracting more teachers with Science/Technology majors. This needs further investigation.

1.6 Teachers/students Ratio at BU

Table 6: Teacher/Student Ratio

	Students Total	**Teachers Total**	**Ratio(1:xx)**
2013	9430	507	1 : 18.60
2014	10496	512	1 : 19.72

1.7 Work experience background for teachers

Table 7: Work background

	Background					
2010-2014	(%) Teachers hired with industrial experience	10	(%) Teachers hired directly from industries	0	(%) Teachers hired directly from University as graduates	90

From 2010 to 2014, 10% of all BU teachers recruited had some industrial work experience. However, BU recruited 90% of teachers directly from universities i.e. graduates and no teachers were employed in BU who came directly from industries. This would appear to indicate the shortage of suitably qualified teachers who also have industry experience.

2. Teacher In-service Training

Table 8: Teacher In-service in 2013

	Training Content	Training Hours provided only by BU staff)	Trainees number	Location
	Lecture on applied science for teaching	4 hours	375	On BU campus
	Seminar on improving teachers teaching	4	6	Nanning
	Distance Teaching Training	Average 1,135 hours	200	On-line learning
	Lecture on effective teaching and teaching arts		376	In BU campus
	Lecture on university teachers lesson plans designs and preparation		376	On BU campus
	Lecture on ideological education	4	376	On Campus
	Lecture on classroom instruction	4	376	On campus
	Training for entry college teachers	48	55	In BU

In terms of training subjects, four training sessions were held on teaching skills and techniques with all teachers participating in them. One ideological training was held with all teachers attending, 200 teachers attended specific course training, 55 teachers attended entry training. While all teachers must attend ideological training, only 6 showed up in courses training. All the training were held on BU campus

In terms of classification, 30 “famous”(professionally recognised) teachers and key teachers participate in the training, accounting for 12.6% of total staff; 15 teachers attended teaching competence training, accounting for 6.3%; 5 teachers went to training on curriculum development; TVET training saw 14 participants, accounting for 5.9%. Other trainings, ranging from participating in trade shows and seminars involved 26 persons, accounting for 10.9%.

Lastly, all the training was directed to general teaching skill training for all teachers.

The number of teaching hours and the training relates very little to TVET with lots of other non-important topics

Needs of teachers for training

The needs of teachers for training are indicated through the following responses to the base-line survey questions provided to 110 BU teachers:

Question 1: What are the key problems confronting you and your colleagues in your teaching?

- Further and better under-standing is needed about what is TVET undergraduate education in terms of its theory, teaching methods, and quality assurance (62 respondents)
- Know little about competency-based curriculum development (49)
- Know little about competency-based mode and methods of teaching (56)
- Know little about competency -based student learning assessment and its verification (27)
- Insufficient capability of e-learning curriculum development and application (34)
- Other (2)

Question 2: What content knowledge do you need the most?

- How majors setting will be better matched with industrial needs (52)
- Real workplace experience and skills (45)
- Ability to guide students in their field training (44)
- How subject taught and vocational standards will be better matched (42)
- Theory and knowledge about TVET undergraduate education (37)

- How teaching process will be better responsive to production process (33)
- TVET education theory (10)
- Other (2)

Question 3: What is your comment on the professional development you received (from BU)?

- Knowledge and skills taught are unpractical (60 respondents)
- Face-to-face classroom lecture is the main teaching mode (55)
- Over emphasis on professional and academic knowledge (47)
- Lack of observation and constructive feedback (32)
- Lack of support (mentoring/ follow support) (19)
- Other (1)

Question 4: What are the most challenging issues you encounter in your daily teaching?

- Understanding of advanced educational philosophy (33 respondents)
- Teaching activities design (24)

Question 5: What among the following courses do you find the most useful in your teaching?

- Job skills (45 respondents)
- Teacher morality (31)
- Modern education technology (30)

6. What do you think is the most urgent if your teaching ability is to be further improved?

- Teaching activities design (28 respondents)
- Continuing professional development (25)

5. Recommendations

1. More training is needed on the rationale and operation (actual teaching) of applicable TVET. “I need to know what it is before I can teach it.” There is a need to change the present mindset and ability among teachers about TVET.

2. Training is needed on competency-based teaching skills to improve teachers’ instructional skills;

3. Training is needed for teachers to better understand the core courses in pilot majors;

4. Management training is needed for administrative staff to assist them to improve their skills in organization and coordination needed for the MLT system;

5. Arrangements should be made for teachers to have some structured industry experience (e.g. observations and job placements) in industry: this need includes both core and special skill areas.

Appendix Three: Guangxi Province TVET Applicable Universities

Profile of the 19 Universities in Guangxi Province selected to be transformed into TVET applicable universities

The Chinese Government made a strategic resolution in February 2014 that 600 traditionally academic universities across China were to be transformed into more market responsive *TVET applicable* universities. In a quick response, Guangxi selected eleven public academic universities and eight private universities (all founded since 1999) for inclusion in the program: Baise University is one of these 19 universities.

Transformation in this context is defined as those provincially run, traditionally academic undergraduate universities being changed into a status that will provide a more science or TVET applicable education. The move is aimed at establishing a TVET educational system that will create learning pathways within and between SVS, VC and UG levels of TVET (with plans to eventually include post-graduate programs).

Of the nineteen selected universities in Guangxi, eight (42%) have previously been either upgraded into an undergraduate university from a former three-year teachers' college, or have had a strong background in teachers' education and training. Six (32%) are private colleges run within a university and five (26%) used to be a vocational colleges. These universities main training area has predominantly been teacher preparation and they lack a science and technological background. More than 160 000 students, with 8 600 full-time teachers will be involved in this transformation. Table 1 provides a profile of the 19 universities in terms of their students, teachers and major programs that are currently offered.

Table 1: Profile of the 19 selected TVET applicable universities in Guangxi

No	Name	Type	Upgraded or Founded	Approval Year	Current Full-time Student Number(in thousand)	Undergraduate Programs Offered	Provincial Level(PL),Self Credited Level(SCL),Key(K),Featured Majors(FM) Majors	Full-time Teachers	Dual Qualified Teachers	Source Deadline
1	Yu Lin Teacher College	Public	Upgraded from a Teacher College	2000	12000	Primary school education, music, dance, fine arts, applied physics, physical education, Chinese language and literature, chemistry, technology education, preschool education, mathematics and applied mathematics, ideological and political education, teaching Chinese as a foreign language, history, physics, applied psychology, Japanese, English, business English; guidance and management of social sports, exercise rehabilitation; visual communication design, environmental design, apparel and fashion design, fashion design, advertising design and production, garden; electronic information science and technology, software engineering, measurement and control technology and instrument, communication engineering, electronic commerce, the computer network technology, electronic and information engineering technology; embedded systems engineering, information management and information system, information and computation science, computer science and technology, radio and television science; advertising, marketing, economics, applied	Materials chemistry, electronic information science and technology, history, pharmaceutical engineering, biotechnology	837	5 accounts for 0.6%	2014.4

						chemistry, biological science, biotechnology, pharmaceutical engineering, chemical engineering and technology, materials chemistry; financial management; accounting and audit, accounting computerization, administrative, secretarial, law, tourism management; hotel management; cooking technology and nutrition				
2	He Chi College	Public	Upgraded from a Teacher College	2003	9000	Chinese language and literature, journalism, Chinese international education, ideological and political education, history, English, business English, mathematics and applied mathematics, information and computer science, statistics, physics, mechanical engineering and automation, electronic information engineering, electrical engineering and automation, chemistry, applied chemistry, pharmaceutical engineering, biological sciences, biotechnology, computer science and technology, network engineering, software engineering, physical education, social sports guidance and management, visual communication design, environmental design, fine arts, music performance, music, performance, primary school education, preschool education, administrative management, marketing, human resources management, tourism management	Chinese language and literature, chemistry, physics, ideological and political education. Administration, electronic information engineering, biological sciences, mathematics and Applied Mathematics	450		2013.7

3	Guangxi Finance College	Public	Upgraded from a Financial College	2004	15000	International economy and trade, international business, economics, the development of rural areas, agriculture and forestry economic management, land resource management, public finance, taxation, labor and social security, public relations, public administration, finance, investment, insurance, financial engineering, English, business English, information management and information system, e-commerce, computer science and technology, statistics, economic statistics, applied statistics, digital media technology, business management, human resources management, tourism management, marketing, exhibition economy and management, logistics management, real estate development and management, project management, project cost, human geography and urban planning, accounting, finance management, financial accounting, auditing, assets evaluation of education, secretarial science, advertising, environmental art design, visual communication design, cultural industry management	Accounting, finance, finance, business management, international economy and trade, statistics, labor and social security	931	558 ,accounts for60%	2013.9
4	Baise University	Public	Upgraded from a Teacher College	2006	8054	International economy and trade, the ideological and political education, humanistic education, preschool education, primary school education, physical education, social sports guidance and management, Chinese language and literature, teaching Chinese as a foreign language, English, Thai, mathematics and applied mathematics, physics, chemistry, biology technology, material forming and control engineering, material chemistry, metal material engineering, electrical	Metal material engineering, biotechnology, tourism management	512	74,accounts for14.5%	2014.6

						engineering and automation, electronic information engineering, communication engineering, computer science and technology, network engineering, chemical engineering, food science and engineering, project management, engineering, marketing, financial management, tourism management, music performance, visual communication design, environmental design, product design, facility agriculture science and Engineering				
5	He Zhou College	Public	Upgraded from a Teacher College	2006	9429	Software engineering, secretarial science, environmental design, network engineering, history, physical education, social sports guidance and management, visual communication design, fine arts, music, radio and television, food science and engineering, biological engineering, international economy and trade, the ideological and political education, tourism management, mathematics and applied mathematics, project management, applied psychology, Chinese language and literature, computer science and technology, dance, electrical engineering and automation, electronic information engineering, public utilities management, communications engineering, primary school education, English, social sports guidance and management, applied chemistry, preschool education, mechanical design and manufacturing automation, clothing and apparel design	Food science and engineering, education; biological engineering, food science and engineering, electronic information engineering, electrical engineering and automation, tourism management	500	Scheduled in its 2014-2016 Staff Development Plan	2014.3

6	Qin Zhou College	Public	Upgraded from a Teacher College	2006	7822	Marine technology, marine engineering, aquaculture, marine science, food science and engineering, Chinese language and literature, Chinese international education, journalism, ideological and political education, city management, financial management, international economy and trade, marketing, logistics management, pedagogy, psychology, preschool education, geographical information science, geography science, tourism management, electronic and information engineering, automation, mechanical engineering, vehicle engineering, English, oil and gas storage and transportation engineering, chemical engineering and technology, visual communication design, environmental design, product design, fine arts, music, music, mathematics and applied mathematics, computer science and technology, network engineering, physical education	Marine engineering, logistics management, art design, chemical engineering and technology; Chinese Major	561	140, accounts for 25%	
7	Wu Zhou College	Public	Upgraded from a Generic College	2006	9632	Business administration, marketing, tourism management, financial management, international economy and trade, electronic commerce, financial engineering, software engineering, electronic information engineering, network engineering, computer science and technology, digital media technology, mechanical engineering and automation, electronic science and technology, automation, industrial design, engineering, business communication English, English, Chinese language and literature,	Tourism management, mechanical engineering and automation; electronic information engineering, international economy and trade, art design,	559	97,accounts for 17.4%	

						journalism, clothing and apparel design, visual communication design, environmental design, product design, animation, music, mathematics and applied mathematics, physics, information and computing science, forestry chemical, pharmaceutical engineering, administration, law, public administration, philosophy, primary school, preschool education	software engineering 程			
8	Guangxi Teacher College for Ethnic Minorities	Public	Upgraded from a Teacher College	2009	10516	Ideological and political education, preschool education, physical education, Chinese language and literature, English, mathematics and applied mathematics, information and computer science, physics, chemistry, electronics and information engineering, communication engineering, computer science and technology, chemical engineering, pharmaceutical engineering, administrative management, logistics management, tourism management, music, fine arts, environmental design, product design, fashion and garment design, Vietnamese, financial management, international economy and trade	Chemical engineering and technology, electronic information engineering, communication engineering, logistics management, tourism management, pharmaceutical engineering, English	481		2013.11
9	Gui Lin Aero Induatrial College	Public	Upgraded from a Generic College	2012	3000	Human resource management, marketing, business English, logistics engineering, visual communication design, software engineering, mechanical engineering and automation, aircraft manufacturing engineering, communication	Computer network technology, communication technology,	596	178, accounts for 30%	2014.3

						engineering, electronic information engineering, automobile service engineering, vehicle engineering, business English, logistics engineering, automation, measurement and control technology and instrument, energy and power engineering	vehicle inspection and repair technology, human resource management, marketing			
10	Guangxi Foreign Languages College	Private College	Upgraded from a Foreign Languages College	2011	10000	Financial engineering, international economy and trade, Chinese language and literature, teaching Chinese as a foreign language, English, French, Thai, Vietnamese, software engineering, network engineering, marketing, financial management, human resource management, auditing, public utilities management, administrative management, broadcasting and hosting art, art design	Vietnamese, Thailand, international Chinese language education, art design, secretarial, computer technology	500	35, or 7%	2014.6
11	Nanning College	Private Colege	Upgraded from a Generic College	2012	3000	Civil engineering, transportation, electrical engineering and automation, business management, marketing, accounting, financial management, computer science and technology	Civil engineering, computer science and technology	515	206, or 40%	2013.11
12	Xing Jian Colleg under Guangxi University	School-industrial Co-run	PrivateCollege	2004	10611	International economy and trade, law, business administration, marketing, English, Japanese, Chinese language and literature, Chinese international education, journalism, radio and television, advertising, art, art education, scientific management, human resource management, public management, property management and social work, psychology, information management and tourism management, information systems, computer science and technology, electronic commerce, network engineering, electrical engineering and automation, electronic science and technology,	Civil engineering, accounting, financial management	621		2013.12

						communication engineering, automation, electrical and intelligent building, material forming and control engineering, industrial design, digital media technology, civil engineering, biological engineering, landscape architecture, environmental design, accounting, financial management, auditing				
13	Li Jiang College under Guangxi Teachers University	School-industrial Co-run	Private College	2004	11130	Chinese language and literature, Chinese international education, journalism, English, business English, translation, Vietnamese, Thai, mathematics and applied mathematics, applied statistics, biotechnology, environmental science, chemistry, computer science and technology, pharmaceutical engineering, electronic information engineering, law, economics, international economy and trade, finance, business management, marketing, financial management, tourism management, hotel management, music, dance, art of broadcasting and hosting, preschool education, environmental design, visual communication design, physical education	Environmental design, English, art and design	420	13, or 3%	2013.11
14	Xiang Si Hu College under Guangxi University For Ethnic Minorities	University Self-funded	Private College	2004	7948	International economy and trade, taxation, Chinese language and literature, Chinese international education, editing and publishing science, jurisprudence, cooking and nutrition education, guidance and management of social sports, English, Lao, Burma, Vietnamese, Thai, Bahasa Indonesia, computer science and technology, digital media technology, information management and information system, security engineering, chemical engineering and technology, tourism management, logistics	Cooking and nutrition education, product design, international education, Chinese Indonesia, animation, computer science	452		2013.12

						management, marketing, cultural industry management, environmental design, visual communication design, product design, fashion and garment design, digital media art, animation, art of broadcasting and hosting, radio and television	and technology			
15	Information andTechnological College under Guilin Electronic University	University Self-funded	Private College	2004	8300	Communication engineering, computer science and technology, electronic information engineering, electronic information science and technology, measurement and control technology and instrumentation, automation, mechanical engineering and automation, mechanical and electronic engineering, material forming and control engineering, electrical engineering and automation, industrial engineering, electronic commerce, human resource management, marketing, financial management, English, visual communication design, environmental design, product design, animation, software engineering, social work, network engineering, network engineering, business English	Material forming and control engineering	196		2013.12
16	Bo Wen Management College under Gui Lin Poly Tech University	University Self-funded	Private College	2004	7200	Civil engineering, surveying, exploration technology and engineering, architecture, urban planning, engineering management, geographical information science, water supply and drainage science and engineering, project cost, gem and material technology, the international economy and trade, business management, marketing, tourism management, financial management, electronic commerce, electronic information engineering, Electronic Science and technology, communication engineering, automation, computer science and technology, advertising,	Civil engineering, surveying and Mapping Engineering	490		2013.12

						animation, visual communication design, environmental design, English				
17	Science New Medical College under Guangxi Traditional Chinese Medical University	University Self-funded	Private College	2004	7200	Traditional Chinese medicine, acupuncture and massage, nursing, pharmacy, pharmacology, pharmaceutical formulations, marketing, food quality and safety, rehabilitation, medical laboratory technology	Traditional Chinese medicine, nursing	456		2013.12
18	Lu Shan College under Guangxi Science and Technology University	University Self-funded	Private College	2004	8500	English, product design, environmental design, visual communication design, fashion and garment design, animation, industrial design, fashion design and engineering, mechanical engineering and automation, mechanical engineering, vehicle engineering, automobile service engineering, transportation, electrical engineering and automation, automation, electronic information engineering, network engineering, computer science and technology, architecture, civil engineering, engineering cost, engineering management, business management, marketing, public utilities management, industrial engineering, financial management, investment, food science and engineering, chemical engineering and technology	Mechanical engineering and automation, transportation, electrical engineering and automation, computer science and technology	600		2013.12
19	Shi Yuan College under Guangxi Teachers University	School-industrial Co-run	Private College	2004	7700	Chinese language and literature, journalism, English, Japanese, international economy and trade, marketing, advertising, preschool education, primary school education, art education, art and design, music, art, dance, sports education, applied psychology,	Chinese language and literature, journalism, information management and information	304		2013.12

						information management and information system, computer science and technology, mathematics and applied mathematics, electronic and Information Engineering, Geographic Science	system, computer science and technology			

NB: Sources: The 19 Universities official websites without final confirmation from them of whether the information is current

Challenges involved in the transition to TVET applicable university status

The 19 universities are likely to encounter the following challenges as a result of their changed status:

Perception of a change in status by both the universities and the general public: As pointed out by Lu Xin, Deputy Minister of Education[56], what most university presidents would least like to see appearing in their university names are terms like *applicable technology* or *vocational technology*. Negative reactions are not difficult to find when it comes to government plans on how and what should be done to achieve a significant TVET reform such as transition. The perception of a decline in status extends from university administrators and teachers, employers, parents as well as to the students themselves. The perception is not well placed when employment figures are considered for academic graduates and those from TVET. However, the long-standing Confucian tradition lingers in the selection of education options for students;

Missing mechanism: Generally speaking, China has failed to set up a proper classification system to administer its universities. For example, there need to be established standards to designate a university as a science-applying university and where this institution is currently placed in China's higher education hierarchy. A corollary of this is the need for incentives to attract and sustain more involvement from industries to TVET.

