

REPUBLIQUE DU CAMEROUN

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REPUBLIQUE OF CAMEROON

Peace - Work - Fatherland

MINISTRY OF HIGHER
EDUCATION

TECHNICAL MEMO ON THE PROJECT E-NATIONAL HIGHER EDUCATION NETWORK

The digital governance component of the New University Governance policy implemented by the Government with a view to modernizing the national system of higher education (Edification of the Cameroon University of the 3rd Generation), aims to on the one hand to give a better cybernetic visibility to Cameroonian universities and, on the other hand, to allow the appropriation and generalization of new teaching and learning methods based on ICT (E-Learning). In the face of the exponential surge in student demand, it is about developing a robust and non-campus based higher education component that will be capitalized in the institutional form of a State University entirely dedicated to higher online education: The **Digital University of Cameroon**. The E-National Higher Education Network project is the first phase of the process of building the Digital University of Cameroon. It aims at: a) the establishment in the State Universities of efficient hardware (computer and telecommunications networks, data centers) and intangibles (e-administration and e-learning) infrastructures, b) the facilitation of students' access to digital terminals; and (c) the development of skills essential to the digital transformation of the Cameroonian University.

1. GENERAL INFORMATIONS OF THE PROJECT

- **Cost:** 937,500,000 yuan (about 75 billion CFA francs)
- **Duration of execution:** 24 months
- **Financial terms:**
 - Eximbank-China concessional loan
 - Interest Rate: 2%
 - Repayment term: 20 years
 - Moratorium : 5 years
- **Legal terms :**
 - The E-National Higher Education Network project is part of the joint priority projects whose financing is provided for in the Cooperation Framework Agreement of the People's Republic of China and the Republic of Cameroon signed on June 18th, 2015 in Beijing by the Cameroonian Minister of Economy, Planning and Regional Development (**Mr. Emmanuel Nganou Djoumessi**) and the Chinese Minister of Commerce in the presence of the Prime Minister, Head of Government (**His Excellency Philémon Yang**).

- This framework agreement marks the approval by the two governments of the application for financing the project submitted to Eximbank China on October 7, 2013 by the Minister of the Economy, Planning and Regional Development (**Mr. Emmanuel Nganou Djoumessi**). MINEPAT supported this request with a plea for the priority of this project in the government concessional loan of Eximbank China for 2014 addressed to the Ambassador of the People's Republic of China in Cameroon by letter of February 17th, 2014.
- Following the validation of the request for financing of Cameroon by the Board of Eximbank China, the Minister, Secretary General of the Presidency of the Republic (**Mr. Ferdinand Ngoh Ngoh**), on July 25th, 2016, instructed the Minister of Higher Education to sign a complementary Commercial Agreement with Chinese company Sichuan Telecom Construction Engineering Co. (subsidiary of state-owned China Telecom) for the implementation of project E-National Higher Education Network restructured at the level of the General Secretariat of the Presidency, by adding a new component "*Donation of 500,000 laptops to students*". The Minister of Higher Education (**Professor Jacques Fame Ndongo**) signs this complementary agreement on July 27th, 2016.
- The Head of State authorized, on July 26th, 2016, the Minister of Economy, Planning and Regional Development (**Mr. Louis Paul Motaze**) to sign a credit agreement with Eximbank-China for the financing of the E-National Higher Education Network project. This agreement (CHINA EXIMBANK GCL No (2015) 11 TOTAL NO. (550)) is signed on August 22nd, 2016.
- The Minister, Secretary General of of the Prime Minister's Office (**Professor Séraphin Magloire Fouda**), signed on December 30th, 2016 the legal opinion relating to this loan agreement.
- Following tough negotiations (personally supervised by **His Excellency Philemon Yang**, Prime Minister, Head of Government) of acceptance by the Chinese side in general and Eximbank-China in particular, of the amendment of the project, considered major by it, made by the Cameroonian side, after the validation of the initial project by the Board of Eximbank-China, Eximbank China approved the implementation of the credit agreement on June 5th, 2017 and released the same day the start-up loan (30% of the total amount of financing) to the project manager, Sichuan Telecom Construction Engineering Co Ltd, in accordance with the credit agreement.
- The credit agreement provides for all payments related to the project to be made directly in China by Eximbank China for the benefit of the Chinese project contractor, which is a Chinese state-owned enterprise subject to state control mechanisms of chinese public funds. **No funds are made available to the direct management of the Government of Cameroon by Eximbank China.**

