Terms of reference for the analysis of the needs in enterprise managers in the major sectors of economic development of West and Central African countries and benchmarking of the Centrale Bachelor program

1. Context

1.1. Adequacy between employment and higher education in sub-Saharan Africa

In a context of sustained economic growth and accelerated technological change, African enterprises and organizations must meet the dual challenge of improving their performance while mastering new tools and new modes of organization. Recruitment policies, job and career management and continuing vocational training are all indispensable levers for maintaining capacity in a competitive environment and for meeting the social and environmental challenges facing Africa. The potential of the African continent is real and well identified, and growth prospects are encouraging. However, analyses show that productive investments made on the continent are still too decoupled from social progress and are insufficiently translated into the creation of jobs and added value. The obstacles are essentially linked to human resources (qualifications not present locally or poorly known) and technology (lack of SMEs and expertise in certain fields). Vocational training must therefore be developed at all levels of qualification to enable economic activities to acquire the human resources necessary for their establishment and deployment. No sustainable technology transfer is possible without the existence of the skills required to appropriate it.

In Burkina Faso, vocational and technological diplomas only concern 7% of high school graduates. Learning is very formalized and often does not give rise to periods of training in a professional establishment. Higher education is essentially generalist and professional or professional outings at the DUT (Diplôme Universitaire de Technologie - Technological University Degree), bachelor and BTS (Brevet de Technicien Supérieur-Higher Technician Certificate) level are largely the result of private establishments which will favor tertiary training for their ease of implementation. Universities are currently constrained to meet social demand by offering higher education prospects to high school graduates whose main ambition is to reach the highest level of qualification possible. However, it should be noted that professionalization is at work in public universities with the creation of vocational institutes and schools.

The rise in the level of qualification is a trend observed in the structure of employment. Tomorrow's jobs will be more skilled and will require more advanced know-how. However, the phenomenon is still difficult to quantify and there is a lack of data to accurately analyse qualification needs at the different levels of graduation. However, existing studies carried out in French-speaking sub-Saharan countries show the following findings:

- the need to develop vocational training at all levels of qualification, from CAP (Certificat d’Aptitude Professionnelle) to master’s degree, with regards to the generalist training offer.
- a substitution of local graduates by expatriate manpower at the level of engineers, which reflects both a lack of knowledge of the existing qualification offer by international groups, and an insufficient professionalization of higher education institutions.
- a very strong demand for higher technicians superior to engineers, in all fields and which remains poorly provided for to date in technical fields.
the engineering degree is the privileged target of young people and their parents. The intermediate undergraduate level Bac+3/Bac+4 (bachelor's degree or licence) is considered unattractive to young people. Moreover, graduates with a Bac+3/Bac+4 level (undergraduate level) can be problematic in companies' salary scales, as depending on the country or company, they are considered either as senior technicians or as works engineers. Communication focused on a secure job, internships, block-release training and the possibility of a bridge to engineering studies can possibly convince the young person to take a bachelor's degree.

The tools that would facilitate the implementation and steering of higher vocational training provision are embryonic and absent in some sectors. These are observatories of trades and skills at the territorial level (countries, regions) and at the level of professional branches. The professional federations and unions have not yet established themselves in all sectors and have not yet included in their missions the identification of qualification needs in the companies they group together. As a result, the provision of vocational training at the higher education level in sub-Saharan Africa is based on two different approaches:

1) A commercial positioning linked to the demand of families and supported by private institutions. There may be a gap between social demand and the labour market needs, which do not follow the same dynamic.

2) The legacy of vocational training provision set up by African States at the end of the 1960s to cover the capacity-building needs of their executives in various fields (medicine, pharmacy, statistics, animal husbandry, agronomy, rural engineering, etc.).

2iE (International Institute for Water and Environmental Engineering) responds to this second logic. The creation of 2iE, in 2007, results from the merger and restructuring of the inter-State schools EIER (School of Rural Equipment Engineers) and ETHER (School of Hydraulic and Rural Equipment Technicians), created respectively in 1968 and 1970 by 14 West and Central African States to train engineers specialized in the fields of equipment and hydraulics. Today, 2iE is a higher education and research institute specialized in the fields of water and sanitation, civil engineering and hydraulics, energy and electricity, environment and sustainable development, management and entrepreneurship. 2iE can accommodate more than 2000 students, the vast majority of whom are from French-speaking sub-Saharan Africa. 2iE is a World Bank Africa Center of Excellence in the field of Water (ACE) and 2iE is accredited by the French Commission des Titres d'Ingénieur (CTI and EUR-ACE). 2iE is also a Center of Excellence of the UEMOA, ECOWAS and NEPAD.

