

GUIDE FOR AFRICAN RESEARCHERS on filing a patent application

From the African Community of Practice on Managing for Development Results at the African Capacity Building Foundation



Guide N° 12

SYNOPSIS

This guide (drawing on a desk review) is an effort to contribute to increased numbers of patent applications from African research institutions. It also provides directions to universities and research institutions on how to use the intellectual property system and information in patent documents for their own research and development.

Among the key findings: The 2013 annual report of the World Intellectual Property Organization shows that patent applications rose to 2.57 million. But of these, all African countries combined accounted for a meager 0.6 percent. Fewer African patent applications mean less innovation in Africa. This challenge arises partly because many African research institutions still hold to the old academic concept of “publish or perish,” that is, publishing research papers is more important than filing patent applications. They seem not to appreciate that filing a patent application and afterwards publishing could give them both types of reward: royalties from patents and the traditional academic benefits of publishing.

The main recommendations: African researchers are strongly advised to file a patent application before they publish or present their inventions at public conferences. This will help them to get patents easily and benefit from the advantages that strong patents can bring. They are also advised to use patent information before they start undertaking their research work.

The continent’s universities and research institutions should reward and motivate researchers through royalties. This is likely to encourage research and innovation. The policies should indicate how the royalties from patents and innovation will be shared after they have licensed the innovation. They should also form a technological transfer office with experienced staff who can assess the innovations generated by researchers and choose what to patent.

Introduction to patents

What is a patent?

A patent is a legal document granted by states to inventors, giving them exclusive rights to prevent third parties, not having the owner's consent, from acts of making, selling, using, offering for sale, or importing products or processes covered by the patent (Idris 2003). The exclusive rights give the inventor a monopoly of 20 years to enable the recovery of the cost incurred in Research and Development (R&D).

The inventor gets monopoly rights to use, sell, license, and franchise her or his patent, and these rights are territorial. But the patent owner, inventor, or applicant must disclose an invention in a manner sufficiently clear and complete so that the invention can be carried out by a person having ordinary skill in the art. This requirement is critical as it is aimed at enhancing the means of developing science (WIPO 2015).

Which subject matters are patentable?

According to IP Australia (undated), patents are granted for a process or a method or a product. Examples of patentable matters are:

- The process or method of making a certain drug, the drug itself, or the method.
- A process of making a certain machine and the machine itself.

It can also be a composition of a matter or any new and useful improvement of any of these, such as a new use of a known compound.

Which subject matters are non-patentable?

A patent cannot be granted on scientific principles or theorems; ideas or inventions contrary to morality such as some biotechnology inventions which can be processes for cloning human beings; processes for modifying the germ line or genetic identity of human beings, uses of embryos for industrial or commercial purposes, or the use of plants or animals for illegal purposes (ARIPO 2014).

But as patent law advances, business methods, software games, and certain life forms such as plants

are becoming eligible for protection under new patent laws in several countries (Harris 1998). For example, software can be protected using copyright laws, and plants can be protected under new plant variety protection laws.

What are the conditions or criteria for patentability?

According to World Intellectual Property Organization (WIPO) (2015):

- For the invention to be protected it should be novel or new, meaning that it should not have been disclosed anywhere, that is, through patents, journals, newspapers, conferences, or other public media at the time the application is filed.
- The invention should be "inventive," meaning it should not be obvious to a person skilled in that field of invention. For example, if the invention is for a drug, it should not be obvious to any pharmacist, or if it is a machine it should not be obvious to any engineer.
- The invention should be industrially applicable, meaning it can be functional, operative, or reproduced in the industry.

According to the African Regional Intellectual Property Organization (ARIPO 2014), patent rights are limited to a period of 20 years from the initial filing date. After 20 years it falls into the public domain. This means that anyone can use it free of charge.

Moreover, patent rights are territorial. Therefore, patent applications should be filed nationally, regionally, and/or internationally (WIPO 2015).

What is the time frame for publishing a patent?

A patent application is normally published 18 months after the date of filing. The objective is for the public to see the new technology and allow those who want to invent around and improve the knowledge to review and build from there a new invention (WIPO 2015).