- **Components of the restructured project currently implemented:**
 - **Component 1 (new): One student - One computer:**
 - ✓ Acquisition, transportation, distribution and maintenance of **500,000 laptops** for students.
 - **Component 2: Development of e-Learning and e-Administration**
 - ✓ Construction, equipment and commissioning of **nine University Digital Development Centers** (one in each State University and one at the Cameroon-Congo Inter-State University, Sangmelima Campus).
- **Financing Package of the project.**
 - **The cost of component 1 relating to the acquisition, transportation, distribution and maintenance of the 500,000 computers is CFAF 50 billion**, i.e. a unit cost of CFAF 100,000 per computer. This cost excludes customs duties and other taxes and excludes the use of a commercial or industrial mark (see MINEPAT letter of 27 January 2017 to the President of Eximbank China, copied to the SG/PR, SG/PM, MINESUP and the Chinese Embassy in Yaounde). In addition, it does not include application software costs that allow the functionality of these computers.
 - **The cost of component 2 related to the development of e-Learning and e-Administration is 25 billion CFA francs**, i.e. a unit cost of 2.5 billion CFA francs for construction, equipment and operationalization of a University Digital Development Center and the National University Data Center. This cost is exclusive of customs fees and other taxes for imported equipment

2. TECHNICAL MEMO OF THE COMPONENT "E-LEARNING AND E-ADMINISTRATION".

- **Objective**
 - In the context of the exponential surge in student demand, it is about developing a robust, non-campus based higher education component that will be capitalized in the institutional form of a State University entirely dedicated to Online Higher education: The **Digital University of Cameroon**. The E-National Higher Education Network project is the first phase of the process of building the Digital University of Cameroon. Its purpose is: a) the establishment in the State Universities of efficient hardware infrastructures (computer and telecommunications networks, data centers) and immaterial (e-administration and e-learning) and, b) the development of essential skills for the digital transformation of the Cameroonian University.
- **Sub-components**
 - **Sub-component 1: Construction of buildings.** Each University Digital Development Center and the National University Data Center is housed in a

building with an area ranging from 400 to 1000 m² depending on the size of the University.

- **Sub-component 2: E-Learning.** Each University Digital Development Center includes for distance education:
 - Virtual classrooms ;
 - A computer system for managing distance education;
 - A studio for digitizing and producing multimedia courses;
 - An access server to the national virtual library.

- **Sub-Component 3: E-Administration.** Each University Digital Development Center includes for university administration:
 - A harmonized university management computer system;
 - A University Data Center.

- **Sub-component 4: Electronic Communication.** Each University Digital Development Center includes for electronic communication:
 - A video conference room ;
 - Secure interconnection equipment of universities;
 - Rehabilitation of computer networks and installation of wifi hot spot networks in the main campuses of beneficiary universities.

- **Sub-component 5: Centers Management.** Each Center for the Development of Digital Universities includes for management:
 - Equipped technical rooms and administrative offices;
 - Remote monitoring systems of installed equipments ;
 - Emergency and alternative power sources;
 - Trained staff.

- **Time Chart**

The environmental, technical and architectural studies related to the implementation of component 2 are under way with a view to starting work at the University of Yaounde 1 in the first quarter of 2018. The duration of the overall Construction and works of Component 2 is 18 months.

3. TECHNICAL MEMO OF THE COMPONENT "ONE STUDENT - ONE COMPUTER"

- **Didactic needs to be satisfied by the student thanks to the PBhev computer**

- Computers have various uses and the technical characteristics of a computer are defined according to the preferential need we want to meet: professional need, office need, fun need, need for access to information, didactic need, etc.