Financial constraints: Greater government investments are indispensable if present available resources are to be reallocated in line with science-applying or vocational needs instead of the present academic and research functions of universities. The reallocated resources need to be conditional on these transformed universities playing a leading role in supplying skills that are more market-adaptive and more market-responsive.

Staff constraints: Constrained by the present employment and salary system, as well as the staff assessment policy, the TVET applicable universities will find it very hard to attract and retain top staff to work with them. In addition, in terms of teaching mode, huge gaps exist between what is expected of a TVET teacher and the present teaching staff, who either lack the necessary industrial experience or have no technical skills at all. The present practice in most universities focuses more on scientific research as a means to achieve promotion. These opportunities are more limited in TVET institutions, limiting a teacher's promotional and career prospects.

[56] Speech at 2014 *China Development Forum*, Saturday, March 22, 2014

As BU is currently undergoing its TVET transformation in advance of most its counterparts and with access to funds, expertise and support through the ADB project, it is reasonably expected that BU will be in a more advantaged position to make the transition than other institutions in Guangxi or in most areas of China. This provides a major opportunity for BU to play a leading role, potentially a Demonstration TVET applicable university role, in Guangxi and the broader region. It also provides support for the current central initiatives that BU is seeking to organise and manage e.g. the TVET Teachers Centre, the Entrepreneurship incubator and the TVET Association.

Recommendations

1. Changes in Students Learning and Training Mode

Classroom instruction closely integrated with workshops and school-industrial partnerships should be central to the learning that occurs in a TVET university. It is evident that of the 19 universities to be transformed, some have established good school-industrial partnerships. However, some are still operating within a more traditional academic environment that sees little linkage with industries. It is also apparent that some universities' only involvement with industry is limited to their role as investors.

While BU has started its reforms in improving the relevance of student learning, much more needs to be done to benefit from more industry involvement. BU is in a position to provide an example and provide experience for others to follow.

2. An overview of curriculum offered in the 19 Universities

In all there are 166 majors in the 19 universities. However, a preview of these majors reveals that liberal arts pre-dominate in terms of student enrolments. The No.1 major is marketing, appearing in 17 universities, followed by English and computer science in 16 universities. The third most prevalent majors are visual communication and design, environmental design, finance and accounting in 13 universities. In fourth position are international trade, hospitality and tourism and Chinese language in 12 universities. An apparent conclusion is that the 19 universities have a considerable number of overlapping majors. It is also apparent that majors leading to employment in both the priority sectors and emerging sectors identified in Guangxi are not well subscribed to by student enrolments. Table 2 provides an overview of the frequency of offered majors and their ranking in terms of popularity across the 19 universities.

Table 2: Majors offered in the 19 Guangxi Province Universities

Numbers of Universities that have identified majors	Majors	Most popular Majors
17	Marketing	1
16	English, Computer Science	2
13	Finance, Visual Communication and Design, Environmental Design, Electronic Information Technology	4
12	International Trade, Hospitality and Tourism, Chinese language	3
9	Communication Engineering, Pre school Education, Maths	3
8	Chinese for International Education, Sports Education, Music	3
7	Public Relations, Fine Arts, Business English, Software Engineering, Automation, Business Administration, Electric Engineering and Automation, Product Design	8
6	News Report, Elementary School Education, Social Sports Guidance and Management, Political and Ideological Education, Chemical Engineering and Techniques, Human Resources Management, E-Business, Internet Engineering, Machinery Design and Production	9
5	Garments Design, Chemistry, Applied Physiology, Public Administration, Machinery Design and Production, Pharmacy, Advertisement, Information Management and System, Cartoon Animation, Project Management, Law	11
4	Dancing, Applied Chemistry, Physics, Digital Media and Technology, Internet Engineering, Information and Computerizing Science, Vietnamese language, Logistics, Project Costing, Food Processing, Civil Engineering, Thai language, Bio Technology	13
3	Economics, Musical Performance, History, Japanese language, Monitoring Technology and Instruments, Electric Science and Technology, Motor Vehicle Engineering, News Announcer and Anchoring	12
2	Hotel Management, Statistics, Gardening, Electric Information and Technology, Financing, Investment, Logistics, Motor Vehicle Services, Applied Statistics, Secretary, Transportation and Communications, Arts Education, Cultural Industry Management, Taxation, Broadcasting and Television, Broadcasting and Television Editing and Conducting, Bio Technology, Industrial Engineering, Architecture, Applied Physics, Bio	26

	Science, Material Chemistry, Geography Information and Science, Machinery Engineering	
1	Science of Education, Exercise-based Recovery, Garment Design, Advertisement Design and Making, Computer and Internet Technology, Built-in Systematic Engineering, Accounting and Auditing, Computerized Accounting, Secretary, Cooking Skills and Nutrition, Stage Performance, International Business, Rural Development, Agricultural and Forestation Management, Land Resources Management, Finances, Labor and Social Security, Insurance, Economic Statistics, Conference and Exhibition Management, Real Estate Development and Management, Humanity Geography and Urban Planning,, Finance and Accounting Education, Environmental Arts Design,, Asset Assessment, Humanistic Education, Metal Material Engineering, Marine Techniques,、marine engineering, aquaculture, Marine Science, Urban Management, Science of Education, Forestation Chemistry, Garment and Ornament Design, Aircrafts Manufacturing, Energy and Dynamics Engineering, French Language, Artistic Designing, Management Science, Property Management and Social Work, Electricalized and intelligentualized Buildings, Translation, Environment Science, Editing and Publication Science, Cooking and Nutrition Education, Indonesian Language, Laos Language, Burmese language, Safety Engineering, Digitalized Media Arts, mechatronic engineering, Social Work, Surveying Engineering, Prospecting Technology and Engineering, Urban and Rural Planning, Water and Sewage Science and Engineering, Jewelry and Material Technology, Garment Design and Engineering, Artistic Designing, Traditional Chinese Medicine, Acupuncture and Massaging, Nursery, Medication, Pharmaceutical formulations, Food Quality and Safety, Rehabilitation therapy、Medical Laboratory Technology、Facility agricultural science and Engineering	71
		166

Many of the majors offered in other universities are also offered at BU. *Table 3* compares the 5 currently identified priority sector majors for the Guangxi Baise TVET Reform Project with their inclusion at other universities.

Table 3: BU Priority Majors

Priority Sector Majors under ADB Project		Offered at other Guangxi Province Universities
Education	Pre-school Education	9
Aluminum	Materials Modeling and Control Engineering	3
	Material Chemistry	2
	Metal Material Engineering	1
Agriculture	Facility Agriculture	1
	Bio Technology	4
	Food Processing	4
Engineering Management	Project Management	5
	Project Costing	4

While pre-school education is also found in nine other universities, it is limited to courses offered at VC and undergraduate levels only. BU has its pre-school education running through all three levels (SVS, VC and UG). There is an opportunity for BU to provide a leading role in this priority sector. Aluminium processing is offered only at BU, providing the major focus for this industry sector.

BU has established a new major in Agriculture which is the only major offered amongst the 19 TVET applicable universities Guangxi. In addition, the other two majors in food processing and bio-technology also have limited opposition from the other universities.

Engineering Management will encounter strong competition from the other transformed universities. Some differentiation in courses and focus needs to be considered in offering this major.

2. Dual Qualified Teachers in the 19 Universities

As indicated in Table 1, nine of the 19 universities include a statistical record on their website of their dual qualification teachers. The percentage of dual qualification teachers is listed as follows:

- Guangxi Finance College 60%: Nanning College 40%: Guilin Aero Industrial College 30%: Qin Zhou College 25%: Wu Zhou College 17.5%: Baise University 14.5%: Guangxi Foreign

Languages College 7%: Li Jiang College 3%: and, Yu Lin College 0.6%

As the top 3 universities in terms of numbers of dual qualified teachers (Guangxi Finance College, Nanning College and Guilin Aero Industrial College) used to be vocational colleges before they became academic undergraduate universities. They therefore made a considerable effort to getting more dual qualification teachers onto their staff.

Qin Zhou College, Baise University, and Wu Zhou College have started to emphasise the importance of TVET capacity building, including attracting and upgrading dual qualified teachers, after they changed from a teachers' college to an undergraduate university. The same is true for Guangxi Foreign Languages College, Li Jiang College and Yu Lin College. No information about dual qualification teachers is available for the remaining ten universities.

3. Recommendations for BU to provide upgrades to dual qualification teachers

BU needs to increase its dual qualification teachers to at least 50% by the conclusion of the ADB project. BU, as a TVET applicable university, will only have credibility with the other universities, government agencies and, most importantly, industries if it can demonstrate that its courses are delivered by staff members that have significant and recent industry experience. While following national and provincial standards on dual qualification teachers, BU should further improve its own standards by maximizing industrial experience for its teachers. BU also needs to formalise it processes for teachers to attain dual qualification through clear policy and guidelines developed in consultation with industry.

4. Quality Assurance

It is still too early to know how the 600 TVET applicable universities will be quality assured, with both internal and external quality assurance (QA) yet to be determined by national and provincial governments. This will be a challenge for the TVET system, with such large numbers and also with many institutions lacking TVET backgrounds and knowledge. It is therefore recommended that BU apply a strong regime of QA to its current reforms in curriculum, teaching and assessment and course and qualifications.[57] The current project support will provide QA information in all aspects of TVET that can be used to assist system changes in response to the creation of TVET applicable universities.

[57] Locally, QA includes the four elements of *a well-set orientation*, *conditional assurance*, *product contribution and customer satisfaction – all of which are highly market-responsive*.

Appendix Four: Analysis of BU, BVC and BVS Programs

This analysis is based on the following sources:

- BU data
- BU baseline survey;
- BU teachers' questionnaire; and
- Site visits and interviews.

A total of 110 BU teachers were surveyed, accounting for 21.5% of all BU teachers (including SVS, VC and undergraduate levels).

The three main levels of BU courses are analysed through the data gathering and analysis: i.e. Undergraduate (UG), Vocational College (VC) and Secondary Vocational School (SVS) courses.

5. Analysis of BU undergraduate programs

1.1. Undergraduate programs and students

At present, BU offers 34 undergraduate programs in 8 Departments: Economics, Law, Education, Liberal Arts, Science, Technology, Management and Fine Arts, with a total enrolment of 8,054 students, with an average of 237 students in each program. The enrolment breakdown by departments and programs is indicated in Table 1:

Table 1: ***Undergraduate curriculum and student enrolment, including adult undergraduate education***

Departments	**Matching Programs**	**Current students**	
		2012	**2013**
Economics	International business and trade	267	261
Law	Political and ideological education	179	284
Education	1. Humanity Education	53	140
	2.Pre-school Education	130	145
	3. Elementary School Education	136	216
	4. Physical Education (PE)	312	361
	5. P.E. Guidance and Management	101	113
Literature and arts	1. Chinese language and literature	484	581
	2. Chinese as a second language	169	175

	3. English language	487	497
	4. Thai language	101	135
Science	1. Maths and Applications	276	294
	2. Physics	109	115
	3. Chemistry	148	165
	4. Biology and Technology	203	269
Technology	3. Materials Modeling and Control Engineering	36	74
	2. Material Chemistry	82	134
	3. Metal material engineering	238	207
	4. Electrical Engineering and Automation	88	145
	5. E-information engineering	310	320
	6. Communication engineering	79	125
	7.Computer science and technology	380	404
	8. Internet engineering	0	83
	9.Chemical engineering and techniques	327	338
	10. food science and engineering	40	80
Management	1. Project management	649	687
	2. Project costing	0	107
	3. Marketing	199	201
	4.Accounting management	466	499
	5. Tourism management	303	284
Fine Arts	1. Music and performance	198	205
	4. Visual communication and designing	0	45
	3. Environmental design	0	48
	4. Product designs	397	317
Total		**6947**	**8054**

Source: BU data

BU has currently had no problem in enrolling enough students for all the listed programs, with 14 of them (41.2%) exceeding the average student numbers. These 14 programs are Project Management (687 students), Chinese language and Literature (581 students), Accounting management (499 students), English language (497 students), Computer science and Technology (404 students), Physical Education (317 students), Maths and Applications (294 students), Political and Ideological Education (284 students), Tourism (284 students), Biological Technology (269 students), International Business and Trade (261 students).

While these programs indicate strong market competitiveness by BU, it should be noted that these programs are also commonly offered in BU's counterparts in Guangxi. How to avoid an overlap of programs is a focal consideration if sustainable market edge is to be maintained in the process of capacity building.

1.2. BU undergraduate programs that supply graduates for the four Baise key industries

BU has tried to emphasise through its programs and majors that the development of a science and technology-based undergraduate education must be responsive to the changes in local economic development, as indicated in Table XXX:

Table XXX: BU undergraduate programs that match four high demand industries in Baise

The four focal industries	Matching Programs	Current students
Aluminum Processing	1. Metal Material Engineering	207
	2. Material Chemistry	134
	3. Chemical engineering and techniques	338
	4. Materials Modelling and Control Engineering	74
	5. Electrical Engineering and Automation	145
Agriculture	6. Biology and Technology	269
	7. food science and engineering	80
Tourism	8. Tourism management	284
	9. Music and performance in orientation of folklore culture and arts	205
	10. Product designs in orientation of folklore crafts design and development	317
	11. English language	497
	12. Thai language	135
	13. Chinese as a second language	175
Engineering Management	14. Marketing	201

	15. International business and trade	261
	16. Internet engineering	83
	17. Accounting management	499
Total		**3904**

Source: BU data

Analysis: Off all undergraduate programs offered in BU, 17 are responsive to the four high demand industries in Baise, accounting for 50% of all programs. Current student enrolments in these programs are 3,904, accounting for 48.5% of all BU undergraduates. This indicates that BU does fairly well in planning a curriculum and student enrolment that is responsive to local industry development.

1.3: Graduate employment

Table 3 provides a breakdown of undergraduate level graduates over the past three years.

Table 3 BU: Undergraduate level graduate employment 2011-2013

	Employ-ment rate	**% of employment in Guangxi**	**% of employment outside Guangxi**	**Major-job matching**	**Average starting pay**
2013	93.86%	79.29%	20.71%	49.80%	2000
2012	92.80%	80.80%	19.20%	48.50%	2000
2011	92.31%	85.88%	14.12%	45.56%	2000

Source: BU data

Analysis: As indicated in the data for the past three years, BU enjoys a stable and high level of graduate employment. The employment rate for 2013 was as high as 93.86% and 80 % of these graduates found their (initial) jobs in Guangxi. However, lower than 50% of the employed students could apply directly what they had learned through their major study area in their jobs. Based on this analysis, consideration needs to be given to the following:

- Programs need to be further readjusted that are more responsive to regional and local industries;
- Present programs need to have a better and clearer positioning with employers;
- Higher graduate employment quality needs to be addressed that will showcase BU's brand majors, quality majors and featured majors

2. Analysis of BVC's programs

2.1 Current TVC programs and students in BU

At present, BVC offers 38 programs in 13 departments in Agriculture, Biology and Medicine, Materials and energy, Civil work, Manufacturing, E-information, Light textiles and food, Finance and accounting, Tourism and hospitality, Public administration, Culture and Education, Arts design and Media communications and Law. Student numbers in 2013 were 2 052 as shown in Table 4:

Table 4: Full time BVC programs and students

Departments	Matching Programs	Current students	
		2012	2013
Agriculture	Tea ceremony	0	0
Biology and medicine	5. Applied Chemical Engineering and technology	26	0
	2. Industrial analysis and testing	32	13
Materials and energy	Material engineering and technology	64	25
Civil work	1. Construction engineering and management	98	140
	6. Project costing	0	48
	3.Real estate and property management	0	18
Manufacturing	1. Modelling designs and production	11	10
	2. Electrical and Mechanical integration techniques	39	18
E-information	1. Computer application and technology	13	12
	2.Computer and network technology	0	0
	7. Computer and multi- media technology	0	0
	8. E-information engineering and technology	59	49
	5. Communication technology	26	0
Light textiles and food	Food nutrition and testing	40	19

Finance and accounting	1. Insurance	23	49
	2. Computerised accounting	273	254
	3. International business	54	42
	4. Investment promotion and management	0	0
	5. Procurement sources and management	0	0
Tourism and hospitality	1.Tourism and management	21	12
	6. Hotel service and management	0	19
Public administration,	1. Social work	0	0
	2.Housekeeping service and management	28	14
Culture and Education	1. Chinese language	181	231
	2. Applied English	0	0
	7. Office secretary	20	0
	8. Applied Vietnamese	14	0
	5. English and education	135	111
	6. Musical education	0	0
	7. Fine arts education	0	0
	8. PE Education	0	0
	9.Pre-school education	451	543
	10.Elementary school education (two year program)	0	100
Arts designing and media communications	1.General liberal arts education	285	243
	2. News editing and making	70	36
Law	Law secretary	72	46
Total		**2035**	**2052**

Source: BU data

Analysis: Excluding the 10 programs that have no current students, an average of 73 students is enrolled in VC programs, indicating a very small enrolment and raising viability issues.

Of the programs, the top 7 in terms of student enrolment are Pre-school education (543 students), Computerised accounting (254 students), General liberal arts education (243 students), Chinese language (231 students), Construction engineering and management (140 students), English and education (111 students) and Elementary school education (100 students). As was the case with BU's undergraduate programs, these 7 programs have a market edge in BU, but they are also the programs found in other VCs in Guangxi. Consideration needs to be given to avoiding repeated programs and to maintaining a market edge through more high demand (and different) courses.

Nine VC level programs have an enrolment lower than 20 students, accounting for 2.37 % of students. These programs are Industrial analysis and testing (13 students), Real estate and property management (18 students), Modeling designs and production (10 students), Electrical and Mechanical integration techniques (18 students), Computer application and technology (12 students), Food nutrition and testing (19), Tourism and management (12 students), Hotel service and management (19 students), Housekeeping service and management (14 students).

Ten programs have had no student enrolments in two consecutive years, accounting for 26.3% of the total programs. They are: Tea ceremony, Computer and network technology, Computer and multi-media technology, Investment promotion and management, Procurement sources and management, Social work, Applied English, Musical education, Fine arts education and Physical Education.