Advantages of patenting African research and innovation

According to the United Nations Economic Commission for Europe (UNECE) (2011) and Wellings (2008), the following are the advantages of patenting research work that can benefit our researchers:

- African researchers will have rights to assign, transfer by succession, and conclude licensing contracts for their patents.
- Strong patents on African research work will play an important role in the overall African economy. It will contribute to employment and achieving development results.
- Strong patents will attract foreign direct investment and technology transfer.
- They will promote the dissemination of new technologies, through publications and through patent disclosure, making innovation and creativity by African researchers more available to the research industry and to society at large.
- Strong patents through licensing will provide incentives for new innovations to be licensed to others in the African market and beyond.
- They will give African researchers the right to stop others from manufacturing, using, or selling their inventions without their authorization.
- Strong patents will enable Africans to license others to manufacture their inventions on agreed terms or take legal action against people who use their invention without their permission.
- They encourage researchers to continue their research, develop new and innovative products, exploit new technology, and promote the transfer of technology to the country.
- Strong patents give trading partners the incentive to provide similar rights and thereby protect African exports in markets abroad.

Understanding a patent document

Patent information for researchers

A patent information document includes a full description of how a patented invention works and the claims that determine the scope of protection as well as details on who patented the invention, when it was patented, and reference to relevant literature. About two-thirds of the technical information revealed in patents is never published elsewhere (WIPO 2015).

As the document includes granted and rejected patent information, patent information constitutes a major source of legal and technical solutions, extending over most fields of technology. Each year about 300,000 new published patent documents are added to the 60 million patents existing with technological information that are available to the public. This makes patent information the single most comprehensive collection of classified technological data (De Laet 2006).

Structure of a patent document

A patent document contains three parts (four with drawing/s): bibliographic data (figure 1); description; claims; and drawings, if any (see annex 1 for a full patent document).

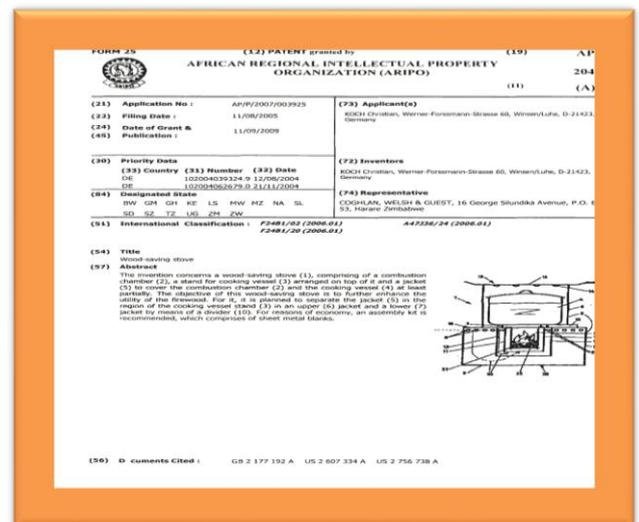


Figure 1. Example of front page of a patent document

The bibliographic data on the front page of the patent document contains key information such as:

- A patent publication number, which can be used to search for a particular document.
- Filing date and publication date, that can also be used to find the document.
- Priority date, which helps the patent examiner to look for prior art that is older than a priority date. It also determines when the exclusive right was granted, and the expiry date.
- Designated states, which show in which countries the invention is protected.
- Applicant(s) and inventor(s) with their addresses, which help anyone interested in the field if she or he wants to contact them.
- International classification, which helps the researcher or patent examiner to search in a correct technical field.
- Title and abstract to search and get the prior art or inventions in the same technical field.

Description. This helps researchers, patent examiners, inventors, or any individuals skilled in the art to read and understand the invention. The description is aimed to enable the reader who is interested in carrying out similar experiments and who still arrive at the same invention or conclusion. It helps other researchers or inventors to invent around and improve the technology and file for a patent on the improvement. It helps the patent examiner to understand the invention and relate it to the claims and assess the novelty and inventive steps in relation to other prior art (figure 2).