- The development of computer science and information and communication technologies has created a Cyberspace that radically changes the relationship to knowledge. In the field of higher education, this translates into the existence of a **World University Cyberspace**.
- In this context, the student who does not have access to the World University Cyberspace is severely handicapped in his quest for knowledge. The main barrier that limits the access of our students to the University Cyberspace is their economic inability to acquire access tools adapted to a didactic use. A large majority of students (+ 90%) use the **mobile phone** to work in the University Cyberspace, although this instrument is not suitable for this purpose.
- A comfortable access tool to Cyberspace should allow the student to meet the following basic needs:
 - ✓ read appropriately everywhere he is located the digital books and documents acquired in the Cyberspace ;
 - ✓ connect to the Internet according to the means offered by the environment in which he is located: internet keys, wifi, cable network, etc;
 - ✓ produce academic documents;
 - ✓ Store books and digital documents in storage media internal or external to the computer.
- **PBhev (Paul BIYA, Higher Education Vision) is an access tool to the World University Cyberspace perfectly adapted to the four basic needs of the student mentioned above.**
- **Essential hardware characteristics**
 - Weight: 1 kg (ultraportable computer)
 - Screen size: 10.1 inches
 - Processor: Intel Atom, 1.44 Ghz
 - RAM: 2 GB
 - HDD: SSD, 32 GB
 - Battery: 8 hours of autonomy
 - Network Connectors Installed

Nota Bene :

- i. Any student can check the features of his computer, including the processor installed (which is Intel branded), with the *systeminfo* command.**
- ii.** Intel Corporation does not sell its products directly to users. It does this only through partner companies. All the processors that equip the PBhev computers have been provided by Chinese companies partners of Intel.

- **Installed software.**

- Microsoft Windows 10 operating system (latest version of this operating system).
- Microsoft Office365 software suite comprising about fifteen software programs including:
 - ✓ The word processor *Word*;
 - ✓ The data manager (spreadsheet) *Excel*;
 - ✓ The workshop for creating multimedia presentations *Powerpoint*;
 - ✓ The technical drawing workshop *Visio*;
 - ✓ The video conferencing software *Skype*;
 - ✓ The e-mail manager *Outlook*;
 - ✓ the collaborative work manager *SharePoint*;
 - ✓ The Cloud file sharing and storage software OneDrive (each student has a personal space for storing files in the Microsoft Cloud of one Terabyte, that is 1000 Gigabytes)

NOTA BENE :

- (i) **Upon receipt of the computer, the Windows10 software is activated and functional. Only students enrolled for this operation whose names have been forwarded to MINESUP in accordance with the procedure prescribed by the Minister of Higher Education to Universities, for consolidation in the National Biometric File of Students will be beneficiaries of the facilities offered by Microsoft in the framework of the convention that binds Microsoft to MINESUP. In particular, each student who has been duly enrolled in the national biometric file will receive, among other things, a personal account in the Microsoft Cloud and an activation code of the Office365 software (which is not activated from the factory for the said software protection reasons).**
- (ii) Thanks to the Memorandum of Understanding between MINESUP and Microsoft, Windows10 and Office365 software benefited from a 99% reduction and were therefore each acquired at a symbolic cost of around 500 CFA per year. The acquisition of Office365 and its use for a period of 3 years by each student (with updates and technical support from Microsoft) was supported by the state budget of Cameroon to the extent that it does not part of the initial specifications signed with the Chinese project manager. This part of the agreement with Microsoft is executed by the English company SoftwareOne, via its South African subsidiary which has been recommended to MINESUP by Microsoft. Indeed, Microsoft sells its products to users only through partner companies.

• Features

- **Electronic reader.**
 - ✓ Easily transportable: its size (10 inches) and its weight (1 kg) makes it possible to put it in a purse and thus to use it wherever you are:
 - ✓ Long autonomy of energy: its operating time without being connected to the electric network, which is 8 hours, is adapted to our energetic context.
- **Network access device.**
 - ✓ Suitable for network operation: it has all the connectivity to connect to existing networks: cable network, wifi network, WLAN network of telephone operators.
- **Creation Workshop.**
 - ✓ The complete Microsoft Office 365 office suite installed there includes the following authoring software:
 - 1) The word processor *Word*;
 - 2) The data manager (spreadsheet) *Excel*;
 - 3) The workshop for creating multimedia presentations *Powerpoint*;
 - 4) The technical drawing workshop *Visio*.
- **Communication tool.**
 - ✓ The complete Microsoft Office 365 office suite installed there includes the following communication software:
 - 1) The *Skype* videoconferencing workshop;
 - 2) The *Outlook* mail manager;
 - 3) The *OneNote* note taking software.
- **Collaborative workshop**
 - ✓ The complete Microsoft Office 365 office suite installed there includes the following collaboration software:
 - 1) The *SharePoint* collaborative network work manager;
 - 2) The OneDrive software for sharing and storing files in the Cloud.
- **Planning Workshop.**
 - ✓ The complete Microsoft Office 365 office suite installed there includes the following planning software:
 - 1) The project management software *Project*.
- As we can see, the PB HEV computer is perfectly adapted and efficient for didactic and pedagogical purposes. The PB HEV computer allows the student the following common uses:
 - ✓ connect to cyberspace;