These undersubscribed VC courses indicate that BU should rationalize their program offerings to those that are more responsive to market needs. This requires better labour market information, current industry sector plans and forecasting (e.g. using signaling theory) of market trends as a basis for cancelling non- performing programs. Current well-subscribed programs that are leading to sustainable jobs need to be further strengthened.

2.2 Market responsiveness in the BVC programs

Table 5 shows how responsive the present BVC level programs are to local key industries.

Table 5: **BVC level programs that match four high demand industries in Baise**

The Four Base Industries in Baise	Matching TVC Programs	Current Students
Aluminium Processing	1. Material engineering and technology	25
	2. Industrial analysis and testing	13
	3. Modeling designs and production	10
Agriculture	1. Tea ceremony	No enrolment
	2. Food nutrition and testing	19

Tourism	1. Tourism and management	12
	2. Hotel service and management	19
Trade and Logistics	1. Investment promotion and management	No enrolment
	2. Procurement sources and management	No enrolment
	3. International business	42
	4. Insurance	49
Total		**189**

Source: BU data

Analysis: Eleven of the 38 BVC level programs are linked to and presumably providing skills required by the four base industries in Baise. These 11 programs only account for 28.9 % of the total BVC programs. The total student enrolment in the 11 programs is 189, accounting for only 9.2% of the students. There is a danger that the low student enrolments may lead to these programs being cut, in spite of their relevance to the current high skill demands of local industries. There is a major case for seeking industry support in promoting the programs that will lead to meeting demand. BVC also has an important marketing role in attracting students to enrol in these courses, based mainly on the promise of employment linked to students' majors' study on graduation.

2.3. Graduate Employment

Table 6 shows employment for BVC graduates over the last three years:

Table 6: BVC graduate employment, 2011-2012

	Employment Rate (%)	**(%) Employed in Guangxi**	**(%) Employed outside Guangxi**	**(%) Matching of Learning to Job**	**Average starting pay(RMB Yuan)**
2013	93.04%	97.33%	2.67%	60.55%	2000
2012	94.33%	93.78%	6.22%	62.15%	2000
2011	93.90%	95.68%	4.32%	55.55%	2000

Source: BU data

Analysis: An average employment rate of 93.7% was achieved for VC graduates in BU over the last three years, with 90 % of these graduates locally employed in Guangxi. Almost 60 percent of these graduates matched what they have learned to the jobs, 1% higher than for undergraduate students.

Starting salaries are also at the same level as for undergraduates[58]. This indicates that BVC graduates are in demand from industry: a strong justification for BU to further develop its VC level of education.

3. Analysis of Baise Secondary Vocational School (BVS) programs

3.1. BVS Curriculum and Its Students

Guangxi Department of Education released a document in 2013 entitled *Directive on Further Optimizing and Readjusting Current Curriculum among SVS in Guangxi*. Based on the minimum qualification requirements outlined in this document, only two BVS current programs meet these requirements. These two programs are Pre-school Education and Music. In 2014, Guangxi Department of Education released another document entitled *Directive on New Programs Offered in SVS in Guangxi*. In compliance with this Directive, BVS offered two more programs: Star-rated Hotel Operation and Management and Marketing.

At present, the BU owned BVS offers five secondary vocational programs that enroll a total of 321 students, as indicated in Table 7:

Table 7 BVS programs and Full time students

Department	Student enrolment			
	Admitted in 2011	**Admitted in 2012**	**Admitted in 2013**	**Current students in 2014**
1. Pre-school Education	121	93	84	298
2. Computer science	23			23
3. Music				No Enrolment
4. Star-rated Hotel Operation and Management				No Enrolment
9. Marketing				No Enrolment
Total				**321**

Source: BU data

Analysis:

BVS needs to increase its present enrolment to 1 200, the minimum qualification requirement for a SVS in China. The two reasons behind this are 1) BVS will justify its establishment by maintaining the minimum enrolment requirement, and BVS will provide a student reserve for future students in BU at both VC and UG levels.

[58] MoE data

3.2 Market responsiveness in the BVS programs

Three of the programs for which BVS has received approval are responsive to the four base industries in Baise, but regrettably, there are no enrolments at all in all these programs, as noted in Table 8:

Table 8: BVS programs responsiveness to the four base industries in Baise

Industries	Matching Programs	Current Students in 2014
Aluminium Processing	No matches	
Agriculture	No matches	
Tourism	1. Star-rated Hotel Operation and Management	No Enrolments
	2. Music	No Enrolments
Trade and Logistics	Marketing	No Enrolments
Total		**0**

Source: BU data

Analysis:

There are a number of key factors why BVS is very weak in its programs and these have been discussed previously (e.g. teaching quality, poor facilities and equipment, inability to attract students). Curriculum development provides a major opportunity for BVS to attract students. Curriculum leading to courses that are responsive to local market needs should benefit BVS through increased student enrolments and its capacity to serve the local economy. It will also be important to use the curriculum development opportunities provided by the ADB project to build courses at the SVS level that link to both VC and undergraduate courses.

1.3 Graduate Employment

Table 9 shows graduate employment from BVS over the past three years.

Table 9: BVS graduate employment 2011-2013

	Employ-ment Rate	Employed in Guangxi	Employed outside Guangxi	Matching of Major to Job	Average starting pay (RMB)
2013	95%	75%	25%	80%	1500
2012	94.3%	75.47%	24.53%	75%	1500
2011	96.7%	40.54%	59.46%	88%	1500

Source: BU data

Analysis:

An average rate of 95.3% has been achieved by BVS in its graduate employment over the last three years. Graduates have found their jobs within Guangxi at a rate of over 70% since 2012, with a major - job matching rate as high as 80%, a rate higher than both BVC and undergraduate students. This good graduate employment rate is heavily influenced by the BVS focus on a pre-school education major, where almost 100% of graduates will receive a job. However, it is a feature that BU should publicise in further developing its SVS program.

Engineering Analysis

Project Number: 47009 / TA 8448-PRC
September 2014

People's Republic of China: Guangxi Baise Vocational Education Development Project

Guangxi Baise Vocational Education Development Project
Engineering Analysis

1. INTRODUCTION

1. The project implementing agency (IA) is Baise University (BU), which is a certified full time undergraduate university by the Ministry of Education of PRC. The project will assist BU to construct a new campus at Chengbi in the north of Baise City. BU has two campuses as shown in **Figure 1**. The main campus of Donghe in Baise downtown area, the Chengbi Campus at about 5 km north of Baise, and each of the campus has east and west campuses. Based on the current BU planning, after the completion of Chengbi New Campus, all school departments will move to the new campus. The existing Donghe both east and west campuses, will be converted into middle school, living area, graduate school and kindergarten. The existing Chengbi West Campus will be converted into the living area. The area of Donghe campus is about 217 mu and that for Chengbi campus is about 1,698 mu. The Chengbi Campus is the future main campus of BU. Currently only a small part of BU facilities is located in the west Chengbi Campus. BU has started Phase I construction of the new Chengbi campus, and the proposed project will finance and assist BU to build Phase II of the new campus.

2. The new campus has a total area of 99.9 ha (1,498 mu) and the dimensions are about 1,210 m in north-south direction and 1,470 m in east-west direction. According to the campus master planning, there will be a total of 24 buildings and facilities at the new campus for teaching, experiment and training, living and supporting structures. The summary of the overall campus buildings and facilities are shown in **Table 1** and the campus plan is shown in **Figure 2**. The new campus will be built in an enclosed mountain valley with all buildings and facilities constructed next to or on the hillsides or excavated areas along both sides of the valley. The central axle of the campus, which is along the original centerline of the valley, will be developed with a manmade lake and water body using the existing stream as well as the recycled wastewater from the campus.

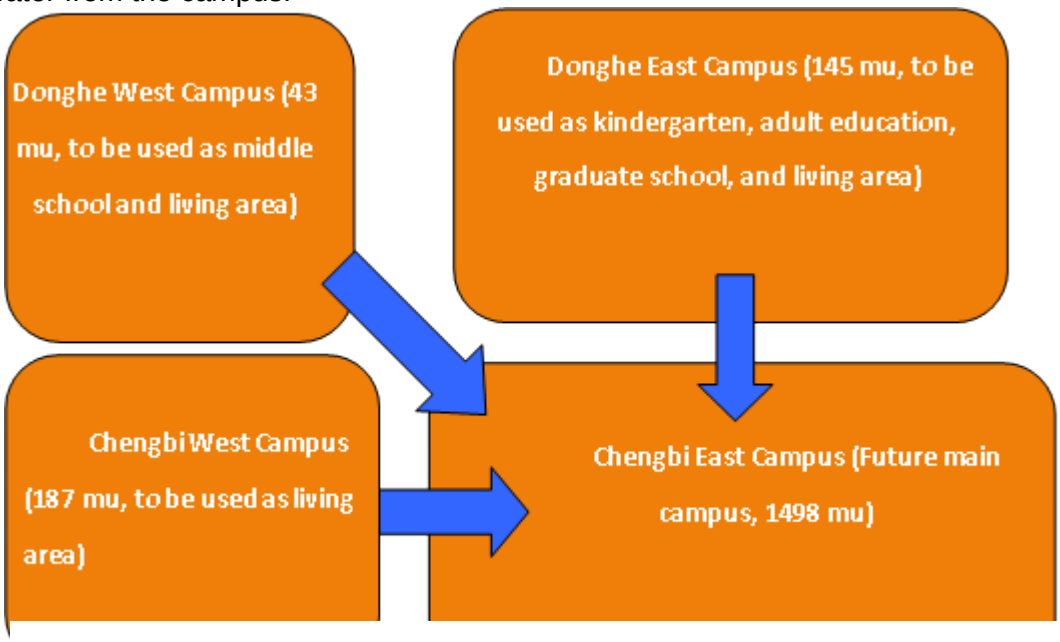


Figure 1 BU Current and Future Campus

Table 1 Summary of Overall Planned Campus Facilities

No	Name	Foot Area (m^2)	Building Area (m^2)	Story	Remark
1	Engineering Experimental and Training Center	3,225	19,600	6	
2	GMS TEVT Teaching Building	2,844	11,800	6	
3	Library	6,112	28,000	8	II
4	Public Experimental Center	4,700	22,190	6	
5	Public Teaching Center	3,113	20,480	6	
6	Administration Building	3,658	10,000	9	II
7	Business School Building	1,575	8,000	6	II
8	Politics and Law Department Building	1,820	8,000	6	II
9	Physics, Electronics and Math Building	2,970	17,800	6	II
10	Chemistry and Biology Department Building	2,970	17,800	6	II
11	Art and Science Education Building	3,500	16,200	6	II
12	Chinese and Foreign Language Department Building	3,200	16,150	6	II
13	Student Career Center	2,320	12,500	6	
14	School Clinic	727	1,100	2	
15	Student Dormitory I	6,400	38,250	6	
16	Student Dormitory II		50,000	6	II
17	Student Cafeteria	3,138	5,266	2	
18	Student and Teacher Cafeteria	2,545	7,600	2	
19	Academic Center	1,500	10,000	8	
20	Business Mall	15,000	30,000	2	
21	Gymnasium and Physical Education Building	4,187	8,200	2	II
22	Track & Field Platform	2,321	2,321	1	
23	Solid Waste Transfer Station	300	300	1	
24	Wastewater Treatment Plant	300	300	1	
	Total =	**78,425**	**361,857**		

(Source: Consultants)

Figure 2 Chengbi Campus Plan

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3. The construction of Chengbi campus construction will be divided into three phases as illustrated in **Figure 3.** Phase I construction, which is financed by the domestic funding, is in progress, Phase II construction is the proposed project and will be financed partially by ADB, and Phase III construction is in the planning stage and will be implemented in the future.

Figure 3 Phases I, II & III of Chengbi Campus Construction

2. VOCATIONAL EDUCATION IN PRC

4. In People's Republic of China (PRC), the education system is strictly controlled by the central government with the government defined certification system. An undergraduate program school/university is only allowed to generate undergraduate students, while a TEVT school is only allowed to produce TEVT graduates. Baise University (BU) is a certified undergraduate program school and its graduates are four year college graduates with Bachelor degrees except for the small numbers of TEVT students from its affiliated Baise TEVT School. Among the four year program universities in PRC, BU is a third or fourth tiers of universities with most students coming from regional and local areas. The graduates from the university cannot compete with those graduated from the larger national level universities due to the limited resources in teachers, education programs, facilities and other local restrictions. Most students will have to settle with jobs in locals and regional areas, and sometimes it is not easy to find the good jobs due to the fierce competitions from other graduates from the major universities. However, in the other hand, there is a big demand for the TEVT graduates, not only locally but also at the national level. The PRC education system has been put more emphasis on the four year college or higher education for the past several decades, and the numbers of the graduates from these colleges and universities have been growing rapidly. The TEVT education, in the other hand, has become a forgotten area with less investment and poor quality of the graduates. This unbalanced education development in PRC has resulted in a

huge problem between the college graduates and the actual demands from the society. The college students, especially those from the lower level universities, have difficulty to find good jobs for the qualifications they have, and in the other hand the industries and enterprises have difficulty to recruit skilled workers and technician with good TEVT training. The Ministry of Education of PRC has realized the problem of weak TEVT education system, and has increased the investments on TEVT education to improve the existing TEVT system, and has encouraged the education professionals to promote and improve the TEVT education system.

5. BU has been exploring the innovative approaches to improve its undergraduate programs. The school has proposed to educate and train its graduates with more application oriented qualifications with the integration of some TEVT skills, and tried to build up a college education program with the integration of undergraduate education, TEVT skill training, local and regional TEVT training program. The objective of this education reform is to produce the college graduates with education background and skills that are really needed by the society and the industries. For the proposed project, in addition to the construction work at new Chengbi campus, a strong capacity development program has been developed to assist to develop a multilevel TVET education system (MLT) with a strong regional corporation program, especially with the schools in the GMS countries and areas. The MLT system will emphasize to train the graduates with more application oriented skills, provide access for students to progress from secondary TVET, to TVET, and even to the undergraduate programs, and to establish stronger school and industry connection and corporation.

6. The design of the new Chengbi campus has incorporated the needs for TEVT training with necessary TEVT facilities. The campus will include a large engineering experimental and training center, which will be used for both college experimental labs and TEVT skill training. The GMS TEVT Teaching Building will be used specially for the training and teaching for the students and trainees from the counties and regions from the Great Mekong Sub-region (GMS). The business school building will be the home for current BU TEVT business school.

3. COMPONENT RATIONALE AND JUSTIFICATION

7. As mentioned previously, there two separate education tracks in PRC, one is the four year undergraduate program and the other is the technical vocational education and training (TVET) program. The two programs are completed separated with very little integration. For the TVET education, there are typically two categories. One is the primary TVET program, sometime simply referred as TVET, and the other is the secondary TVET program.

8. The primary vocational education and training schools (TVET) are 3~4 years' programs with the education objectives to train the students with some preliminary professional knowledge as well as certain vocational skills. The education curriculum will include most of college education courses in addition to the TEVT skill training. The graduates from the primary TVET schools will be issued diplomas of Higher TVET Certificates (Dazhuan). The secondary TVET education program includes secondary specialized schools, technical training schools and vocational high schools. The secondary TVET schools are usually 2 year programs with the emphasis to teach students the actual skills in production and services such as factories, kindergarten, nursing, etc. The graduates from the secondary TVET schools will be issued with TVET Certificates (Zhongzhuan).

9. The TVET education system in PRC has been a forgotten education system with less investment and attentions for the last several decades. One of the reasons could be the cultural influence of the traditional Chinese perception, where people do not feel the TVET education is a part of the higher education, rather than a simply skill training. People would rather spend more time and money to get college education rather than the TVET education, even thought

there is a big shortage of skilled workers and technicians in the current society. As the result, the four year college education program has been growing rapidly in PRC in the last several decades, while the TVET education system has not been sufficiently funded and developed. The college graduates, especially those from the 3rd, 4th or lower level colleges, are facing challenges to find good jobs, but in the other hand the industries and enterprises are having difficulties to find qualified skilled workers and technicians due to the less developed and unqualified TVET education programs.

10. The central government has realized the problems in the undergraduate and TVET education programs, and has been promoting education reform and the improvement of TVET education system. As reported by the news, the topic of improving the vocational education system in China is one of the topics discussed during the people congress held in March 2014. In 2005, the State Council issued "the State Council's Decision about Strengthening Vocation Education[1] " asking to strengthen the country vocational education program. Guangxi is the pioneer in promoting vocational education. In 2005, Guangxi Zhuang Autonomous Region Government held a conference for the vocational education within the region and issued the "Implementation Suggestion for State Council's Decision about Strengthening Vocational Education[2]" and "Notice for revitalization of vocational education's Nine Engineering Plan in Guangxi Zhuang Autonomous Region[3]", requesting the improvement and strengthening of the vacation education program in the region. In 2009, the first National Vocational Education Comprehensive Reform Pilot Area in Ethnic Minority Region was built by Regional government and Ministry of Education, and an agreement was signed to explore ways to accelerate the development of vocational education in ethnic minority region, which was a major a milestone of Guangxi vocational education development.

11. Guangxi Zhuang Autonomous Regions is one of the areas identified as Great Mekong Sub-region. In order to promoting GMS regional corporation, Guangxi has been identified as China-ASEAN Cultural Industry Logistics Zone and Training Base. There is an urgent need to cultivate a large number of multi-level vocational talents for meeting the regional development needs. Similarly to other parts of the PRC, the vocational education system in Guangxi is relatively weak, especially in Baise there is a lack a strong TVET leader to help improving the local TVET education system.

12. Facing the challenges and the local economic development needed, BU has developed the university development strategy for school long term development and to cope with the local development needs. The university has positioned its development direction as an application oriented undergraduate program with multilevel education system with integrated vocational education programs. The objective of the higher education is to produce college graduates with the skills and qualifications that are needed in the real world. As stated in the school development strategy plan[4], the school is to develop an education center in Baise, serving Guangxi and the other parts of the country, connecting to ASEAN countries, as a multilevel education system emphasizing on applications and integrating TVET programs. The school program will include undergraduate education, advanced and secondary vocational education, continuing education and preparatory education, etc. The other objective of the school development is to become a Baise TVET center by integrating and improving the TEVT education system in Baise. The rationale and justifications for the proposed project include:

- At present, the total building area for BU is about 207,944 m2 and the total number of students is about 14,939. The projected student enrollment by 2018 is 18000. The existing school facilities cannot meet the needs of students that is current in the

[1] National DRC (2005) No 35.
[2] Gui (2005) No 58
[3] Gui (2005) No 142
[4] Development Plan for Baise University (2012 - 2020)

campus and could not facilitate more future enrollments. The new campus will provide adequate teaching and living facilities to meet school development needs.