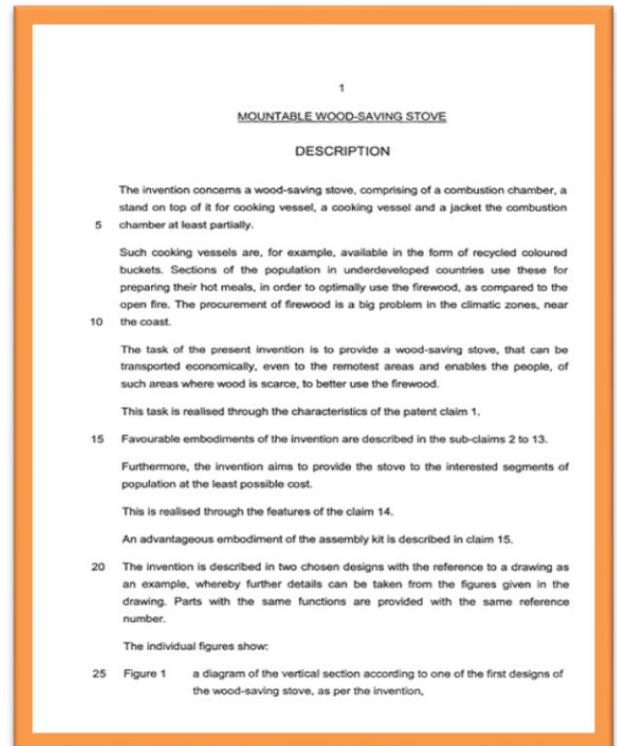


Figure 2. Example of a description

Claims. The claims (or claim) set the boundary of protection (figure 3). The patent examiner and other researchers normally check the claim to see if the applicant is not infringing other people's rights by claiming beyond her or his invention. A research item or applicant infringing other people's rights might end up in court. It is thus up to the patent examiner to inform the applicant claiming beyond her or his rights to limit the invention to avoid litigation.

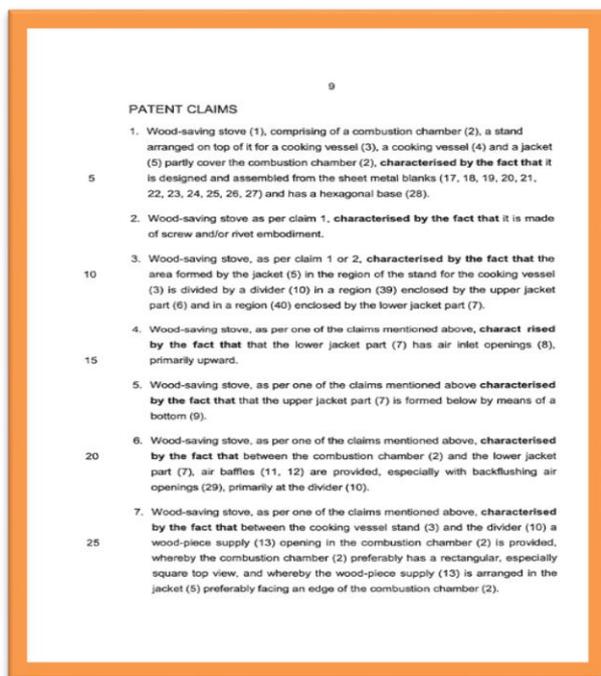


Figure 3. Example of patent claims

Drawings or chemical formulas. The drawing normally helps the researcher leading the invention to understand much better, so that she or he can improve on the drawing and produce an improved invention. The drawing also helps the patent examiner to easily understand and differentiate the invention from others.

Seven-step guide to drafting and filling a patent application

Step 1: Drafting a patent application

According to ARIPO (2014) a patent application is structured in standard form and should contain the following six elements.

1. Title. This should be clear and should be related to the invention and must not exceed 15 words (annex 1, p. 1). A title and abstract can be used for search purposes.

2. Abstract. This should be clear and concise, contain chemical formulas or drawings, and not exceed 150 words (annex 1, bibliography, and p. 11).

3. Description. This should:

- First state the title of the invention as appearing in the request form.
- Specify the technical field to which the invention relates.
- Indicate the background art that, as far as known to the applicant, can be regarded as useful for understanding the search and for examination of the invention, and preferably, cite the documents reflecting such art.
- Disclose the invention in such terms that it can be understood, and state its advantageous effects, if any, with reference to the background art.
- Briefly describe the figures in the drawings, if any.
- Set forth at least the best mode contemplated by the applicant for carrying out the invention; this shall be done in terms of examples, where appropriate, and with reference to the drawings, if any.
- Indicate explicitly, when it is not obvious from the description or nature of the invention, the way in which the invention is industrially applicable and the way in which it can be made and used, or, if it can only be used, the way in which it can be used (annex 1, pp. 1–8).