- ✓ produce documents (dissertations, theses, presentations, etc.);
- ✓ do data analyses (statistics);
- ✓ read properly multimedia digital documents of all types of formats (textual, video and audio documents);
- ✓ work remotely with other students by forming virtual working groups through teleconferencing and online sharing of documents;
- ✓ save data locally in the computer (up to 32 Gibits), in removable storage media (external hard drives, USB sticks) that the student can buy according to his needs, or in the storage spaces It can acquire over the internet (cloud) in addition to the space of 1 tetra byte that is offered in the Microsoft Cloud

- **Memory capacity**

- No computer can answer in terms of memory capabilities to all types of specific uses that can be made with a computer. The installed memory capacity is fully in line with what is expected of a Cyberspace access tool that will enable any student to meet the four basic learning needs of the student. More than 90% of students have needs that are limited to these four basic uses of a digital terminal.
- It is pointed out, however, that advanced professional work going beyond the didactical and pedagogical framework may require other types of computers with capacities more suited to this type of use (there is no computer for general use having capacities adapted to all types of use).
- The hard drive is SSD (solid state drive) which, because of its high price, was not until very recently used as standard in computers. The usual hard drives and therefore the most known are type HDD (hard disk drive). Despite its high cost, the main advantage of the SSD is that unlike the HDD, which is mechanical, it is fully electronic and fits on a microchip. Which gives it qualities that HDD discs do not have, among others:
 - ✓ ultrafine disc;
 - ✓ no heat emission;
 - ✓ robustness to shocks;
 - ✓ extremely fast response to access requests from the computer
 - ✓ usable by the computer as a secondary RAM. **This speeds up the execution of applications and relativizes the use of large RAM.**
- The computer equipped with a hard disk SDD is generally faster than a computer with the same characteristics but with a hard disk HDD instead of the SDD disk.
- The advantage of the HDD disk is that it offers higher internal computer storage capacity at a lower cost. With equal storage capacity, the price of an SSD can be five times the price of the HDD.

- In a context where the possibilities of external storage to the computer at low cost have become popular (USB keys, external hard drives, Cloud), the value for performance of a computer equipped with a SSD hard drive is far superior to that of a computer having the same characteristics but has a hard disk HDD instead of the SDD disk.
 - - Ultrafine computers are therefore equipped with SSD hard drives in order to optimize their performance. However, the capacity cost of this technology is still very high. The option is to limit the storage capacity on this type of disk in order to limit the cost of the computer. The hard disk is used in this case just to run the software and incidentally as a temporary storage space for data that is supposed to be permanently stored on media external to the computer.
 - The 32 Gigabit SSD hard disk space is totally sufficient to install and run several software programs since the average size of the current software is of the order of ten megabits (1 Gigabit corresponds to about 1000 megabits) . The software already installed occupy 4 Gigabits, the student has at his disposal 28 Gigabits to possibly install other software, which is more than enough
 - **As an illustration, the installation and operation of the standard version of the MATLAB scientific computing software, used by engineers and scientists, has been tested successfully on the PBhev computer (only 2 GB used on the hard disk).**
 - Given the threats that are incurred when connected to the Internet, it is increasingly discouraged to store data on the hard drive of his computer, which can also be stolen. The new technology paradigm is to reduce the storage space on the hard disk of computers, but to increase the storage capacity and reduce the cost of external storage media (an 8GB USB key costs about 2000 FCFA).
 - Storage capacity of 32GB on the hard drive can be extended to infinity by the use (more recommended) of external storage media: USB sticks, external hard drives, Microsoft Internet storage (Cloud) or other providers (free or expensive).
- **Maintenance.**
 - The PB HEV computer has a manufacturer's warranty of one year.
 - As part of the implementation of this guarantee, the manufacturer puts at the disposal of the Government a team in charge of the post-delivery service, of which one antenna will be installed in each State University and in MINESUP.
 - After-delivery service is free for students and fully supported by the project for all work covered by the manufacturer's warranty (manufacturing failures).
 - **Training students in the use of the PB HEV computer.** The agreement signed between MINESUP and Microsoft provides for training seminars and the

provision of self-training courseware for students, as well as training offers leading to international certifications.