- Pioneer in improving PRC TVET program - the proposed university based TVET development is an innovative concept in PRC. If outcome of the proposed TVET system is successful, it will have import impact to PRC vocational education system.
- Promote TVET development in medium and small cities - the universities in the medium and small cities could not compete with the major universities. To adjust the development strategy for such schools may open new direction for school development.
- Innovative TVET development concept - Utilizing strong resources from universities to lead the TVET development could be more effective in improving the TVET education system.
- University based TVET development center - The university based TVET development center, as proposed by BU, could use the rich resources to provide training and instigate the local TVET programs for better TVET system. It could be a more effective way to improve the TVET system, and
- Introducing successful TVET experience from the developed counties.
- An improved employment opportunity for women and minorities – Baise has a high percentage of minority population and the minority accounts for more than 85% of the total population. For BU, the percentage of girl students is much higher than that of the boy students since the majority of the majors in BU such as preschool education attract more girl students. The project will help to promote and increase the employment opportunities for women and minorities.

4. PROJECT COMPONENTS FOR CIVIL WORKS

13. The new Chengbi campus is located in the north of Baise as shown in **Figure 4.** The civil works involve the construction of site work and site utilities, teaching and living buildings and facilities, and equipment procurement and installation. Phase I construction is mainly for the buildings and facilities in the west side of the campus including campus roads, Center Scenery Area, Engineering Experimental and Training Center, GSM TEVT Teaching Building, Public Teaching Center, Public Experimental Center, Student Cafeterias, Dormitories and sports facilities. Phase II construction is mainly at the east and central parts of the campus. There are 12 buildings including Library, Administration Building, Gymnasium, Business School, Politic and Law School, Chinese and Foreign Language Building, Physics Electronic and Math Building, Chemistry and Biology Building, Art and Science Education Building, and Dormitories B1, B2 and B3. In addition, Phase II construction will also build a photovoltaic power generation system, sports facilities, slope protection and other associated structures. The component will also include the procurement and installation of teaching and training equipment for various TVET and undergraduate programs, which will be procured using a special funding from the Ministry of Education. The summary of Phase II component is shown in **Table 2.** The summary of the teaching and lab equipment is shown in **Table 3.** The equipment mainly includes the training and teaching equipment for various labs and classrooms such as aluminum lab, chemistry lab, language lab, etc. The total civil works construction and equipment purchase and installation cost is about $82.4 million, and the estimated total investment is $103.9 million.

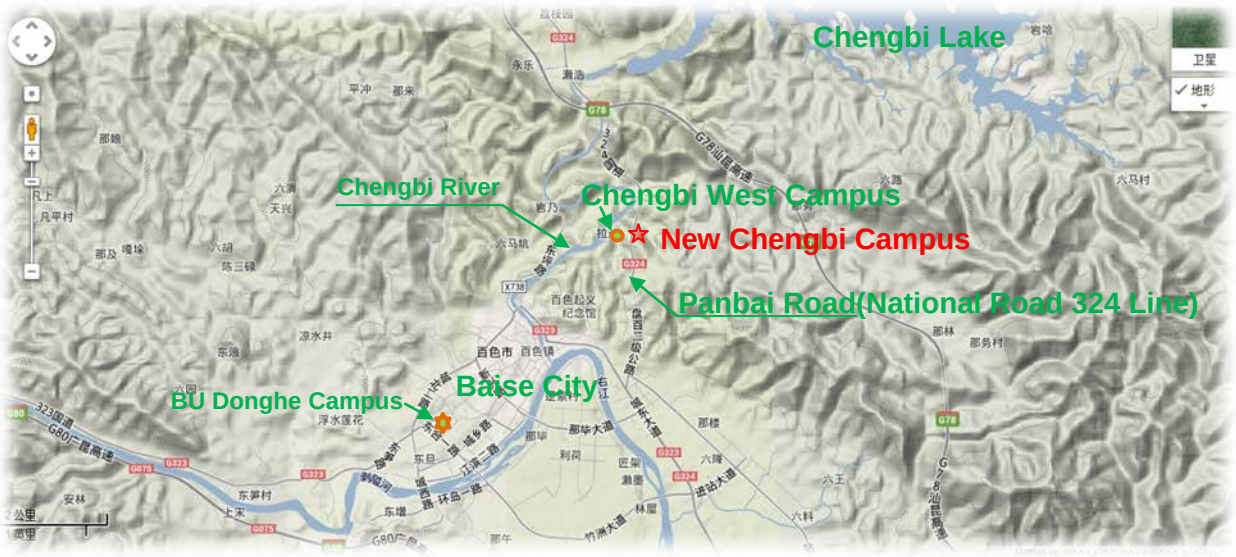

Figure 4 Location of Chengbi Campus

Table 2 Phase II Buildings and Facilities

No	Name	Foot Area (m^2)	Building Area (m^2)	Story	Remark
1	Library	5,019	27,545	8	
2	Administration Building	3,169	12,338	8	
3	Gymnasium and Physical Education Building	3,625	8,751	4	
4	Business School Building	2,090	8,788	6	
5	Politics and Law Department Building	1,491	8,295	6	
6	Chinese and Foreign Language Department Building	3,286	16,448	9	
7	Physics, Electronics and Math Building	3,412	19,538	6	
8	Chemistry and Biology Department Building	1,907	10,167	6	
9	Art and Science Education Building	3,854	17,006	6	
10	Dormitory B1	2,380	13,600	5	
11	Dormitory B2	1,080	9,060	6	
12	Dormitory B3	1,564	9,157	6	
	Photovoltaic Power System	Capacity = 3860000 kwh			
	Outdoor Sports Facilities	basketball, badminton, tennis courts			
	Slope Protection and Retaining Walls	Area = 40606 m^2			
	Teaching and Training Equipment				
	Total =	**32,877**	**160,693**		

(Source: Consultants)

Table 3 Summary for Teaching and Lab Equipment

No	Description	Unit	Quantity	Unit Price (10k CNY)	Cost (10k CNY)	Remark
1	Casting Mold Lab	set	1	261.47	261.47	
2	Electronic Simulation Lab	set	1	82.42	82.42	
3	Aluminum Lab	set	1	298.30	298.30	
4	Physics, Chemistry and Material Lab	set	1	251.50	251.50	
5	Chemical Engineering Lab	set	1	135.00	135.00	
6	Corrosion Protection Lab	set	1	90.00	90.00	
7	Chemical Engineering Simulation Lab	set	1	80.00	80.00	
8	Tropical Biology Lab	set	1	284.50	284.50	
9	Natural Organic Lab	set	1	290.00	290.00	
10	Agricultural Product Lab	set	1	444.26	444.26	
11	ERP Lab	set	1	50.00	50.00	
12	E-commerce Lab	set	1	60.00	60.00	
13	Language Lab	set	1	50.00	50.00	
14	Digital Language Lab	set	1	88.40	88.40	
15	Multipurpose Language Learning Center	set	1	253.00	253.00	
16	Internet and Information Lab	set	1	161.20	161.20	
17	Internet Engineering Lab	set	1	358.00	358.00	
18	Intelligence Control Engineering Lab	set	1	202.70	202.70	
19	Communication Engineering Lab	set	1	597.76	597.76	
20	Ethnic Minority Teaching Lab	set	1	157.00	157.00	
21	Digital Media Art Lab	set	1	122.22	122.22	
22	Fashion Design Lab	set	1	46.45	46.45	
23	Art Lab	set	1	50.68	50.68	
24	Clay Art Lab	set	1	63.12	63.12	
25	Textile Coloring Lab	set	1	112.35	112.35	
26	Tourism Planning Lab	set	1	200.08	200.08	
27	You River Basin Cultural Research Center	set	1	110.20	110.20	
28	Piano Room	set	1	135.00	135.00	
29	Acoustic Lab	set	1	48.18	48.18	
30	Music Room	set	1	32.19	32.19	
31	Minority Performance Hall	set	1	220.78	220.78	
32	Library Information System	set	1	547.84	547.84	
33	Campus Network System	set	1	512.90	512.90	
	Total =				**6397.50**	

(Source: Consultants)

5. PROJECT SPECIAL FEATURES

5.1 Photovoltaic Power Generation System

14. In order to promote the application of renewable energy and to demonstrate the use of solar power, a photovoltaic power generation system will be installed on top of the school buildings. The total design capacity will be 3.86 million kWh, and the power generated will be used for lighting, AC, hot water, and other school operation uses. The power generated will be used within the campus and it will not be integrated into the state grid system. The estimated power generation will account for about one third of the total campus consumption, which will save significant electrical bill for future school operation.

15. The proposed photovoltaic system consists of photovoltaic panels, which will be installed on top of the school buildings that have flat roof top, transformers, electrical conversion and control system, wiring cable and monitoring system. The estimated construction cost is about CNY 29.58 million.

5.2 Wastewater Treatment and Reuse System

16. The campus site water system, including the lake and center water pond system relies on the flood water discharged from a river in south of the campus. There could be short of water supply especially during the dry seasons. In order to promote wastewater reuse and environmental protection, a wastewater treatment and reuse system will be built and installed to collect and treat the campus sewage water and reuse the treated water for the campus lake and water body system. The design capacity of the system is 2000 m^3/day; the system will reduce CDO discharge for about 75 ton per year and saving water for about 6 million m^3.

17. The proposed treatment system will use biological treatment process, namely Anaerobic-Anoxic-Oxic process. The treatment processing chart is shown in **Figure 5.** The wastewater from the campus is first treated to remove large particles and debris, and then gone through the biological process of Anaerobic-Anoxic-Oxic, after further settlement and disinfection, the water will reach 1A standard and can be discharged into the campus site water system.

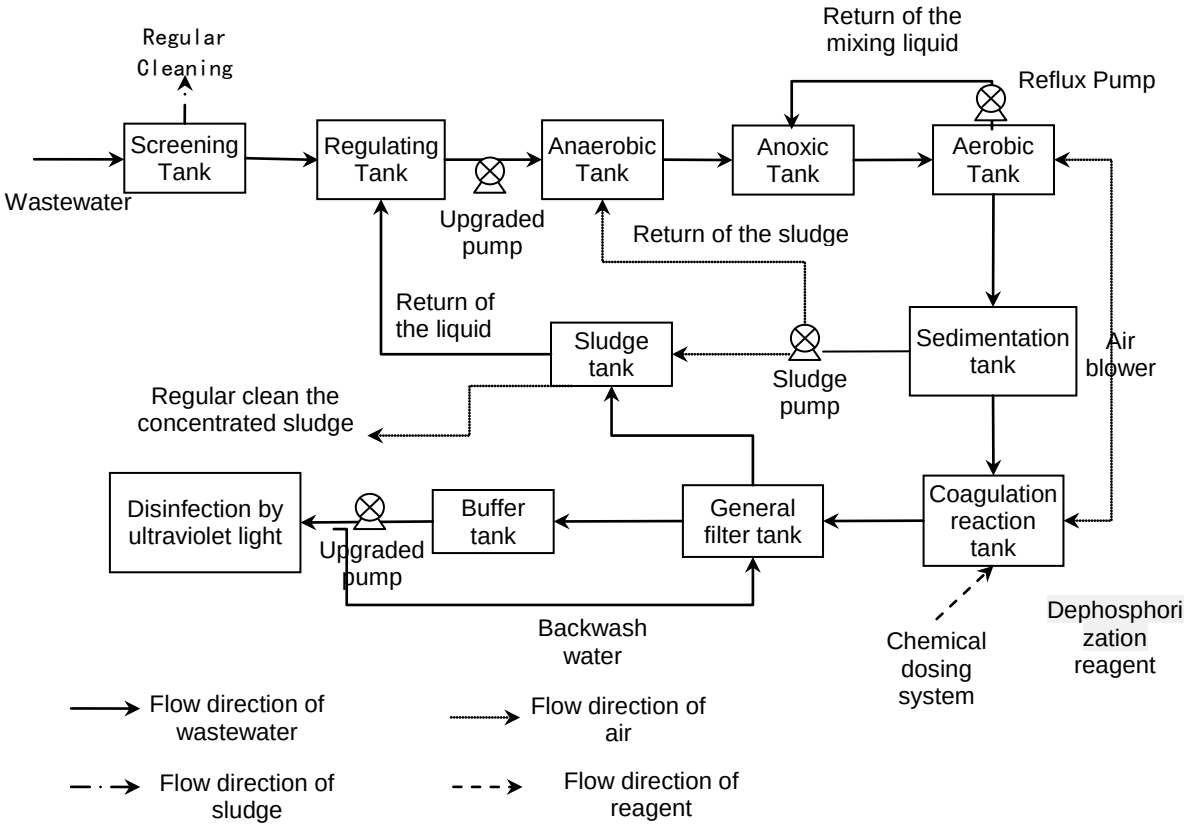

Figure 5 Wastewater Treatment Process Chart

5.3 Energy Conservation Construction Materials

18. New energy conservation construction materials have been proposed for the new campus buildings. The energy conservation sintered porous shale brick, which have better insulation properties than conventional concrete masonry blocks and are of lighter weight, will be used for all exterior walls. On the building roof, extrusion molding Polystyrene foam plastic board will be used to be exterior insulation layer which heat conductivity coefficient is low and about 0.03.the material use will improve insulation properties of roof. High efficiency energy saving lighting is proposed for the new school building. The high strength reinforcing steel will be used in the building structure, which will save steel usage in comparison to the conventional steel. The exterior glass curtain wall will be avoided as much as possible to improve the building energy consumption. To resolve afternoon hard sunlight, a kind of hollow glass will be used which name is LOE. on the other hand, a kind of simple aluminum alloy heat reflection coated glass windows will be adopted on the south windows of buildings to alleviate heat radiation. The energy saving design is conducted following the PRC energy saving codes and regulations including:

- Guidelines for Energy Saving in Engineering Design (GBJ6-85)
- Energy Saving for Public Building (GB50189-2005)
- Building Energy Saving Design Standards in Guangxi Zhuang Minority Autonomous Region (DB45/221-2007)

5.4 Heat Pump Hot Water and AC System

19. For campus AC systems in Administration Building and Library and hot water for the student dormitories, the energy efficient hot pump system will be used. The proposed heat pimp system is an integrated system to provide cooling and heating for two school buildings, Administration Building and Library, and hot water to the student dormitories. The proposed heat pump system is an energy efficient system to use heat exchange with the water body, the lake, in the campus to achieve heating or cooling effects. It is more energy efficient in comparison to the typical electrical hot water or AC system. The hot water produced by the system will be supplied to the student dormitories by pipelines.

6. ENGINEERING ANALYSIS

20. The campus design was carried out in accordance with national governing regulations and design codes. The design has adopted the approach of green development and energy conservation by introducing solar photovoltaic power system, onsite wastewater treatment and reuse system (financed and constructed in Phase I), energy efficient construction materials, etc. The major governing design codes and specifications include:

- Universal Design Code GB50763-2012
- Building Design Code GB50352-2005
- Fire Prevention Design Code for High Rise Buildings GB50045-95
- Energy Conservation Design Standards for Public Buildings GB50189-2005
- Library Building Design Code JGJ38-89
- Building Seismic Design Code GB50011-2001
- Building Foundation Design Code GB50007-2011

6.1 Campus Master Planning

21. The new campus is built in a small valley surrounded by mountains/hills in three sides. All buildings and facilities for teaching and living are built along the hill sides and some of them are on the cut and filled slopes. A natural lake will be preserved and a new water body will be built along the centerline of the campus at the location of the existing flood discharge ditch. The campus was divided into 6 functional areas as shown in **Figure 6** which are the Front

Campus Area, Teaching Experiment and Administration Area, Dormitory Area, Physical Education and Sports Area, and Ecology and Scenery Area.

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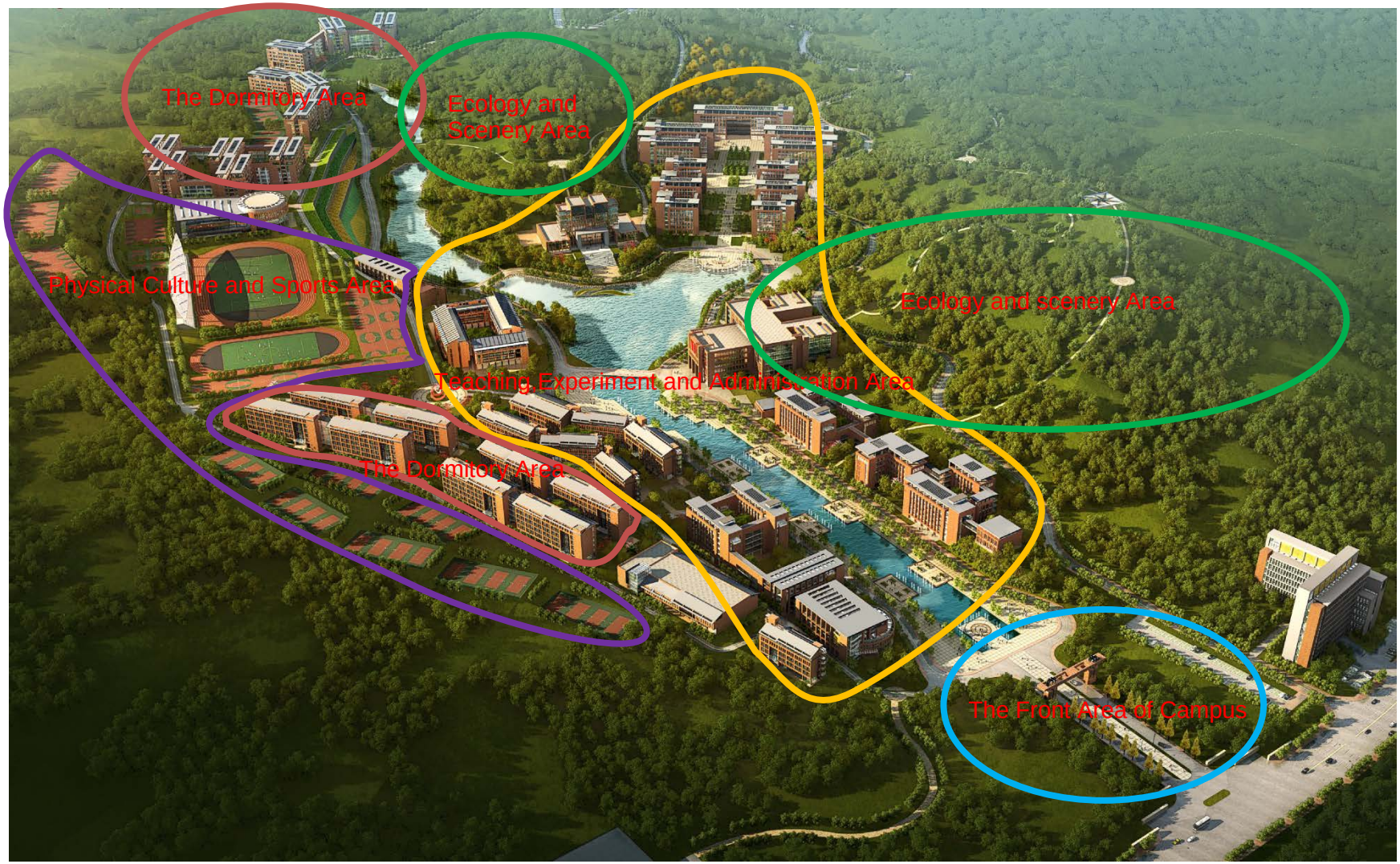


Figure 6 Campus Master Plan

a. Campus Traffic Planning

22. The campus road system shall be designed mainly for pedestrians, bicycles/e-bike with the full consideration of student safety. There are 3 types of campus roads in the current design as shown in **Figure 7**, namely campus major road, campus branch road, and campus walkway.