4. The claims (contents of the claims). Claims define the subject matter for which protection is sought in terms of technical features of the invention. They should be clear and concise and be supported by the description. The number of claims should be reasonable, taking into account the nature of the invention, and where there are several claims, they should be numbered consecutively in Arabic numerals.

Wherever appropriate, claims should contain a characterizing portion, preceded by the word “characterized in that,” “characterized by,” “wherein the improvement comprises,” or any other words to the same effect, stating concisely the technical features that, in combination with the features stated in the previous paragraph, it is desired to protect (annex 1, pp. 9–10).

Claims should not, except where absolutely necessary, rely (in respect to technical features of the invention) on reference to the description or drawings. In particular, they should not rely on such references as “as described in part ... of the description,” or “as illustrated in figure ... of the drawings.”

Claims related to medical indications or use claims should, for the examination, be drafted in accordance with standard phrases provided below.

Claims regarded as first medical indications:

- Pharmaceutical composition for the prophylaxis/treatment of Y (= disease) comprising X (= a drug/medicament).
 - Pharmaceutical composition comprising X.
 - Compound X for use as a drug/medicament for the treatment of Y.
 - Use of X for manufacture of a pharmaceutical composition. (Note that the disease indication is not mentioned in the claims).
 - Compound X for use as an analgesic.
 - Compound X for use in treating disease Y.
 - Compound A containing X for use in treating disease Y (compound A may be genetically defined).
 - Medicament containing compound X.
 - Use of X for preparing a medicament.

Claims regarded as second medical indications:

- Use of X for manufacture/preparation of medicament/pharmaceutical composition for the treatment of Y.
- Process for preparation of medicament for treating disease Y characterized in that compound X is used as the main active component of the medicament.

5. *The drawing (or drawings).* Drawings, if any, can be presented in the abstract and as an attachment. (For subheads 1–5, see ARIPO 2014.)

6. *International patent classification.* According to WIPO (2015), a patent application should be classified under the technology to which it belongs based on the international standard classes. The

fields of technology are divided into eight classes/sections as follows: (a) human necessities; (b) performing operations, transport; (c) chemistry, metallurgy; (d) textiles, paper; (e) fixed construction, mining; (f) mechanical engineering; (g) physics, information; and (h) electricity.

Why can a patent application be rejected?

According to IP Australia (undated), reasons for rejecting a patent application are:

- Many original patent specifications do not describe the invention properly in a clear and complete manner so that the skilled person in the art can carry out the invention.
- The invention is not new because the applicant has disclosed it in public, for example a conference or workshop, before applying for a patent.
- The invention is not new because the applicant disclosed the invention to the public after filing a provisional application that did not adequately describe the invention in a clear manner, and she or he did not provide an effective priority date.
- The invention is not new because it is already disclosed in other prior art documents.
- The invention is a non-patentable subject matter.
- The applicant has not paid the fees (search and examination fees).

Step 2: What to consider before filing the application

First, check if your invention is new, not publicly disclosed, and with commercial potential. You can search in several free patent databases such as the United States patent office website (USPTO.org), the European patent office website (Espacenet.org), Google Patents, Patent Lens, Google Scholar, the WIPO database (Patentscope), or sales magazines to ensure that your invention has not already been created by anyone else.

Then consider what type of patent will suit your needs: Either file for a patent that lasts for 20 years from the date of filing, or file for a utility model that

lasts for 7–10 years and costs less (box 1 for filing at ARIPO).

Box 1. Filing a utility model at ARIPO

This is very much encouraged for African applicants. The procedure is the same as for a patent application. But the utility model criteria of patentability are simpler:

- Novel—the invention should be new in the country or region.
- Industrially applicable—it can be reproduced by industry.
- The protection time is 7–10 years.
- The fees are about US\$100.
- Examples of the utility model are a cooking stove or a simple solar charger for villages (ARIPO 2014).

You can do this by first seeking professional advice from a patent attorney or contact a patent office for help in conducting a search in all databases to check if your invention is new (not publicly known) before you file your application and waste money. They can also help you to check if your application contains the necessary documents (IP Australia undated).