1.2. CentraleSupelec, Ecole Centrale Casablanca and the Groupe des Ecoles Centrale

CentraleSupélec (CS), a French public institution of higher education and research, was created in January 2015 from the merger of Ecole Centrale Paris and Supélec, two French engineering Grandes Ecoles. CentraleSupélec has more than 4,000 graduate students, including more than 3,000 engineering students. With 3 campuses in France - in Paris-Saclay (Ile de France), Metz (Lorraine) and Rennes (Brittany), the School has developed a vast network of partnerships and collaborations with nearly 150 companies, 200 partner universities, and multiple co-operations of research programs and structures with national organizations such as CNRS, CEA, INRIA, INSERM and ONERA. CentraleSupélec leads the Groupe des Écoles Centrale (Lille, Lyon, Marseille and Nantes) with which it has developed establishments in China, India and Morocco. Ranked among the world's best
institutions (137th overall and 61st in the engineering sciences ranking, QS 2019), and for the employability of its graduates (7th for employer reputation, QS 2018), CentraleSupélec has a network of more than 35,000 active graduates, in all professional sectors and on all 5 continents. CentraleSupélec is a founding member of the University of Paris-Saclay, a flagship project in the restructuring of the French space of higher education, research and innovation, and of the T.I.M.E. and CESARER networks, bringing together more than 80 European and world universities in science and technology.

The Ecole Centrale Casablanca (ECC) is the result of a partnership between the French State and the Kingdom of Morocco, signed in April 2013 by the ministries concerned, in the presence of the President of the Republic François Hollande and His Majesty Mohammed VI, King of Morocco. This international partnership gives Centrale Casablanca the status of a public institution, supported by the Fondation École Centrale Casablanca.

Founded in December 1990, the Groupe des Écoles Centrale (GEC) comprises CentraleSupélec, Centrale Lyon, Centrale Nantes, Centrale Lille and Centrale Marseille. These five engineering schools share the same values, missions and vision of the future. The main mission of the five institutions is to train multidisciplinary generalist engineers and PhDs capable of responding in an innovative way to the challenges of our society. In France, the Groupe des Écoles Centrale graduates nearly 2100 engineers each year. It meets the criteria of academic and research excellence thanks to the investment of more than 800 permanent teachers and researchers and no less than 2000 external contributors.

1.3. Project ADESFA 2iE-CS-ECC

This study is part of a project to create an undergraduate scientific program at 2iE in Burkina-Faso. It is funded by France Education International on the basis of an ADESFA (Aide au Développement de l'Enseignement Supérieur Français en Afrique) call for projects, 2019 campaign. The partners of this project are 2iE, the Ecole Centrale Casablanca (ECC) and the Groupe des Écoles Centrale (GEC) via CentraleSupélec (CS), the project's lead institution. The aim of the project is to create a high level general scientific undergraduate program in Burkina Faso (at 2iE) based on the academic requirements of the GEC schools with two possible outputs:

- A graduation at the end of 3 years of the program allowing an integration into an École Centrale through an entrance competition in the first year of the engineering cycle: Path 3+3, i.e. 2iE Bachelor's degree (3 years) + Diplôme d’ingénieur Centralien (3 years). In this case (3+3), the primary objective is the Centralien engineer.
- A second graduation at the end of 4 years of program allowing professional integration into middle management positions, with the possibility of joining a GEC school by admission on file and to follow a two years Accelerated Engineering Degree Program Master’s level: Path 4+2, i.e. Centrale Bachelor’s degree (4 years) + Diplôme d’ingénieur Centralien (2 years).

There are therefore two profiles of professionals who are targeted by the different paths envisaged within the framework of this new training:

- **Centrale Bachelor’s graduate**: middle manager able to exercise middle management functions of scientific and technical teams (engineering assistants, local or supervisory managers, sales manager, etc.). Its competencies are detailed in the following section.
• **Ingénieur centralien**: Generalist engineer with a high scientific and technical level and a strong international culture (engineering managers, senior executives). His vocation is to manage programs in all their components, beyond their technological dimension (economic, strategic, organisational, etc.). He is an expert in launching and managing innovative projects, and knows how to apprehend complex systems through a global approach without necessarily being a specialist in each of their components. He knows how to mobilize his skills to transfer them from one field to another.