23. **The campus major road** (in red color) has the cross section of 2+7+2 m, designed for 2 travel lanes and 2 sidewalks. There are no NMT lanes for bicycles and e-bikes. The design shall be revised to include NMT lanes. The followings options can be considered: (i) widening the current road section (suggested section: 2+8.5+2 m); (ii) placing the additional NMT/bike lanes in the landscaping area along both sides of the road (suggested bike path wider: 2 m); or (iii) designing the road as one way traffic only.

24. **The campus branch road** (in green) has a road section of 4.5 m travel lanes without pedestrian and NMT lanes. The section shall be revised to include the sidewalk and NMT to accommodate the pedestrian and bike/e-bike traffic needs. The following options can be considered: (i) widening the road to include sidewalk, NMT lanes and travel lanes (suggested section: 2.5+4.5+2.5 m); (ii) adding sidewalk/NMT in the landscape area along both sides of the road; and (iii) designing the roads as pedestrian and NMT traffic only roads, which can be used as emergency fire truck routes.

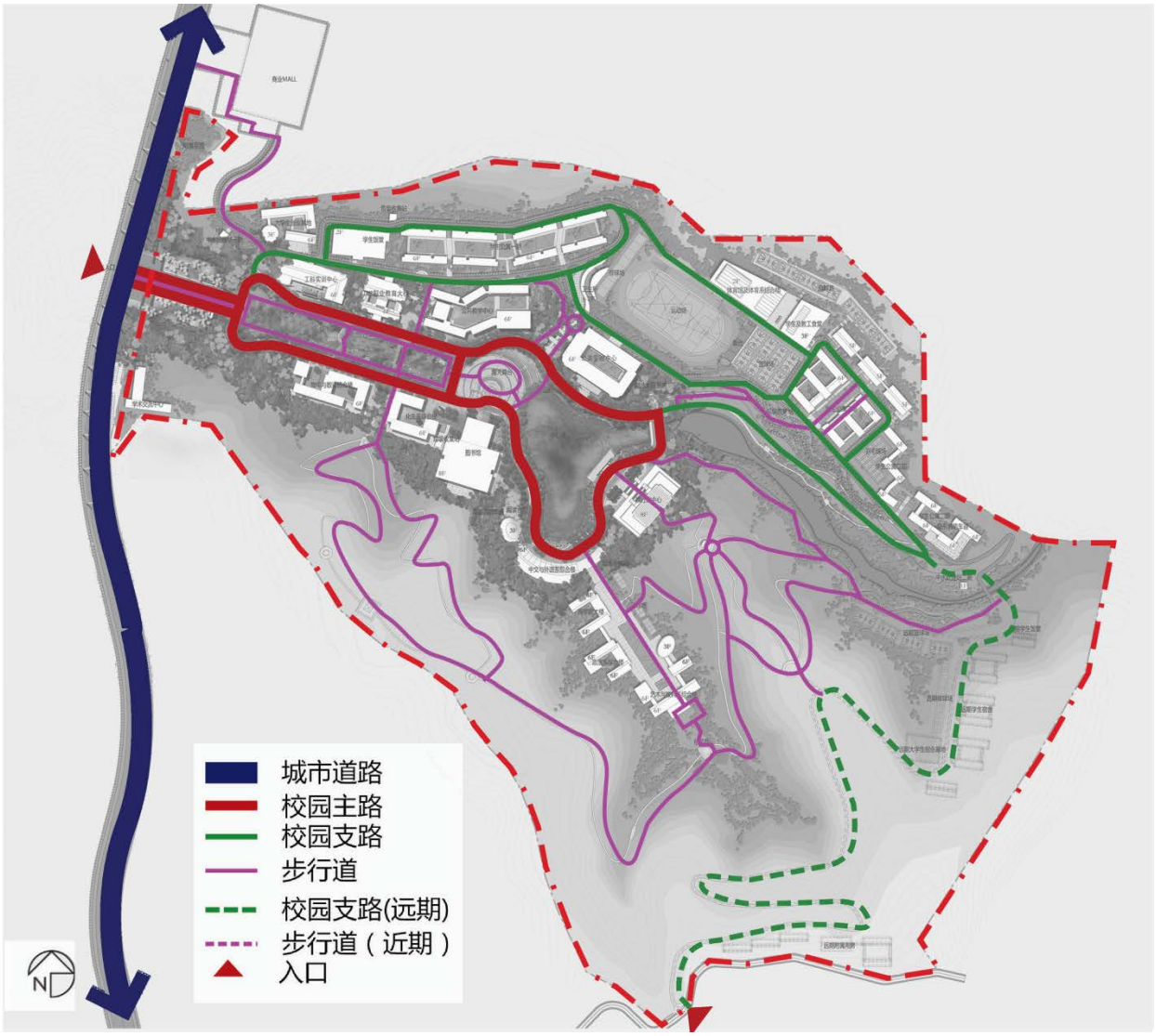
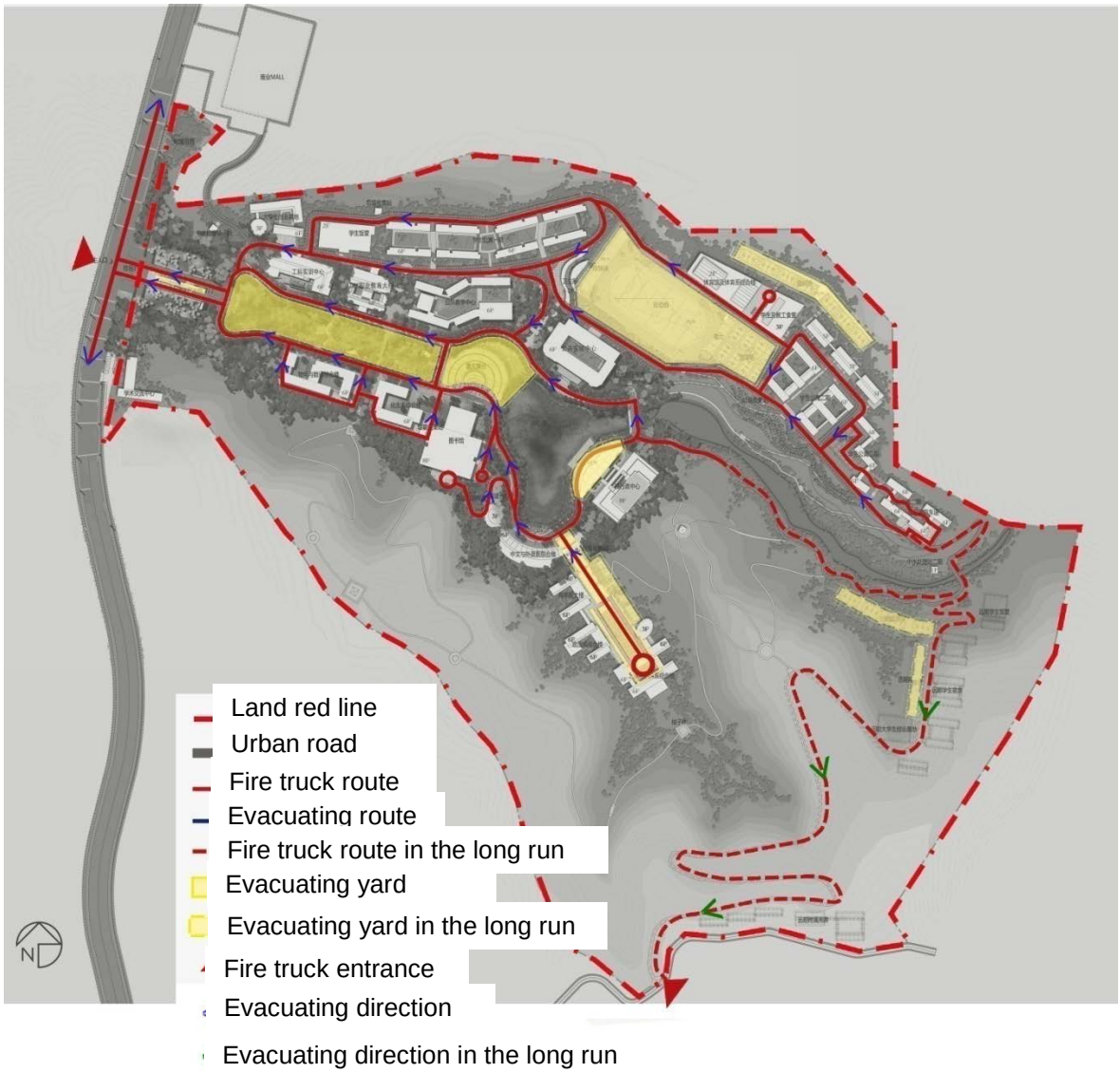


Figure 7 Campus Traffic Planning

b. Campus Fire Truck Route

25. The campus fire truck route is shown **Figure 8.** The updated fire truck route has covered all buildings on the campus to meet the fire-fighting requirements. Due to the large size of the fire truck and bigger turning radius, the fire truck route shall be detailed designed in the preliminary design stage to ensure that the all engineering and geometry details are in compliance of national fire-fighting design codes.

Figure 8 Campus Fire Truck Route and Emergency Evacuation Sites



c. Campus Security System

26. Typically a campus security system shall include the security pass system, security monitoring system, and campus emergency call stations. BU will install the security monitoring system using the domestic funding. For the proposed project, the security system will not be included. In addition to the security monitoring system, BU shall consider to install security pass system as well as emergency call station system in the future campus upgrades.

d. Campus Emergency Evacuation Planning

27. Schools are designed to be extremely safety-sensitive and able to handle emergency evacuations in the events of fire, earthquake, terrorist attack, and other natural or human disasters. Based on the campus planning and design, an emergency evacuation plan has been developed. The emergency evacuation sites as well as the emergency exits have been identified as shown in **Figure 8**. It is suggested that after construction is complete, the school should establish the designated safety and security unit in charge of the campus security and safety, develop the emergency evacuation plan, and conduct emergency evacuation drills and education program.

e. Campus Utilities

28. The new campus will be the home for 18,000 students plus teachers, faculties and supporting personnel. It will create great demands on various municipal utilities. The basic information of the campus utilities such as water, power, sewage and solid waste. The updated demand and supply analysis has been conducted in the FSR. With the proposed photovoltaic power generation system as well as the wastewater treatment and reuse system, the public utility providers from Baise municipal government can meet the new campus needs. Bu is in the process of communicating with the utility providers to secure the necessary commitment letters and/or permits.

f. Campus Flood Risk Assessment

29. The proposed waterway in the campus will be built on the old flood discharging ditch. A hydrological analysis and flood risk assessment has been conducted, and the risk of flooding to the campus is small. Based on the design flood water elevation and tunnel cross area, the maximum flood flow would be 12.4 m^3/s, while the maximum capacity of the campus discharging system is 23.8 m^3/s, which is adequate to discharge the flood.

g. Slope Stability and Slope Protection

30. The campus is surrounded by various hills and slopes, and the project involves lot of cuts to the existing hills. The slope stability is one of the major safety concerns for the project, especially during rains which could increase the risk of mudslides. At the FSR stage, the preliminary slope stability analysis shall be conducted and findings shall be included in order to come up with a reasonable cost estimate, which shall include geotechnical information, slope formation, typical stability analysis, recommended types of the slope protection, etc.

31. A preliminary geotechnical assessment was conducted to evaluate the potential risk of landslide and slope stability problems. The geotechnical formation at the campus site consists of top backfill soil of 0.8 to 1.1 m, hard clay of 0.3 to 15.3 m, sandy rock of 0.7 to 13.9 m, and lime stone of 2 to 18.8 m. The general condition of the geotechnical condition is categorized as the hard soil to soft rock. It is relatively stable and suitable for general construction.

32. Based on the geotechnical condition, 3 types of the slope protections can be used for the campus construction:

- Natural grass slope protection - where minor excavation is required.
- Gravity retaining wall slope protection - used at cut sections
- High slope protection with concrete reinforcement - for slope cut higher than 20 m

6.2 Campus Building Design

33. There are total of 12 buildings to be constructed in Phase II. Based on the campus master planning, the schematic design of each building has been completed for the FSR. The schematic design will be discussed and updated between BU and DI continuously to proceed towards the preliminary design. As for the civil work in the project, the dormitory buildings cater students daily life needs, the library buildings can be used for research and study activities, and the administrative buildings support institutional management. For all buildings except for the three dormitories, the library, the administrative, the summary of the functional areas for classroom, lab, office, and facilities is shown in **Table 4**,the 7 building functions embody some features as TVET buildings.

Table 4 Summary of Functional Areas in Each Building

No.	Names	Workshops/Lab		Facility Rooms		Classrooms		Admin Office	
		No. Room	Areas (m^2)	No. Room	Areas (m^2)	No. Room	Areas (m^2)	No. Room	Areas (m^2)
1	Gymnasium and Physical Education Department Building	14	3440	2	140	10	788	14	512
2	Business Department Building	23	2160	0	0	17	1980	19	1074
3	Politics and Laws Department Building	10	900	0	0	25	2641	24	1064
4	Foreign Language, Chinese Department Building	29	2746	0	0	61	5599	54	2440
5	Building of Physics & Communication, Mathematics and Computer Engineering Department	78	7312	5	155	33	3475	17	1555
6	Chemical and Life Sciences Department Building	46	3133	1	37.88	28	2632	10	545
7	Arts and Educational Science Department Building	138	6972	9	148	28	2490	29	1108
	Total:	338	26663	17	480.88	202	19605	167	8298

(Source: Consultants)

6.2.1 Library

34. The library is a reinforced concrete frame structure with 8 stories above the ground and one underground story. The total building area and the footing area are shown in **Table 2.** The total building height is 38.7 m. The building includes four functional areas of storage, borrowing, reading and management. The design has fully incorporated the use of natural air flow and adoption of energy saving materials for exterior walls, roof and windows. The lighting design will follow national energy standards. A central AC system will be installed for the entire building.

35. In the revised FSR, it indicates that the AC system will be installed by school, which seems a mistake. The duct works for the central AC system need to be designed and installed together with the building construction.

6.2.2 Administration Building

36. The administration building is an 8 story reinforced concrete frame structure. The total building area and the footing area are shown in **Table 2.** The total building height is 29.4 m with one underground story. The building includes three functional areas of offices, conference rooms, and supporting use area. The design has fully incorporated the use of natural air flow and adoption of energy saving materials for exterior walls, roof and windows. The lighting design will follow national energy standards. A central AC system will be installed for the entire building.

37. In the revised FSR, it indicates that the AC system will be installed by school, which seems a mistake. The duct works for the central AC system need to be designed and installed together with the building construction.

6.2.3 Gymnasium

38. The gymnasium is a reinforced concrete frame structure with 4 stories above the ground and one underground story. The total building area and the footing area are shown in **Table 2.** The total building height is 27.0 m. The building includes three functional areas of physical education, teaching and research, and administration. The design has fully incorporated the use of natural air flow and adoption of energy saving materials for exterior walls, roof and windows. The lighting design will follow national energy standards. The building will not include central AC system; instead the individual AC system will be installed by the school separately in the future.

6.2.4 Business School Building

39. The business school building is a reinforced concrete frame structure with 6 stories above the ground. The total building area and the footing area are shown in **Table 2.** The total building height is 23.7 m. The building includes four functional areas of large classrooms, regular classrooms, teaching and research, and administration. The design has fully incorporated the use of natural air flow and adoption of energy saving materials for exterior walls, roof and windows. The lighting design will follow national energy standards. The building will not include central AC system; instead the individual AC system will be installed by the school separately in the future.

6.2.5 Political and Law School Building

40. The political and Law School Building is a reinforced concrete frame structure with 6 stories above the ground. The total building area and the footing area are shown in **Table 2.** The total building height is 23.7 m. The building includes three functional areas of teaching and training, teaching and research, and administration. The design has fully incorporated the use of natural air flow and adoption of energy saving materials for exterior walls, roof and windows. The lighting design will follow national energy standards. The building will not include central AC system; instead the individual AC system will be installed by the school separately in the future.

6.2.6 Chinese and Foreign Language Building

41. The Chinese and Foreign Language Building is a reinforced concrete frame structure with 6 stories above the ground. The total building area and the footing area are shown in **Table 2.** The total building height is 23.7 m. The building includes four functional areas of experimental and training, classroom, teaching and research, and administration. The design has fully incorporated the use of natural air flow and adoption of energy saving materials for exterior walls, roof and windows. The lighting design will follow national energy standards. The building will not include central AC system; instead the individual AC system will be installed by the school separately in the future.

6.2.7 Physics Electronics and Math Building

42. The Physics Electronics and Math Building is a reinforced concrete frame structure with 6 stories above the ground. The total building area and the footing area are shown in **Table 2.** The total building height is 23.7 m. The building includes three functional areas of teaching and training, teaching and research, and administration. The design has fully incorporated the use of natural air flow and adoption of energy saving materials for exterior walls, roof and windows. The lighting design will follow national energy standards. The building will not include central AC system; instead the individual AC system will be installed by the school separately in the future.

6.2.8 Chemistry and Biology Building

43. The Chemistry and Biology Building is a reinforced concrete frame structure with 6 stories above the ground. The total building area and the footing area are shown in **Table 2.** The total building height is 23.7 m. The building includes four functional areas of experiment and training, classroom, teaching and research, and administration. The design has fully incorporated the use of natural air flow and adoption of energy saving materials for exterior walls, roof and windows. The lighting design will follow national energy standards. The building will not include central AC system; instead the individual AC system will be installed by the school separately in the future.