Searching. In order for researchers to innovate they should use patent information in advancing research. Such information can be obtained by searching in free worldwide patent databases such as:

- List of national patent databases:
<http://www.wipo.int/ipdl/en/resources/links>.
- WIPO'S Patent Scope:
<http://www.wipo.int/patentscope>.
- European Patent office's search services:
<http://ep.espacenet.com>.
- Google Patents (US patents only):
<http://www.google.com/patents>.

Examples of commercial databases:

- <http://www.delphion.com>.
- <http://www.patentcafe.com>.
- <http://www.wipsglobal.com>.

Why should any applicant conduct a search?

According to WIPO (2015), a search is conducted to:

- Determine if your invention is new, and therefore worth protecting.
- Make sure that you are not infringing other people's rights.
- Learn about other companies or researchers working in the same field, that is, your competitors, and what they are doing, so that you can improve your product.
- Look at the patents that you can invent around, and see if you can improve on them and file a patent on the improvements.
- Determine the patents that have already expired and start production or importation of generic products.
- Check that your intellectual property rights are not being infringed.

Researchers can search using key word, inventor name, publication number, title, abstract, or classification.

Step 3: Where to file your patent application

An African researcher or applicant can file her or his patent application at a national or regional patent office or at the International Bureau of the Patent Cooperation Treaty (PCT) by applying through the national or regional office.

Applicants from French-speaking West African countries can file at their regional Office, the African Intellectual Property Organisation (OAPI), based in Yaoundé, Cameroon, or through the website www.OAPI.org.

Applicants from English- and Portuguese-speaking countries can file at their national patent office, and their applications are transmitted to the African Regional Intellectual Property Organization (ARIPO), based in Harare, Zimbabwe; or they can file directly with ARIPO.

Step 4: How to file at a national patent office (Kenya)

According to the Kenya Industrial Patent Institute (KIPI), a researcher or applicant may file with a provisional or complete specification (description and claims) at the Kenya Patent Office (KIPI 2007).

The application should contain:

- A request form (Form IP 3) with the title of the invention, applicant, inventor, including address and nationality.
- A description.
- One or more claims.
- One or more drawings.
- An abstract if possible containing a chemical formula or one drawing.
- The application fee (US\$150) with final specification.

A formality check will be done to see if all formalities are met.

For a substantive examination the applicant has to pay a fee of US\$250. A substantive examination will be carried out, including search and examination. If there are more than 10 claims, each claim after 10 applicants will pay US\$20. If the application is accepted, the applicant will pay US\$150 as the publication fee.

The application will then be published in the journal and a patent will be granted.

The applicant should pay a maintenance fee each year of US\$300. Kenyan citizens pay in local currency.

The processing time for granting a patent is roughly two to three years.

For more information, contact the Kenya patent office: Kipi@swiftkenya.com.

Step 5: How to file with ARIPO

National route. Applicants should download Form 3 from the ARIPO website www.aripo.org (ARIPO 2014).

Fill out the form with the following: title of the invention, name of applicant, name of inventor, nationality, country of residence, representative (if any), power of attorney for nonresidents, designated state or all 19 ARIPO member states (see the website) where she or he wants to be protected, disclosure, priority document (if any), and the International Patent Classification. The document must be translated into English.

Prepare a checklist with the following:

- Request (Form 3).
- Description.
- Claim(s).
- Abstract.
- Title.

Indicate the number of sheets or pages and sign.

Submit the documents to the national office, which in turn will transmit the documents to ARIPO, with Form 9.

The ARIPO office, on receiving the documents, checks if all required documents are there and if everything is in order. If so, ARIPO sends Form 12 to the applicant, giving her or him an ARIPO application number. The same form is sent to member states, informing them of the application received at ARIPO and that will eventually be protected in those states. If the documents filed are not in order, ARIPO will issue Form 11 to the applicant requesting her or him to send the required documents.

The applicant will be required by ARIPO to pay application, designated, and annuity fees in US\$. Nonresident applicants will be required to submit a document signifying power of attorney.

If the researcher or applicant pays all fees and submits all necessary documents, ARIPO sends her or him Form 13 indicating that the applicant has met all the formal requirements and her or his application is due for substantive examination. (See rest of procedure under “Substantive examination and issuance of patent” below.)

Regional route. A researcher or applicant who wants to file directly with ARIPO should do the following (ARIPO 2014).