Moreover, in terms of prospects, the Bachelor's degree program envisaged in this project targets high school students with a very good or even excellent academic profile (scientific bac series C, D or E with honours and/or well ranked in high school) who are potentially interested in an engineering school of international renown. This student profile is largely found among mobile African students who pursue high-level scientific studies, particularly in France or North Africa, sometimes with the support of their country (state scholarship for excellence). According to data from Agence Campus France, France remains one of the priority destinations for mobile African students, particularly for those from French-speaking countries for whom it is still the first choice (72,000 students from sub-Saharan Africa in 2017-2018\(^1\)). The majority of students from sub-Saharan Africa go to French universities (76%), with 5% going to engineering schools and 6% to higher education colleges (CPGE). According to a Campus France survey, the motivations of these African students on scholarships that encouraged them to study in France are primarily linked to "the search for a better education" (68%) and the desire to "follow an education that is not available in their country" (47%), "these two reasons being priorities in 60% of cases". "Half believe that graduating abroad facilitates access to employment and seek a degree from a prestigious, well-ranked foreign institution. »\(^2\)

2. **Elements of the Centrale Bachelor's competency framework**

In order to sound out the needs of the job market on the profile of middle management targeted by the Centrale Bachelor's program, it is necessary to describe the basic elements of the competency framework of this program. A graduate of the Centrale Bachelor program has a multidisciplinary scientific, technical and human training allowing him to respond in an innovative way to the challenges and technical development of his sector of activity, in order to improve its products and services. To do so, he takes into account technological progress, its societal impact and the development of the company and the organization. Aware of multidisciplinary and intercultural projects, he is an "Operating Engineer” with a broad scientific and technical background, endowed with an entrepreneurial spirit and middle management skills as well as a strong international culture, including the mastery of at least two or even three modern languages. At the end of their training, graduates will be able to integrate professionally in many sectors of activity or apply for further studies at an Ecole Centrale, in a master's degree in a speciality or in an Accelerated Engineering Degree Program Master’s level for the Centrale engineering diploma in 2 years. The Centrale Bachelor's program provides a solid and diversified base of scientific, technical and human knowledge through a diversified pedagogy designed to develop the ability to apply the concepts of the associated engineering sciences.


The Operating Engineer implements his scientific, technical and technological knowledge, as well as his know-how in terms of products and/or services for the company through five key transferable skills:

<table>
<thead>
<tr>
<th>Skill 1</th>
<th>The ability to apprehend a concept or a new product or service in order to contribute to its development.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill 2</td>
<td>Mastery of the technical development of the product and/or service adapted to a context and responding to expressed needs.</td>
</tr>
<tr>
<td>Skill 3</td>
<td>The ability to integrate the production, promotion and sales dimensions in order to be able to deploy them.</td>
</tr>
<tr>
<td>Skill 4</td>
<td>The ability to manage a technical team and to integrate into a larger organisation.</td>
</tr>
<tr>
<td>Skill 5</td>
<td>The ability to project one’s action, to project oneself.</td>
</tr>
</tbody>
</table>

3. Objectives of the study

The general objective of the study is to identify the present and future needs of the labour market in terms of skills and qualifications at middle management levels in the major sectors of economic development in West and Central African countries (French and English speaking), such as:

- Energy, water and environment
- Building and public works, urbanism
- Industry
- Digital, telecommunications, data engineering
- Transport and logistics
- Financial institutions, banks and insurance companies
- Health and food: bio-engineering, bio-technology, agronomy, agriculture, agri-food

The aim for 2iE, ECC and GEC is to have a visibility on the demand of companies for middle managers corresponding to the profile of Centrale Bachelor graduates described above, in an area that represents both the predominant area of recruitment and insertion of 2iE students, while prospecting in English-speaking countries where the Bachelor degree is well recognized.