6.2.9 Art and Science Education Building

44. The Art and Science Education Building is a reinforced concrete frame structure with 6 stories above the ground. The total building area and the footing area are shown in **Table 2.** The total building height is 23.7 m. The building includes four functional areas of experiment and training, classroom, teaching and research, and administration. The design has fully incorporated the use of natural air flow and adoption of energy saving materials for exterior walls, roof and windows. The lighting design will follow national energy standards. The building will not include central AC system; instead the individual AC system will be installed by the school separately in the future.

6.2.10 Dormitories B1, B2 and B3

45. The dormitory group B has 3 buildings. Each of them is a reinforced concrete frame structure with 6 stories above the ground. The total building area and the footing area are shown in **Table 2.** The total building height is 19.8 m. The first floor of the building will have study rooms, bike storage, laundry rooms, and other supporting use rooms. The stories 2 to 6 are student dormitory rooms. The design has fully incorporated the use of natural air flow and adoption of energy saving materials for exterior walls, roof and windows. The lighting design will follow national energy standards. The building will not include central AC system; instead the individual AC system will be installed by the school separately in the future.

7. CONTRACT PACKAGING AND PROCUREMENT PLAN

46. There are 12 buildings to be built in Phase II construction. In addition, the project will also install a photovoltaic power generation system, wastewater treatment and reuse system, and the procurement of teaching and experimental equipment that will be purchased using Ministry of Education special funding. Based on the discussion with BU for school activity and the construction needs, the contract packaging has been developed as shown in **Table 3.** The advance contracting and retroactive financing will be needed for the student dormitory package in order to meet school calendar need to receive new students in September 2015.

47. The detailed procurement plan which includes all contract packages for civil works, equipment purchase and installation, and consulting services is shown in the attached supplementary appendix.

Table 5 Contract Packaging

Package No	General Description	Estimated Value	Procurement Method	Review (Prior/Post)	Bidding Procedure	Advertisement (Quarter/Year)	Comments
	Civil Work						
C01	Site Utilities and Site Development	$5,127,885	NCB	Post	1S1E	Q1/2015	Note 1
C02	Student Dormitory B1, B2 & B3	$8,672,499	NCB (AC&RF)	Prior	1S1E	Q4/2014	
C03	Business, Political & Law, Art & Education, Administration, Chinese & Foreign Language	$18,260,154	ICB	Prior	1S1E	Q1/2015	
C04	Gym and Sports Facilities	$3,970,614	NCB	Post	1S1E	Q2/2015	
C05	Library, Chemistry $ Biology, Physics Electronic & Math	$17,388,718	ICB	Prior	1S1E	Q3/2015	
C06	Slope Protection	$3,577,716	NCB	Post	1S1E	Q1/2015	
	Equipment Supply & Installation						
E01	Photovoltaic Power System	$4,770,968	ICB	Prior	1S1E	Q1/2016	
E02	Heat Pump Systems at Libraey & Administration Building	$2,324,048	ICB	Prior	1S1E	Q1/2016	
E03	Teaching Equipment	$10,318,565					Note 2
NCB = National Competitive Bid, ICB = International Competitive Bid, AC = Advance Contracting, RF = Retroactive Financing, 1S1E = 1 Step 1 Envelope							
Notes:							
	1. Includes site septic tanks, soil erosion protection, and environmental protection cost.						
	2. Includes multiple contracts to be procured following national procurement procedures and financed by Ministry of Education (MOE) special fund.						

(Source: Asian Development Bank)

Annex 1

BU TVET features in Existing and Future Campus

As for the civil work in the project, the dormitory buildings cater students daily life needs, the library buildings can be used for research and study activities, and the administrative buildings support institutional management, 7 TVET-featured buildings at faculty levels are illustrated as follows:

TVET Buildings in the Project

No.	Names	Workshops /Lab		Facility Rooms		Classrooms		Admin Office	
		Room No.	Areas (m^2)	Room No.	Areas (m^2)	Room No.	Areas (m^2)	Room No.	Areas (m^2)
1	Gymnasium and Physical Education Department Building	14	3440.00	2	140.00	10	788.00	14	512.00
2	Business Department Building	23	2160.00	0	0.00	17	1980.00	19	1074.00
3	Politics and Laws Department Building	10	900.00	0	0.00	25	2641.00	24	1064.00
4	Foreign Language, Chinese Department Building	29	2746.00	0	0.00	61	5599.00	54	2440.00
5	Building of Physics & Communication, Mathematics and Computer Engineering Department	78	7312.00	5	155.00	33	3475.00	17	1555.00
6	Chemical and Life Sciences Department Building	46	3133.00	1	37.88	28	2632.00	10	545.00
7	Arts and Educational Science Department Building	138	6972.00	9	148.00	28	2490.00	29	1108.00
	Total：	338	26663.0	17	480.88	202	19605.0	167	8298.00

Among 338 workshops/labs, 41 of them are about to be moved from the present Donghe campus(see Attachment 1) and the 29 workshops/labs to be constructed in the proposed project. All these workshops/labs are necessary places and facilities to support basic TVET knowledge learning and skill training.

Table1：Workshops/Labs to be moved into the new campus

No.	Workshops/Labs	To be located in
1	Comprehensive Utilization Laboratory of Mineral Resources	Chemical and Life Sciences Department Building
2	Agricultural Nutrition and Analytical Testing Laboratory	Chemical and Life Science Department Building

No.	Workshops/Labs	To be located in
3	Food Nutrition and Testing Laboratory	Chemical and Life Science Department Building
4	Mineral Processing Laboratory	Chemical and Life Science Department Building
5	Rock and Mineral Analysis Laboratory	Chemical and Life Science Department Building
6	Financial Accounting Simulation Laboratory	Business College Building
7	E-Commerce Laboratory	Business College Building
8	Economy and Trade Laboratory	Business College Building
9	Analog Tour Guide Laboratory	Business College Building
10	Logistics Laboratory	Business College Building
11	The Western Guangxi Traditional Ethnic Sports Training Center	Gymnasium and Physical Education Department Building
12	3G Mobile Communications Innovation Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
13	CAD / CAM Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
14	DSP Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
15	FPGA Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
16	SCM Simulation Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
17	Electrical and Electronic Engineering Innovation Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
18	Circuit Production and Testing Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
19	Assembly of Electronic Technology Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
20	Electro-Mechanical Simulation Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
21	Engineering Mechanics Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
22	Engineering Drawing and Model Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
23	The Welding Training Room	Building of Physics & Communication, Mathematics and Computer Engineering Department
24	Mechanical Design and Analysis Training Room	Building of Physics & Communication, Mathematics and Computer Engineering Department
25	Computer Animation Design Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
26	Computer Professional Certification Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
27	Computer-Organization Principles and Maintenance Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
28	Advanced Metallic Materials Processing Technology Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
29	General Machine Tools Training Room	Building of Physics & Communication, Mathematics and Computer Engineering Department
30	The Locksmith Training Room	Building of Physics & Communication, Mathematics and Computer Engineering Department
31	CNC Training Room	Building of Physics & Communication, Mathematics and Computer Engineering Department

No.	Workshops/Labs	To be located in
32	Network Engineering and Information Security Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
33	New Aluminum Alloy and Processing Technology Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
34	Signals and Systems Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
35	Automatic-Control Principles Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
36	The Folk Crafts Design Laboratory	Arts Department and Educational Science Departent Building
37	Pre-School Training Center	Arts Department and Educational Science Departent Building
38	The Moot Court Laboratory	Politics and Laws Department Building
39	Multi-Functional Studio	Building of Chinese Department and Foreign Languages Department
40	Multi-Functional Language Laboratory	Building of Chinese Department and Foreign Languages Department
41	Foreign Language Self-Learning Center	Building of Chinese Department and Foreign Languages Department

Table2：New Workshops/Labs to be built during the project implementation

No.	Workshops/Labs	To be located in
1	Material Corrosion and Protection Laboratory	Chemical and Life Science Department Building
2	Chemical Analog Laboratory	Chemical and Life Science Department Building
3	Chemical Practicing Laboratory	Chemical and Life Science Department Building
4	South Asia Sub-tropical Biological Laboratory	Chemical and Life Science Department Building
5	Agro-Processing and Storage Laboratory	Chemical and Life Science Department Building
6	Natural Organics Laboratory	Chemical and Life Science Department Building
7	Physical and Chemical Innovation for Materials Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
8	Electro-Mechanical Simulation Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
9	Aluminum material molding and control laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
10	Molding Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
11	Communication Engineering Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
12	Network Engineering and Information Security Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
13	Network Engineering Laboratory	Building of Physics & Communication, Mathematics and Computer Engineering Department
14	Intelligence Control Engineering Training Center	Building of Physics & Communication, Mathematics and Computer Engineering Department
15	Clothing and Apparel Design	Arts Department and Educational Science Department Building
16	Piano Room	Arts Department and Educational Science Department Building

No.	Workshops/Labs	To be located in
17	Online Observation for Teaching and Education for Ethnic People Laboratory	Arts Department and Educational Science Department Building
18	Ethnic Arts Performance Hall	Arts Department and Educational Science Department Building
19	Dying and Weaving Laboratory	Arts Department and Educational Science Department Building
20	The Vocal Music Room	Arts Department and Educational Science Department Building
21	Digitalized Media and Arts Laboratory	Arts Department and Educational Science Department Building
22	Screening Laboratory	Arts Department and Educational Science Department Building
23	Ceramic Professional Laboratory	Arts Department and Educational Science Department Building
24	Musical Composition Laboratory	Arts Department and Educational Science Department Building
25	“Revolutionary” Tourism Planning and Engineering Laboratory	Politics and Laws Department Building
26	Research Center for Ethic Culture on the You Jiang Basin	Politics and Laws Department Building
27	Multilingual Language Learning Center	Building of Chinese Department and Foreign Languages Department
28	Multilingual Translation Skills Training Room	Building of Chinese Department and Foreign Languages Department
29	Digital Language Laboratory	Building of Chinese Department and Foreign Languages Department

Annex 2 - Teaching and lab equipment in new campus

1	**Rooftop solar photovoltaic power stations**				**2958.00**
1-1	(See listing plan ,which is 38,240,000, too high,please adjust to 25.98 million yuan)				2958.00
2	**Mold Laboratory**				**261.47**
2-1	Dual nozzle melt extrusion rapid prototyping machine	set	1	25.00	25.00
2-2	Slant bed CNC lathe	set	1	29.00	29.00
2-3	Engraving and milling machine	set	1	18.80	18.80
2-4	Activities bridge CMM	set	1	73.60	73.60
2-5	CNC EDM machine	set	1	7.90	7.90
2-6	Axis vertical machining center	set	1	68.00	68.00
2-7	All-electric two-color injection molding machine	set	1	9.80	9.80
2-8	Double injection mold	pair	3	0.90	2.70
2-9	All-electric casting machine	set	1	7.20	7.20
2-10	Aluminum die-casting mold	pair	3	0.80	2.40
2-11	Teaching stamping drawing machine	set	1	3.60	3.60
2-12	Aluminum Mould disassembly	pair	8	0.40	3.20
2-13	Removable aluminum injection mold	pair	8	0.60	4.80
2-14	Plastic materials	bag	1	0.07	0.07

2-15	Aluminum	piece	50	0.06	3.00
2-16	Mold display	set	2	1.20	2.40
3	**Electro-mechanical simulation laboratory**				**82.42**
3-1	Server	set	1	5.30	5.30
3-2	Computers and related equipment	set	51	0.84	42.84
3-3	Switching equipment , 24 S1824 + 10/100 Adaptive Switch	set	1	1.08	1.08
3-4	Electronic Design Simulation Software	pair	1	10.00	10.00
3-5	Mechanical Design Simulation Software	pair	1	8.00	8.00
3-6	Projection equipment	set	1	3.20	3.20
3-7	Cutting Board	set	4	1.50	6.00
3-8	Transfer Machine	set	4	1.50	6.00
4	**Aluminum molding and Control Laboratory**	**—**		**—**	**298.30**
4-1	Die casting equipment	set	3	1.80	5.40
4-2	Visualization temperature transparent plastic injection mold equipment	set	5	7.20	36.00
4-3	Visualization transparent metal mold equipment	set	5	0.50	2.50
4-4	Aluminum extrusion , blowing , suction , compression molding, stamping mold equipment	set	5	0.60	3.00
4-5	Aluminum injection mold equipment disassembly	set	5	1.10	5.50
4-6	Aluminum mold equipment failure analysis	set	3	1.20	3.60
4-7	Aluminum mold equipment disassembly combination	set	3	1.20	3.60
4-8	Color sectional aluminum mold equipment	set	2	1.30	2.60
4-9	Aluminum Mould equipment disassembly	set	5	0.60	3.00
4-10	Mapping bench disassembly	pair	20	0.80	16.00

4-11	Mold disassembly mapping tools	pair	20	0.30	6.00
4-12	Composite CMM equipment	set	1	31.00	31.00
4-13	Showcase	set	4	0.50	2.00
4-14	CAD / CAM / CAE computer room	set	20	0.70	14.00
4-15	EDM Machine ZNC-450	set	1	9.80	9.80
4-16	Axis machining center V800L-5AX-I	set	1	82.00	82.00
4-17	Injection molding machine	set	1	8.90	8.90
4-18	Stamping, drawing machine	set	1	4.50	4.50
4-19	Horizontal extrusion , blowing , suction , compression molding , punching machine Observing	set	1	18.00	18.00
4-20	Hydraulic universal testing machine	set	1	8.60	8.60
4-21	Impact Tester	set	1	3.50	3.50
4-22	Tribometer	set	1	22.00	22.00
4-23	Torsion testing machine	set	1	6.80	6.80
5	**Materials Physics Chemistry Innovation Lab**	**—**	**—**	**—**	**251.50**
5-1	SEM scanning electron microscope equipped with EDS (EDS)	250	1	250.00	250.00
5-2	Environmental Modification	1.5		1.50	1.50
6	**Chemical Training Center**				**135.00**
6-1	Ethyl acetate production line frame	set	1	55.00	55.00
6-2	Reactor	set	1	1.80	1.80
6-3	And in the kettle	set	1	1.80	1.80
6-4	Distillation column reactor	set	1	0.60	0.60
6-5	Sieve distillation column	set	1	4.00	4.00

6-6	Packing distillation column	set	1	4.60	4.60
6-7	Reactor condenser	set	1	2.00	2.00
6-8	Sieve column condenser	set	1	2.00	2.00
6-9	Packed tower condenser	set	1	2.00	2.00
6-10	Sieve preheater tower	set	1	1.80	1.80
6-11	Material pump (acetic acid, ethanol)	set	10	1.50	15.00
6-12	HTF pump	set	1	0.90	0.90
6-13	Vacuum	set	1	1.50	1.50
6-14	Level Display	set	30	0.80	24.00
6-15	Distributed Control System	set	1	18.00	18.00
7	**Corrosion and Protection Laboratory**				**90.00**
7-1	Electrochemical workstation (Integrated Test System)	set	1	21.00	21.00
7-2	Salt spray corrosion test chamber	set	1	3.70	3.70
7-3	Surface Coating Kit	set	1	5.00	5.00
7-4	Stress corrosion testing machine	set	1	15.00	15.00
7-5	Electrolytic cell , a saturated calomel electrode, a platinum electrode , etc.	-	1	1.00	1.00
7-6	DC power supply	set	1	1.00	1.00
7-7	Intelligent three elemental analyzer	set	1	1.30	1.30
7-8	Differential thermal analyzer	set	1	40.00	40.00
7-9	Ultrasonic cleaning	set	1	1.00	1.00
7-10	Anodizing tank	set	1	1.00	1.00
8	**Chemical Simulation Laboratory**				**80.00**

8-1	Server	set	1	2.30	2.30
8-2	Computers and related equipment	set	51	0.84	42.84
8-3	Switching equipment, accessories wire	batch	1	1.50	1.50
8-4	Switcher	set	2	0.75	1.50
8-5	Three switches	set	1	1.50	1.50
8-6	20K power supply	set	1	2.00	2.00
8-7	Chemical simulation platform	set	1	25.00	25.00
8-8	Projection equipment	set	1	3.36	3.36
9	**South Tropical Biological comprehensive laboratory**				**284.50**
9-1	Shaker	set	1	1.80	1.80
9-2	Electronic analytical balance	set	10	1.20	12.00
9-3	Cell fusion instrument	set	1	1.00	1.00
9-4	Biological Microscope	set	20	1.70	34.00
9-5	Fluorescence microscopy	set	1	10.50	10.50
9-6	Inverted microscope	set	1	20.00	20.00
9-7	Phase contrast microscope	set	1	7.50	7.50
9-8	Dissecting microscope	set	20	0.30	6.00
9-9	Minus 86 ℃ cryopreservation tank	set	2	4.50	9.00
9-10	Pipette series (each span)	set	2	1.80	3.60
9-11	Refrigerated Centrifuge	set	1	20.00	20.00
9-12	Professional digital fluorescence imaging system	set	1	20.00	20.00
9-13	UV - visible spectrophotometer	set	1	7.50	7.50

9-14	Temperature gradient PCR instrument	set	1	9.00	9.00
9-15	Cycler	set	1	8.00	8.00
9-16	Standard Edition biological digital interactive classroom system	set	1	24.00	24.00
9-17	Paraffin machine	set	1	8.60	8.60
9-18	Leica freezing microtome	set	1	19.00	19.00
9-19	Portable modulated chlorophyll fluorometer	set	1	15.00	15.00
9-20	LA-S versatile plant image analyzer system	set	1	13.50	13.50
9-21	LI-6400XTR portable photosynthesis measurement system	set	1	9.50	9.50
9-22	LCPro + automatic portable photosynthesis system	set	1	20.00	20.00
9-23	BaPS soil nitrogen cycle monitoring system	set	1	5.00	5.00
10	**Natural organic laboratory**				**290.00**
10-1	Fourier Transform Infrared Microscopy / Raman spectroscopy		1	36.00	36.00
10-2	Sonicator		1	1.00	1.00
10-3	Solid phase extraction device		1	1.00	1.00
10-4	Microwave extraction device		2	6.50	13.00
10-5	Ultrasonic extraction biochemical analyzer		2	3.00	6.00
10-6	Fluoscence fluorescence spectrophotometer		1	25.00	25.00
10-7	Vapor - mass spectrometry		1	128.00	128.00
10-8	Inductively Coupled Plasma Spectrometer		1	80.00	80.00
11	**Agricultural Processing and Storage Laboratory**				**444.26**
11-1	Atomic absorption spectrophotometer	set	1	31.00	31.00
11-2	Desktop (digital) low-speed centrifuge	set	2	0.20	0.40