- **On the manufacturing of computers in China.**

- As part of the implementation of the instructions contained in correspondence No. 521 / CF / SG / PR of 25 July 2016, Sichuan Telecom Construction Engineering Co Ltd, prime contractor for the E-National Higher Education Network project , since November 26, 2017, after validation of all financial and technical prerequisites, under the supervision of MINESUP, the manufacture of the 500 000 computers, object of the Presidential Donation to students in a renowned Chinese factory (*Shenzen Xingfei Technology Co Ltd*) .
- Part of the opinion believes that the best option would have been, for the same amount of funding, to establish a computer assembly plant in Cameroon. For the proponents of this thesis, this plant would have contributed not only to significantly lowering the costs of computers, but also to reduce youth unemployment in Cameroon. Although this option was not prescribed at MINESUP (which would then have been within the competence of the ministerial department responsible for industrial development), the Minister of Higher Education nevertheless, in order to anticipate this debate populist hints, asked the project team at the time to shed light on the technical, financial and economic feasibility of this option whose main merit is to be very captivating for the populations and therefore potentially "politically incorrect" to oppose it publicly.
- Subject to a better appreciation by the ministerial department in charge of industrial development, the first limiting factor of this option is the small size of the national and subregional computer market which could not benefit a factory located in Cameroon from the economy of scale enjoyed by factories in Asia. Experiences in other African countries clearly indicate that it is difficult for our countries to produce (on a small scale) computers at a lower cost or equivalent than Asian countries, especially China. The **economic viability** of this type of industrial project in Africa is not yet guaranteed. Very few private investors are therefore interested for the moment in this sector, in the absence of strong equilibrium subsidies by the state (which they require to pay interest). It is interesting to bear in mind that the computer industry has already fully converged with the mobile phone industry (computers and cell phones are manufactured in the same conglomerates of factories). Unlike computers, the mobile phone market is not that close in Africa (more than 10 million mobile phones are in use in Cameroon). But, we can see that investors are not jostling for cell phones in sub-Saharan Africa. The reasons are to be found in the **technical and industrial feasibility** of this type of project.
- A **computer assembly plant** is just the last link in a chain of more than a dozen factories most often located close to each other (in a technology park that creates an industrial value chain) and specialized each in the manufacture of a particular component of the computer. Implementing only

the assembly plant in Cameroon, when all computer component manufacturing plants remain in China (or elsewhere) poses a serious problem of technical feasibility of the project. On the other hand, it is not so obvious to believe that the owners of hardware and software components (for reasons of **industrial geostrategy**) have a natural disposition to properly supply their components to an assembly plant that is not part of their **industrial alliances**. It is therefore difficult for an isolated plant installed in Cameroon and therefore not immersed in an industrial alliance and value chain to be technically viable.

- At the financial level, the break-even point of an assembly plant can only be envisaged for an annual production well above 3,000,000 units. The financial cost of the investment to be made not only to implement, but also to support and make optimally functional and economically viable (which takes several years) such a plant in Cameroon is enormous (supply of quality energy, training of personnel, chain marketing, product quality assurance, reliable industry partnerships, market penetration, etc.).
- Although it is a politically very catchy idea, a project to provide 500,000 computers to students can hardly justify economically, financially and technically the establishment of a computer assembly plant in Cameroon. Indeed, the viability of this plant must be guaranteed beyond the initial production of 500,000 computers which is far from being the case. Some African countries have embarked on this venture (Ghana, Kenya, Rwanda) and, contrary to what is maliciously distilled in the public opinion, all these experiments proved to be unsustainable: the *Industrial Computer Plant* installed in 2013 in Kumasi Polytechnic in Ghana is shut down, the computer assembly plant set up in 2015 at the Jomo Kenyatta University of Agriculture and Technology is almost shut down due to the prohibitive production cost of its computers, the assembly plant of computers and mobile phones in Kigali, Rwanda, for a projected annual production of 720,000 units, although heavily subsidized by the state, has only been able to produce an anecdotal amount of computers.
- Instead of focusing on the hardware manufacturing industry that requires an industrial environment and heavy investments, the Government is emphasizing the alternative option which is the promotion in Cameroon of an **industry of software, content and digital services**, more accessible to countries with low levels of industrialization, but with an ingenious and creative youth.
- The donation of computers to all students is part of a logic of rapid immersion of our students in digital culture, to make each student a potential creator and entrepreneur of the national software, content and digital services industry.
- It should be recalled that the turnover of the digital content and services industry (Software Industry) is far superior to the turnover of the hardware industry. But the digital hardware industry is more fascinating entrepreneurs in the African political and social arena because it is visibly