More specifically, this will involve:

(i) identifying the sectors of activity for which the need for middle management (profile of the Centrale Bachelor graduate) will be most expressed,
(ii) identifying the expected professional skills based on the needs expressed for the profile of middle management,
(iii) to analyse the relevance of the skills of the Centrale Bachelor's competency framework in order to answer these needs in qualifications and if necessary to propose amendments (in particular, to question on the skill innovation, entrepreneurship, design)
(iv) to carry out a competitive benchmarking of the Centrale Bachelor's program in the identified sectors of activities, in particular in the English-speaking countries.
4. Methodology

The main part of the study will have to be based on a systematic questioning of professionals in relation to their needs in terms of skills and qualifications, in particular as regards middle management. It cannot be based solely on the re-use of the results of previous surveys, which may, however, be used to support the study as a reference. “Professionals” must be understood as: managers of professional branches or unions, managers of companies and organisations with which 2iE maintains links in relation to the integration of its graduates, managers of companies and organisations which do not yet have a formal link with 2iE but are likely to be interested in the new training provision (Centrale Bachelor) in relation to their activities. It will be a question of identifying, within each company, the person or group of persons most likely to be able to answer the question of recruiting middle managers corresponding to profile targeted by this study.

The study and questioning should focus as much as possible on a representative group of professionals in the geographical area of integration of 2iE graduates (CEMAC + UEMOA) but also on English-speaking African countries likely to better understand the Bachelor’s degree program in 4 years. For the French-speaking area, the emphasis will therefore be placed in particular on Cameroon, Gabon, Côte d’Ivoire and Benin. For the Anglophone zone, the emphasis will be on Ghana and the Anglophone zone of Cameroon. Benchmarking of the training may also be limited to this zone. The consultant will therefore be asked to carry out a mission in a French-speaking country (Gabon, Côte d’Ivoire or Benin) and a mission in an English-speaking country (Ghana or the English-speaking zone of Cameroon).

Questioning will be done through face-to-face, telephone, video-conference, email or online surveys. The efforts of the consultant recruited for the study will be aimed at ensuring a sufficient number of responses and the sincerity of the answers. Survey forms will be proposed by the consultant and validated by the ADESFA project team. They will make it possible to formally collect the opinions of professionals. The desired study is aimed at qualitative elements. However, the consultant may, if he deems it useful, present quantitative elements either taken from the survey or from pre-existing sectoral or geographical studies on the employment of middle managers in the fields identified. In the latter case, the data may relate to the added value of the sector, productivity, the number of jobs per job type, qualification or territory, etc. Professional expertises (know-how) will be the element to be privileged to question the professionals (“the graduate must be capable of”). They can indeed help in the construction of curricula through the competency-based approach. However, the tools or concepts to be mastered are also useful elements to be collected for analysis.

5. Deliverables

At the end of the study, the consultant shall provide:

1. A detailed analysis of the needs of current and future companies for middle managers in a wide range of sectors (see section 3), companies of all sizes (SMEs, Multinationals), highlighting the sectors of activity and the types of companies most in need of this type of profile. It should also identify the professional expertise corresponding to the needs expressed for the profile of middle managers in the sectors identified.

2. A reasoned analysis of the relevance of the Centrale Bachelor’s competency framework in order to meet these needs in terms of qualifications and, if necessary, to propose amendments to the competency framework.
3. An analysis of the opportunity to set up block-release training arrangements and/or awarding scholarships for students (contractualisation between the student, 2iE and the company).

4. Remuneration levels of middle managers and their prospects for development within companies in the sectors identified.

5. A competitive benchmarking analysis of the Centrale Bachelor's program in the identified fields, particularly in English-speaking countries.

6. The interview guides and questionnaires used, the raw results of the survey (answers collected from professionals) in Excel, PDF and Word formats.

6. Timeframe of the study

Once the ADESFA project team has accepted the consultant's offer, the deadline for carrying out the study will be 2 months from the date of signature of the contract. The study must be completed by the end of May 2020 at the latest.

7. Consultant Profile

The consultant should have a good knowledge of the employment-training relationship, of the professional and economic context in sub-Saharan Africa and of conducting qualitative surveys. He should be able to justify similar studies in the targeted geographical area. He will have to justify an independent or even autonomous level of both English and French (corresponding to level B2 or C1 of the Common European Framework of Reference for Languages).

8. Financial terms and conditions

The expertise service will be remunerated up to 800 € per day worked. On-site mission expenses will be covered on the basis of the per diem in force in the countries visited and according to CentraleSupélec's travel policy. Transport costs will be covered by the ADESFA project.

9. Submission

The submission package should include :

- an up-to-date CV
- a financial offer excluding VAT (with details of the duration of the mission, estimated mission costs);
- a technical offer, detailing the planned methodology;
- references (documents, links) proving the consultant's experience in qualitative surveys on the employment-training relationship.

The application must be sent no later than 15 April 2020 in PDF format to the e-mail address yves.louet@centralesupelec.fr.