11-3	Lovibond colorimeter	set	1	0.30	0.30
11-4	Gas chromatography -mass spectrometry	set	1	80.00	80.00
11-5	Nikon inverted fluorescence microscope	set	1	21.00	21.00
11-6	DYCZ-25D Vertical electrophoresis tank	set	2	0.18	0.36
11-7	DYCP-31BN -type horizontal electrophoresis tank	set	2	0.16	0.32
11-8	Universal Furnace	set		0.02	0.00
11-9	Milli-pore water system	set	1	10.00	10.00
11-10	Large horizontal electrophoresis tank	set	1	0.50	0.50
11-11	High-throughput large vertical electrophoresis tank	set	1	0.40	0.40
11-12	Electrophoresis power supply	set	1	0.69	0.69
11-13	C1000 PCR instrument	set	1	15.00	15.00
11-14	CFX 96 real-time quantitative PCR instrument	set	1	38.00	38.00
11-15	Pressing machine	set	1	0.17	0.17
11-16	Food display cabinets	set	2	0.14	0.28
11-17	Automatic Kjeldahl analyzer	set	1	7.20	7.20
11-18	Water Activity Analyzers	set	1	0.50	0.50
11-19	High-speed refrigerated centrifuge	set	1	3.50	3.50
11-20	High-speed desktop centrifuge	set	1	1.18	1.18
11-21	Vacuum oven	set	1	0.80	0.80
11-22	Water-Heated Incubators	set	2	0.80	1.60
11-23	Incubator	set	1	0.90	0.90
11-24	Humidity Chamber	set	1	1.20	1.20

11-25	Artificial climate chamber	set	1	2.00	2.00
11-26	Electric oven thermostat blast	set	2	0.25	0.50
11-27	Digital thermostat water bath	set	3	0.80	2.40
11-28	Shaker	set	1	1.00	1.00
11-29	Moisture Analyzers	set	3	0.50	1.50
11-30	Colloid	set	1	0.52	0.52
11-31	Rotary evaporator	set	2	2.00	4.00
11-32	Multi-purpose circulating water pump	set	2	2.30	4.60
11-33	Glassware dryer	set	2	0.20	0.40
11-34	pH meter	set	2	0.05	0.10
11-35	Automatic sealing machine	set	1	0.50	0.50
11-36	Sartorius electronic balance (0.1g)	set	2	0.50	1.00
11-37	Electronic Balance	set	2	0.50	1.00
11-38	Electronic balance (0.0001g)	set	2	0.70	1.40
11-39	Pink knives, aluminum case , for sampling device	set	3	0.02	0.06
11-40	Fatty acid value tester	set	1	0.80	0.80
11-41	Art Cake Decorating special spray gun	set	10	0.08	0.80
11-42	Intelligent temperature and humidity incubator	set	1	1.00	1.00
11-43	Abbe refractometer	set	3	0.40	1.20
11-44	Colorimeter measurement	set	1	2.90	2.90
11-45	Colorimetric color measurement instrument	set	2	0.80	1.60
11-46	Digital automatic polarimeter	set	1	1.20	1.20

11-47	Multi-speed oscillator	set	3	0.20	0.60
11-48	CNC ultrasonic cleaner	set	1	1.80	1.80
11-49	Desktop digital refractometer	set	1	10.80	10.80
11-50	Handheld Thermometer	set	3	0.05	0.15
11-51	And noodle machine	set	2	0.20	0.40
11-52	Timing electric mixer	set	2	0.20	0.40
11-53	Freeze Dryer	set	1	2.00	2.00
11-54	Rotary vane vacuum pump	set	1	0.10	0.10
11-55	Ice cream machine	set	1	0.80	0.80
11-56	Electronic scales	set	4	0.05	0.20
11-57	Juicer	set	4	0.25	1.00
11-58	Single Door Proofer	set	1	2.00	2.00
11-59	Vacuum packing machine	set	1	3.20	3.20
11-60	Concentrated under vacuum pot	set	1	4.50	4.50
11-61	A full set of molds and baking utensils	set	1	1.80	1.80
11-62	Electric oven	set	1	1.60	1.60
11-63	Semi-automatic segmentation spheronization machine	set	1	6.00	6.00
11-64	Dough Sheeter	set	1	1.80	1.80
11-65	Microwave	set	4	1.20	4.80
11-66	Cooker	set	8	0.08	0.64
11-67	Pans	set	8	0.08	0.64
11-68	Electric pressure cooker	set	4	0.05	0.20

11-69	Electric Fryer	set	4	0.20	0.80
11-70	Mixer beat eggs	set	2	0.20	0.40
11-71	Vegetable dehydration machine	set	2	1.80	3.60
11-72	Food cutting machine	set	1	0.32	0.32
11-73	Experimental pasteurization tank	set	1	2.50	2.50
11-74	Double cone rotary vacuum dryer	set	1	6.50	6.50
11-75	Thermostatic oven	set	4	0.02	0.08
11-76	Spray dryer	set	1	0.80	0.80
11-77	Hoods	set	2	0.80	1.60
11-78	Ultra-low temperature freezer	set	1	4.60	4.60
11-79	Refrigerator	set	4	0.50	2.00
11-80	Vacuum freeze dryer	set	4	0.50	2.00
11-81	Oven thermostat blast / oven	set	2	0.50	1.00
11-82	Infrared oven	set	2	0.35	0.70
11-83	Freezer	set	2	0.30	0.60
11-84	Heated Incubators	set	1	0.40	0.40
11-85	Bread fermentation tank	set	1	0.15	0.15
11-86	Cabinet shake-flask full temperature	set	1	1.50	1.50
11-87	Rotary evaporator	set	1	0.50	0.50
11-88	Rheometer	set	1	0.60	0.60
11-89	HPLC	set	1	36.00	36.00
11-90	UV-Vis spectrophotometer	set	4	1.20	4.80

11-91	Electronic Balance	set	2	2.00	4.00
11-92	Sterilizer	set	3	1.50	4.50
11-93	Laboratory PH meter	set	1	0.20	0.20
11-94	High-speed desktop centrifuge	set	1	3.80	3.80
11-95	Digital thermostat water bath	set	4	0.05	0.20
11-96	Clean Benches	set	2	1.20	2.40
11-97	Universal high-speed grinder	set	1	0.50	0.50
11-98	GBCN series quadruple magnetic stirring glass fermenter	set	1	10.00	10.00
11-99	GelDocXR + gel imaging system	set	1	19.00	19.00
11-100	Biological Microscope	set	1	32.00	32.00
11-101	Laboratory environment remodeling costs	—	—	5.00	5.00
12	**ERP Lab**				**50.00**
12-1	Internship analog sandbox	set	1	15.00	15.00
12-2	ERP Software	set	1	18.00	18.00
12-3	Goods and customs dimensional simulation training system	set	1	10.00	10.00
12-4	5.4 GPS / GIS simulation system teaching system	set	1	3.80	3.80
12-5	Projector	set	1	1.00	1.00
12-6	Laboratory control equipment	set	1	2.20	2.20
13	**E-commerce Laboratory**				**60.00**
13-1	Germany, Italy and the experimental system of e-commerce	set	2	3.75	7.50
13-2	Germany, Italy and logistics experimental system	set	2	2.70	5.40
13-3	Network Marketing experimental system	set	2	2.35	4.70

13-4	Experiment chain management system	set	1	2.00	2.00
13-5	Germany, Italy and the cashier experimental system	set	4	1.50	6.00
13-6	Germany, Italy and the construction of professional training platform e-commerce site	set	1	4.90	4.90
13-7	Software running equipment	set	45	0.48	21.60
13-8	Laboratory control equipment	set	1	7.90	7.90
14	**Multilingual translation skills training room**				**50.00**
14-1	Teachers terminal equipment	set	1	5.00	5.00
14-2	Students terminal equipment (50 students digit +4 translators bit)	set	1	38.00	38.00
14-3	Translation Training System Software	set	1	4.00	4.00
14-4	Digital wireless simultaneous interpretation equipment (10 -bit)	set	1	3.00	3.00
15	**Digital Language Lab**				**88.40**
15-1	Fieldwork language digital devices	set	6	7.00	42.00
15-2	Spectrum Analyzer	set	2	7.00	14.00
15-3	Versatile voice signal analysis software	set	1	3.00	3.00
15-4	VP IV 3950 En visual tone instrument	set	2	1.80	3.60
15-5	Nasal flow meter Ⅱ	set	2	2.30	4.60
15-6	Glottal wave detector	set	2	3.50	7.00
15-7	Aerodynamics of speech sound system (PAS)	set	1	1.80	1.80
15-8	Canon color copier	set	1	1.70	1.70
15-9	Desktop Computers	set	20	0.49	9.70
15-10	Laboratory Equipment Management System	set	1	1.00	1.00

16	**Multifunctional Language Learning Center**				**253.00**
16-1	Multimedia Language Lab	set	5	45.00	225.00
16-2	Multimedia booth	set	8	1.80	14.40
16-3	Portable Multimedia Demonstrator	set	8	1.50	12.00
16-4	Network Teaching System	set	1	1.60	1.60
17	**Network Engineering and Information Security Training Center**				**161.20**
17-1	Routing equipment	set	12	1.80	21.60
17-2	Switcher	set	12	1.00	12.00
17-3	Three switches	set	6	1.80	10.80
17-4	Voice Equipment	set	1	8.00	8.00
17-5	Firewall VPN equipment	set	6	1.00	6.00
17-6	Student computer	set	51	0.80	40.80
17-7	Training test equipment	set	2	10.00	20.00
17-8	Information Security Principle Platform	set	1	10.00	10.00
17-9	Information Security Technology Experiment Platform	set	1	10.50	10.50
17-10	Internet penetration attacks platform	set	1	9.50	9.50
17-11	Certified Management Platform	set	1	2.00	2.00
17-12	Border defense platforms	set	1	2.00	2.00
17-13	Border defense drone	set	1	2.00	2.00
17-14	IPSEC VPN gateway platform	set	1	2.00	2.00
17-15	MPLS VPN gateway platform	set	1	2.00	2.00
17-16	Offensive and defensive target platform	set	1	2.00	2.00

18	**Internet of Things Engineering Laboratory**				**358.00**
18-1	Server equipment	set	2	8.00	16.00
18-2	Computer equipment	set	55	0.72	39.60
18-3	Switching equipment	set	3	0.30	0.90
18-4	Air Conditioning Equipment	set	2	0.80	1.60
18-5	Projection equipment	set	1	3.50	3.50
18-6	Things multi-network integrated training platform for innovation	set	55	3.00	165.00
18-7	USB_PROBE II	set	55	0.07	3.85
18-8	An application restore feature	set	55	0.07	3.85
18-9	Speech recognition module	set	55	0.02	1.10
18-10	Vehicle Management System (sandbox)	set	1	38.80	38.80
18-11	Smart home museum	set	1	39.20	39.20
18-12	Things Intelligent Greenhouse Control Training System (sandbox)	set	1	19.80	19.80
18-13	Smart Home Training Platform	set	1	7.80	7.80
18-14	Laboratory environment remodeling costs	set	1	16.00	17.00
19	**Intelligent Control Engineering Training Center**	**—**	**36**	**—**	**202.70**
19-1	Scalable basis of experimental robots	set	10	5.20	52.00
19-2	Humanoid robot	set	5	2.00	10.00
19-3	Sensor Kit (optional)	set	5	2.00	10.00
19-4	Three omnidirectional robot soccer (RoboCup / FIRA competition type)	set	1	18.00	18.00
19-5	Dimensional stepper motion control platform	set	2	4.00	8.00
19-6	Dimensional servo motion control platform	set	2	5.00	10.00

19-7	Three stepper motion control platform	set	2	6.00	12.00
19-8	Three servo motion control platform	set	2	6.80	13.60
19-9	Advanced Process Control Experimental System	set	2	12.00	24.00
19-10	Process Control System for Experiment Teaching	set	2	10.20	20.40
19-11	Process Control and Automation Instrumentation Training Equipment	set	2	8.60	17.20
19-12	Comprehensive building a lab environment	—	1	7.50	7.50
20	**Communication Engineering Laboratory**				**592.58**
20-1	SDH optical transport platform	—	1	—	38.10
20-2	Convergence layer transmission equipment	set	1	16.12	16.12
20-3	Access layer transmission equipment	set	2	7.17	14.33
20-4	Official communications system	set	1	0.03	0.03
20-5	Installation Materials	set	1	0.75	0.75
20-6	e-Bridge Communication Experiment software interface components (optical transmission section)	set	1	5.00	5.00
20-7	Laboratory environment remodeling costs	—	—	—	1.87
20-8	4G telecom business development platform	—	1	—	48.03
20-9	4G interface processing unit	set	1	6.17	6.17
20-10	4G development processing unit	set	1	6.49	6.49
20-11	Integrated Development Unit	set	1	5.77	5.77
20-12	CRBT Software	set	1	12.00	12.00
20-13	Unified payment platform software	set	1	12.05	12.05
20-14	Development and training costs with	—	—	—	3.00
20-15	Laboratory environment remodeling costs	—	—	—	2.55

20-16	LTE mobile communications platform	—	1	—	411.39
20-17	LTE base station equipment	set	1	59.36	59.36
20-18	LTE core network equipment	set	1	275.73	275.73
20-19	Core network switches	set	1	1.31	1.31
20-20	VOIP server	set	1	6.77	6.77
20-21	LTE terminal devices	set	1	23.31	23.31
20-22	Experiment Management Software	set	1	19.50	19.50
20-23	Laboratory infrastructure facilities	—	1	2.12	2.12
20-24	Laboratory environment remodeling costs	—	1	—	23.29
20-25	Basic equipment	set	1	5.18	5.18
20-26	Laboratory renovation Subtotal	—	1	—	95.06
20-27	Air conditioning	set	3	0.95	2.85
20-28	Laboratory terminal	set	100	0.65	65.00
20-29	Teachers terminal	set	2	0.65	1.30
20-30	Projector	set	2	3.50	7.00
20-31	Anti-static floor	M2	280	0.03	7.84
20-32	Glass walls	M2	56	0.04	2.35
20-33	Hexagonal desks	set	14	0.60	8.40
20-34	Teachers and chairs	set	2	0.16	0.32
21	**Online demonstration of national education and teaching laboratories**				**157.00**
21-1	Taped Host	set	4	7.50	30.00
21-2	Taped Management System	set	4	5.00	20.00

21-3	Teachers camera	set	4	2.00	8.00
21-4	Students camera	set	8	2.00	16.00
21-5	Tracking auxiliary camera	set	12	0.16	1.92
21-6	Digital Audio Matrix	set	4	1.50	6.00
21-7	Professional pickup hanging meters	piece	32	0.08	2.56
21-8	Image tracking host	set	4	2.50	10.00
21-9	Image Tracking System	set	4	2.00	2.00
21-10	Intelligent Switching System	set	4	0.70	2.80
21-11	One-button taped in the control system	set	4	0.68	2.72
21-12	Dual-channel wireless lapel microphone	set	4	0.40	1.60
21-13	Interactive machine	set	4	3.50	14.00
21-14	Professional Amplifier	set	4	0.25	1.00
21-15	Professional Audio	pair	4	0.15	0.60
21-16	Multimedia platform	piece	4	0.30	1.20
21-17	Classroom chairs	set	120	0.05	5.40
21-18	Air conditioning	set	4	0.70	2.80
21-19	Engineering auxiliary fees (taped dedicated high-definition cable)	set	4	0.40	1.60
21-20	Laboratory environment transformation	set	4	1.50	6.00
21-21	LCD TV	set	1	1.00	1.00
21-22	Management computer	set	1	0.50	0.50
21-23	Video server resource management software platform	set	1	3.20	3.20
21-24	Depending control software (taped classroom management software)	set	1	3.00	3.00

21-25	Video resource management software (including video interactive features)	set	1	12.80	12.80
21-26	Master Control Room Project auxiliary fees	set	1	0.30	0.30
22	**Digital Media Arts Lab**				**122.22**
22-1	Multimedia display terminal	set	1	1.50	1.50
22-2	Multimedia display screen	piece	1	0.16	0.16
22-3	Multimedia Speakers	pair	1	0.18	0.18
22-4	Multimedia loudspeakers	set	1	0.18	0.18
22-5	Teaching Microphone	set	1	0.03	0.03
22-6	Wireless Microphones	set	1	0.26	0.26
22-7	Media control system	set	1	0.35	0.35
22-8	Teachers master workstation	set	1	2.85	2.85
22-9	Teachers master monitor	set	1	0.35	0.35
22-10	Students learn workstation	set	50	1.80	90.00
22-11	Monitor student learning	set	50	0.35	17.50
22-12	Network Switches	set	3	0.20	0.60
22-13	Network Cabinet	set	1	0.20	0.20
22-14	Laboratory room management system	set	50	0.09	4.50
22-15	Large format printers	set	1	2.58	2.58
22-16	Large format high Shoot machine	set	1	0.98	0.98
23	**Costume Design Lab**	**—**		**—**	**46.45**
23-1	Disc sewing machine	set	1	0.20	0.20

23-2	Disc sewing machine	set	1	0.98	0.98
23-3	High-speed electronic button sewing machine	set	1	3.60	3.60
23-4	Dense Kaoji	set	1	0.22	0.22
23-5	Pack deduction	set	1	0.06	0.06
23-6	Computer EOC	set	30	0.55	16.50
23-7	Three packets of sewing machine	set	1	0.55	0.55
23-8	Four-wire package sewing machine	set	1	0.60	0.60
23-9	Keyhole	set	1	1.30	1.30
23-10	Iron	set	5	0.02	0.10
23-11	Buried folder	set	1	1.50	1.50
23-12	Double machine	set	1	0.35	0.35
23-13	Hemming machine □flat to	set	1	0.35	0.35
23-14	Computerized Flat Knitting Machine	set	1	10.00	10.00
23-15	Straight pin female human body	set	30	0.08	2.40
23-16	Straight pin male human body	set	30	0.08	2.40
23-17	Straight pin boy body of people of different ages Desk	set	15	0.08	1.20
23-18	Straight pin pregnant women who	set	1	0.08	0.08
23-19	Underwear special people	set	30	0.04	1.05
23-20	Ironing table	set	2	0.18	0.36
23-21	Hangers	set	5	0.03	0.15
23-22	Laboratory environment remodeling costs	—	—	2.50	2.50
24	**Screen Lab**				**50.68**