manifested by factories that can be "seen" and "ushered in". On the other hand, the software industry, even more accessible to African countries, does not find the same craze because it is an intangible industry whose plants and products are not visible!

- **Student Opinions on PBhev Computer**

There are two scenarios:

- **Students enrolled in computer science and related engineering fields**, which represent less than 2% of the enrollment of students enrolled in national universities, are reserved on the PB HEV computer that would not be suitable for their specific needs of practical computer engineering work. Moreover, these students usually already have a computer whose possession is imperative for their training. They find that the capabilities of the PB HEV computer are below the computer they already have. **However, increasingly, this initial impression fades away: the students of the Computer Science departments of the Faculty of Sciences, the National School of Engineering and the Advanced Teachers Training College of the University of Yaounde I use with satisfaction the PBhev computer for their practical work. Until now, they have not been able to highlight a didactic activity that could not be done with the PBhev computer (Matlab's operating test was successfully conducted by the Master's students in Computer Science at the Faculty of Sciences of the University of Yaoundé I).**
- **Students enrolled in all other fields of study** who do not have practical computer engineering work to do are overwhelmingly very satisfied with the PB HEV computer, especially since most of them do not had no computers and used the mobile phone (for those who own a mobile phone Android) for their didactic uses. This population represents more than 90% of the students and was the real target of the project "One student – One computer"
- **Conclusion on the component "One Student - One Computer"**

The main target of the "One student - One computer" project, which is made up of students not enrolled in computer or related fields and students from other sectors who do not have a laptop (+ 90% of students) is very satisfied with the Presidential gift. Potentially higher needs, quite understandable, were expressed by students in computer science with specific concerns in terms of computer performance. It was these initial criticisms, which faded away from the use of the PBhev computer that were picked up and amplified by the critics of the project in the hope of downplaying its political significance.

An empirical evaluation of the general reception and the first uses of the PB HEV computer by the students in the campuses of the universities of Yaoundé I and II indicates that the project "A computer -Un student" is an excellent project:

- The PB HEV computer is practical:

- it is a modern and easily transportable tool;
- it is technically efficient;
- it is appreciated by ordinary students;
- The project is democratic (access to the largest number of students) and technologically modern (ultrafine computer equipped with components and software of the latest generation like the hard disk type SSD instead of the old model HDD and the system Windows10 operating system).

In the light of the unsuccessful experiments carried out in other African countries, the Head of State has made an exceptional and unprecedented donation, for a precarious but neuralgic fringe of the Cameroonian society.

4. TIME SCHEDULE FOR THE DISTRIBUTION OF COMPUTERS TO STUDENTS OF CAMEROON UNIVERSITIES.

- **Students of 2016-2017 academic year**

- **University of Yaoundé 1 and Yaoundé 2** : as from december 2017 (after the arrival in Yaounde of the first consignment of computers made in China);
- **University of Bamenda, Buéa, Douala et Dschang** : as from February 13, 2018 (after the arrival in Yaounde of the 1st consignment of the 2nd batch, on February 9th and the arrival on February 11th, 2018 of the 2nd consignment of the second batch);
- **University of Maroua and Ngaoundere**: upon arrival by boat of the third consignment (April - May 2018).
- **Private Institute of Higher Education**: upon arrival by boat of the third consignment (April - May 2018).
- **New students of 2017-2018 Academic Year**: upon arrival by boat of the third consignment (April - May 2018).

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