24-1	Prints rubbing machine	set	2	1.50	3.00
24-2	Copper machine	set	1	25.00	25.00
24-3	Aquatint box	set	1	2.30	2.30
24-4	Proofer	set	1	0.30	0.30
24-5	Photographic machines	set	1	5.00	5.00
24-6	Copperplate cutting machine	set	1	1.50	1.50
24-7	Bake edition boxes	set	1	1.50	1.50
24-8	Vacuum Frames	set	1	3.50	3.50
24-9	Handprint Taiwan	set	1	1.20	1.20
24-10	Prints rubber roller	set	2	0.30	0.60
24-11	Prints rubber roller	set	2	0.20	0.40
24-12	Linden wood -sided board	set	10	0.01	0.10
24-13	Printmaking inks (water-soluble)	set	48	0.01	0.48
24-14	Paper clip declared Edition	box	1	0.20	0.20
24-15	Dry layer foldable easel 30	set	4	0.40	1.60
24-16	Copper edition tool	set	1	2.00	2.00
24-17	Laboratory environment remodeling costs	—	—	2.00	2.00
25	**Ceramics Laboratory**				**63.12**
25-1	Electric kiln HC-GDY-1000 devices	set	1	10.00	10.00
25-2	Experimental electric kiln HC-GDY-007	set	1	3.50	2.10
25-3	High temperature gas kiln HC-GQY-1500 devices	set	1	8.80	8.80
25-4	DECORATED electric kiln HC-KHL-120	set	1	2.10	2.10

25-5	Speed casting machine HC-BLP-3	set	40	0.50	20.00
25-6	Clay Machine HC-NBL-2	set	2	0.60	1.20
25-7	Turntable HC-ZP-1	set	40	0.01	0.40
25-8	Washable spray glaze sets HC-PYZ-1	set	1	2.30	2.30
25-9	Sculpture turntable HC-DST-50	set	15	0.10	1.50
25-10	Blank frame	set	10	0.25	2.50
25-11	Grinding machines	set	2	0.08	0.16
25-12	Blue and white material	botle	50	0.03	1.50
25-13	Ceramic painting professional pen	piece	80	0.00	0.08
25-14	Transparent glaze	botle	50	0.00	0.10
25-15	Spices dish	set	40	0.00	0.04
25-16	Mason board	set	40	0.00	0.08
25-17	Fettling knife	set	10	0.01	0.10
25-18	Kiln dust	botle	5	0.01	0.05
25-19	Blade	set	10	0.01	0.05
25-20	High Nai	ton	1	0.50	0.50
25-21	High temperature Glaze	botle	40	0.01	0.40
25-22	The temperature Glaze	botle	40	0.01	0.20
25-23	Overglaze material	botle	20	0.01	0.20
25-24	Underglaze material	botle	20	0.05	1.00
25-25	Spread glaze	botle	20	0.05	1.00
25-26	Pottery ten sets	set	20	0.01	0.20

25-27	Ceramic Decal	piece	50	0.01	0.50
25-28	Mason board	set	50	0.01	0.50
25-29	Roller		50	0.01	0.50
25-30	Trample mud stool	piece	2	0.05	0.10
25-31	Quick Mill	set	1	0.60	0.60
25-32	Mixers	set	1	0.40	0.40
25-33	Students casting kit	set	20	0.02	0.40
25-34	Students decorated pottery tool bag	set	20	0.05	1.00
25-35	Teachers decorated pottery tool bag	set	2	0.08	0.16
25-36	Clay molding tool student package	set	40	0.01	0.40
25-37	Laboratory environment remodeling costs	—	—	2.00	2.00
26	**Dyeing Laboratory**				**112.35**
26-1	HBC- rotating floor- type room temperature sample dyeing machine computer	set	1	1.25	1.25
26-2	Continuous reduction steamer	set	1	7.00	7.00
26-3	Vat dye	set	2	1.60	3.20
26-4	Yancheng KM-350B-7S series of high-speed automatic tangent flat sewing	set	2	1.00	2.00
26-5	Full servo precision cross-stitch embroidery machines	set	1	12.00	12.00
26-6	Small single-head embroidery machine speed	set	2	7.50	15.00
26-7	Printing machine	set	1	36.00	36.00
26-8	One machine	set	5	3.50	17.50
26-9	Universal Printer	set	1	8.00	8.00
26-10	Professional digital camera pictures	set	1	2.60	2.60

26-11	3KW ironing facilities	set	2	0.35	0.70
26-12	15 kg eluting bake one machine	set	1	2.10	2.10
26-13	Laboratory environment remodeling costs			5.00	5.00
27	**Red tourism planning and engineering laboratory**	**—**		**—**	**200.08**
27-1	Mobile workstation design	set	3	3.00	9.00
27-2	Desktop machine (teachers) equipment	set	3	1.80	5.40
27-3	Graphics work stations	set	62	0.85	52.70
27-4	MAPGisK9 teaching software	set	1	26.00	26.00
27-5	ArcGis10.1 teaching software	set	1	37.50	37.50
27-6	The classroom desks and chairs	set	1	0.25	0.25
27-7	Double student computer desks and chairs	set	31	0.08	2.48
27-8	projector	set	1	1.50	1.50
27-9	The intensity of the computer console MA2048	piece	1	0.15	0.15
27-10	power amplifier	set	1	0.16	0.16
27-11	The speakers	pair	2	0.18	0.36
27-12	Teaching microphone	set	1	0.05	0.05
27-13	Wireless microphone	set	1	0.12	0.12
27-14	The wireless receiver		1	0.10	0.10
27-15	Multimedia installation auxiliary material	item	1	0.08	0.08
27-16	Constant temperature constant temperature curing concrete cases	set	1	0.70	0.70
27-17	Breathable surface instrument and accessories	set	1	0.80	0.80
27-18	Boiling in box	set	1	0.60	0.60

27-19	Concrete pumping resistance meter	set	1	1.30	1.30
27-20	test	set	1	6.25	6.25
27-21	Liquid plastic limit joint meter accessories	set	1	1.06	1.06
27-22	Circular knives, caliper caliper, soil cutting knife, wire saw, petrolatum, glass plate	set	1	0.85	0.85
27-23	Soil moisture meter	set	1	0.65	0.65
27-24	Aluminum box, adjust soil knife, adjust soil cup	set	1	0.08	0.08
27-25	Mortar, rubber head pestle	set	1	0.05	0.05
27-26	Small pore water pressure gauge	set	1	2.10	2.10
27-27	Geological hammer	set	10	0.02	0.20
27-28	Acoustic meter	set	1	2.65	2.65
27-29	Rebound hammer	set	1	0.35	0.35
27-30	Rock point load meter	set	1	2.30	2.30
27-31	High-end touch-screen multi-parameter water quality analyzer	set	1	5.80	5.80
27-32	Soil handheld detector	set	1	22.50	22.50
27-33	Soil salinity tester	set	1	0.95	0.95
27-34	Soil nutrient analyzer	set	1	0.85	0.85
27-35	Han was the type of soil moisture and temperature tester	set	1	0.50	0.50
27-36	Earth drilling	set	1	0.09	0.09
27-37	MIDas geotechnical engineering simulation software	set	1	8.60	8.60
27-38	Laboratory environment remodeling costs	—	1	5.00	5.00
28	**Youjiang River National Culture Research Center**	**—**		**—**	**110.20**
28-1	Server	set	1	6.50	6.50

28-2	Video camera	set	4	4.50	18.00
28-3	Video camera	set	2	1.80	3.60
28-4	Wide-angle lens camera	set	2	0.50	1.00
28-5	Camera	set	4	5.00	20.00
28-6	Camera	set	4	0.50	2.00
28-7	Shot	set	2	0.35	0.70
28-8	Shot	set	2	0.55	1.10
28-9	Shot	set	2	0.50	1.00
28-10	CPX professional photography Bench	set	2	3.00	6.00
28-11	Non-linear editing system (no card)	set	2	1.27	2.50
28-12	Projector	set	1	2.00	2.00
28-13	Video and audio effects system	set	4	3.00	12.00
28-14	Digital TV	set	2	1.30	2.60
28-15	Sound Amplifier	set	8	1.90	15.20
28-16	Computer	set	2	1.50	3.00
28-17	Screen display	set	1	0.20	0.40
28-18	Interview microphone	set	4	0.45	1.80
28-19	Laptop	set	4	1.20	4.80
28-20	Laboratory environment remodeling costs	batch	—	—	6.00
29	**Piano Lab**				**135.00**
29-1	YAMAHA upright piano	set	30	2.80	84.00
29-2	32 -inch interactive touch one machine	set	30	1.10	33.00

29-3	Full-range speaker	set	30	0.30	9.00
29-4	Wall-mounted air conditioner	set	30	0.30	9.00
30	**Vocal Laboratories**	set		**—**	**48.18**
30-1	YAMAHA grand piano	set	1	8.30	8.30
30-2	Main speakers spread , back to listen to speakers and other	set	1	4.00	4.00
30-3	Amplifier (main expansion, back to listen)	set	4	1.00	4.00
30-4	Digital processor , multi-function digital processor Kara OK , power timing devices	set	6	0.80	4.80
30-5	Yamaha mixer, Shure microphones , cables and other professional	set	1	5.60	5.60
30-6	Moving Head Light	set	4	0.50	2.00
30-7	Computer chasing light	set	2	0.50	1.00
30-8	Back light	set	8	0.10	0.80
30-9	Television soft lights	set	8	0.10	0.80
30-10	Days row of lights	set	6	0.10	0.60
30-11	Digital Strobe	set	3	0.10	0.30
30-12	Back light color changer , soft lights change color picker , color changers day discharge lamps	set	22	0.09	1.98
30-13	Sony camcorder	set	1	3.20	3.20
30-14	Computer	set	1	1.50	1.50
30-15	Computer Console	set	1	1.20	1.20
30-16	Color Change Console	set	2	0.80	1.60
30-17	Projector, projector screen , etc.	set	1	0.50	0.50
30-18	Vertical air conditioning	set	2	1.00	2.00

30-19	Professional dimming	set	1	1.20	1.20
30-20	Color changer enlarge distributor	set	2	0.20	0.40
30-21	DMX512 signal amplification distributor	set	2	0.20	0.40
30-22	Laboratory environment remodeling costs	—	—	—	2.00
31	**Music studio**	**—**	**—**	**—**	**32.19**
31-1	Computer		5	1.62	8.10
31-2	Sound		1	0.65	0.65
31-3	Monitor Speakers	set	2	1.20	2.40
31-4	Mixer	set	1	3.50	3.50
31-5	Microphone	set	2	1.00	2.00
31-6	Shure Microphone	set	2	0.30	0.60
31-7	Monitor Headphones	set	1	0.30	0.30
31-8	Monitor Headphones	set	8	0.08	0.64
31-9	Collecting digital recorder	set	1	0.80	0.80
31-10	Professional Wire	batch	1	1.00	1.00
31-11	A piano YAMAHA	set	1	2.60	2.60
31-12	Read music notation software a professional	set	1	1.00	1.00
31-13	Set of professional notation notation software	set	1	0.50	0.50
31-14	Music production software	set	1	3.50	3.50
31-15	Synthesizer	set	1	3.60	3.60
31-16	Laboratory environment remodeling costs	—	—	—	1.00

32	**Ethnic Performing Arts Hall**	**—**	**—**	**—**	**220.78**
32-1	SEEBURG acoustic line F8 main box	set	8	3.00	24.00
32-2	SEEBURG acoustic line A6 pull sound box	set	2	2.00	4.00
32-3	SEEBURG acoustic line A6 back to listen to me	set	4	2.00	8.00
32-4	SEEBURG acoustic line A1 backcourt complement sound	set	4	2.00	8.00
32-5	SEEBURG acoustic line B15 ultralow box	set	4	4.00	16.00
32-6	RAM Audio S-4000 amp main box	set	4	4.00	16.00
32-7	RAM Audio S-4044 pull back sound amplifier	set	2	4.00	8.00
32-8	RAM Audio S-4000 ultra-low- power amplifier	set	2	4.00	8.00
32-9	RAM Audio S-3004 surround amplifier	set	1	4.00	4.00
32-10	SENNHEISER Monitor Headphones	pair	1	0.20	0.20
32-11	JBL LSR6325P monitor box	set	2	1.00	2.00
32-12	ALLEN & HEATH Mixer GL2400/416	set	1	2.00	2.00
32-13	SENNHEISER wireless handheld microphone EW345G3	set	2	1.00	2.00
32-14	SENNHEISER wireless microphone headset EW352G3	set	2	1.00	2.00
32-15	SENNHEISER wireless lapel microphone EW322G3	set	2	1.00	2.00
32-16	NEUMANN Neumann Choir microphone U87A	set	2	2.10	4.20
32-17	BSS FCS 966 electronic equalizer	set	1	0.99	0.99
32-18	BSS 336T digital processor	set	1	2.21	2.21
32-19	T.C M-one XL effects	set	1	0.68	0.68
32-20	Pioneer BDP4110 Blu-ray machine	set	1	0.10	0.10
32-21	EM 1802 Power Sequencer	set	2	0.25	0.50

32-22	Audio wire	batch	1	3.00	3.00
32-23	Audio connectors	batch	1	1.00	1.00
32-24	Professional audio 12U cabinet	set	2	0.19	0.38
32-25	Designed tricolor HS-4055	set	12	0.17	1.99
32-26	Trichromatic lamp OSRAM 55W	set	24	0.01	0.17
32-27	1200W Moving Head Light HS-3018	set	10	0.92	9.20
32-28	200W Beam Light HS-2016 computer	set	10	1.35	13.50
32-29	2KW movie back light HS-2000DH	set	10	0.06	0.60
32-30	Back light color changer HS-512C	set	8	0.05	0.40
32-31	Color changer controller HS-512-8	set	1	0.29	0.29
32-32	LED Light HS-L162T2 computer staining	set	40	0.46	18.40
32-33	Atrium astigmatism Light HS-2000WT	set	4	0.05	0.20
32-34	To row astigmatism lights HS-2000WD	set	4	0.05	0.20
32-35	Back light bulb 2KW quartz bulb	set	8	0.01	0.06
32-36	Astigmatism light bulb lamp 2KW	set	8	0.01	0.06
32-37	3KW professional smoke machine	set	2	1.52	3.04
32-38	Follow Light HS-2500	set	2	0.86	1.72
32-39	Silicon case DS626 digital efforts	set	1	0.48	0.48
32-40	The intensity of the silicon box Power PW4	set	1	0.42	0.42
32-41	The intensity of the computer console MA2048	set	1	1.42	1.42
32-42	Intensity signal splitter SPL8	set	1	0.30	0.30
32-43	Lighting cables	set	1	6.00	6.00

32-44	Lighting connector	set	1	1.50	1.50
32-45	Total Power Box	set	1	0.50	0.50
32-46	Light shelf + Installation	batch	1	11.00	11.00
32-47	Retardant professional stage curtain	㎡	500	0.01	2.75
32-48	Curtain track	track	1	1.20	1.20
32-49	Big screen machines	set	1	3.80	3.80
32-50	Control console + wardrobe	set	1	4.20	4.20
32-51	Curtain along the curtain	㎡	140	0.01	0.77
32-52	Curtain side curtain	㎡	120	0.01	0.66
32-53	Installation Accessories	batch	1	0.60	0.60
32-54	Gree air-conditioning professional 5P	set	5	0.91	4.55
32-55	Laptop	set	1	1.55	1.55
32-56	Laboratory environment remodeling costs	—	—	—	10.00
33	**33 libraries of digital information resources and sharing platform**				**547.84**
33-1	server	set	3	10.00	30.00
33-2	30T storage system	set	1	39.00	39.00
33-3	Backup Software	set	1	8.20	8.20
33-4	core switch	set	2	3.80	7.60
33-5	Optical switches	set	2	3.50	7.00
33-6	Network Cabinet	set	3	2.28	6.84
33-7	UPS	set	1	8.00	8.00

33-8	Storage Systems 8T (backup storage)	set	1	8.20	8.20
33-9	Database-building software	D	1	10.00	10.00
33-10	paper submission publishing software	set	1	5.00	5.00
33-11	Hot Standby software	set	1	4.50	4.50
33-12	Library Information Management System Integration	set	1	16.00	16.00
33-13	Guangxi College Network Platform System Library	set	3	15.00	45.00
33-14	CD with the book management software	set	1	5.00	5.00
33-15	Full-text database of Chinese doctoral thesis	set	3	5.00	15.00
33-16	China Master Thesis	set	3	9.00	27.00
33-17	China Proceedings of conference Full-text Database	set	3	3.00	9.00
33-18	Chinese Almanac web publishing pool	set	3	11.00	33.00
33-19	33-19 Chinese books online publishing pool	set	3	5.00	15.00
33-20	33-20 Chinese academic journals online publishing pool	set	3	14.00	42.00
33-21	VIPExam Learning Resources Network Test	set	3	5.00	15.00
33-22	Online Auditorium	set	3	6.00	18.00

33-23	Software Help ' - computer skills self- learning video system network	set	3	6.00	18.00
33-24	FLTRP language resource library	set	1	6.20	6.20
33-25	Academic Superstar Video	set	1	10.00	10.00
33-26	Superstar Duxiu Knowledge	set	3	10.00	30.00
33-27	Chongqing VIP Information Chinese Scientific Journals Database"	set	3	2.00	6.00
33-28	Springerlink (Springer) foreign language database	set	3	1.50	4.50
33-29	College English Learning Resource Library	set	3	2.00	6.00
33-30	Information and Data Full-text Database	set	3	5.00	15.00
33-31	Superstar eBooks	10,000	30	2.00	60.00
33-32	Kintu original foreign-language e-books	10,000	2	7.50	15.00
33-33	China Law Search	set	1	2.80	2.80
34	**Campus network construction**				**512.90**
34-1	Core Switch	set	5	35.00	175.00
34-2	Access Switch	set	50	0.50	25.00
34-3	Network equipment exports	set	2	22.00	44.00
34-4	Construction of the data center room	set	1	20.00	20.00
34-5	Server	set	7	10.00	70.00
34-6	Dedicated server cabinet	set	7	0.70	4.90

34-7	Room for precision air conditioning	set	4	3.00	12.00
34-8	UPS power supply	set	2	16.00	32.00
34-9	Campus digital authentication platform system	set	1	50.00	50.00
34-10	Underground cable laying		1	40.00	40.00
34-11	Integrated wiring		1	40.00	40.00
				Total =	**9350.33**