Download Form 3 from the ARIPO website www.aripo.org

Fill out the form: title of the invention, name of applicant, name of inventor, nationality, country of residence, representative (if any), power of attorney for nonresidents, designated states (see website) where she or he wants to be protected, disclosure, priority document (if any), and International Patent

Classification (if any). The document must be translated into English.

Prepare a checklist with the following:

- Request (Form 3).
- Description.
- Claim(s).
- Abstract.
- Drawings (if any).

Indicate the number of sheets or pages and sign.

The ARIPO office, on receiving the documents, checks if all required documents are there and if everything is in order. ARIPO sends Form 12 to the applicant, giving her or him an ARIPO application number. The same Form is sent to member states informing them of the application received at ARIPO and that will eventually be protected in those states. If the documents filed are not in order, ARIPO will issue Form 11 to the applicant requesting her or him to send the required documents.

The researcher or applicant will be required by ARIPO to pay application, designated, and annuity fees in US\$ dollars (annex 2). Nonresident applicants/researchers are required to submit a document signifying power of attorney.

If all fees are fully paid and all necessary documents submitted, ARIPO sends her or him Form 13 indicating that the applicant has met all the formal requirements and her or his application is due for substantive examination.

Substantive examination and issuance of patent. Before conducting that examination, the patent examiner will check that all formalities have been met and all fees paid, and that the invention does not concern a non-patentable subject matter. If it is non-patentable, the examiner should reject the application.

The examiner also checks if there is “non-unity” of the invention. If there are two or three inventions in one application, the examiner will examine the first group of inventions and ask the applicant to file “divisional applications” for the two inventions. These two inventions are “daughter applications,”

and the first group the “mother application.” They are all granted at the same time and have the priority date of the mother application.

In the substantive examination, the examiner looks at the description to check if the invention can clearly make a person skilled in the art understand it, and if she or he when performing the experiment following the description will achieve similar results. The examiner will also check that the claims are clear and supported by the description, so that applicants cannot claim more than what was invented.

The examiner also conducts searches using different types of patent databases, commercial and free, including non-literature documents, books, magazines, and so on. The aim of the search is to retrieve prior art documents filed before the application to determine if the invention is new (not disclosed before in documents), if it is inventive (not obvious to a person skilled in the art), and if it is industrially applicable.

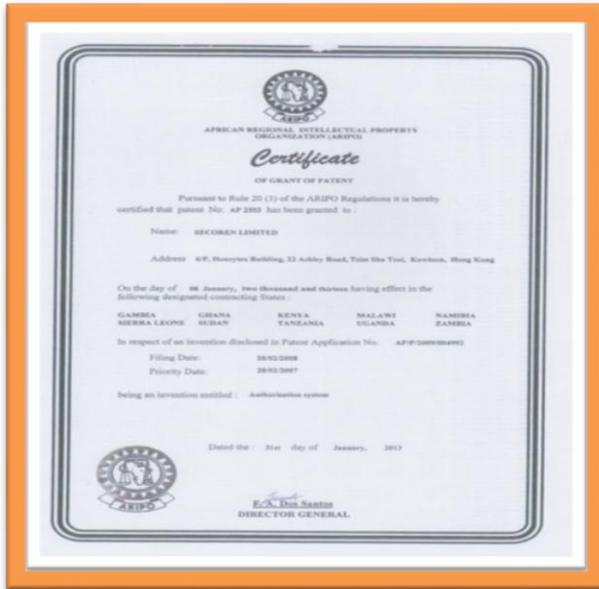
If everything is in order—claims are clear and concise; supported by description; and new, inventive, and industrially applicable—the examiner will grant the patent by issuing Form 21, an examination report, and a search report. These three documents will also be sent to ARIPO member states informing them to grant the intellectual property right to the applicant.

If everything is not in order the applicant is informed by Form 18, the Examination report, and asked to amend her or his application. After the application is amended, the examiner can accept or reject the application.

If it is rejected, the researcher can change it into a utility model or petty patent; if unsatisfied, she or he can open a case with the ARIPO Board of Appeal, whose decision is final.

After the patent examiner issues Form 21, the researcher/applicant waits six months for a response from member states. If there is no opposition, the patent is granted using ARIPO Form 25, and a certificate is issued to the applicant. The grant is also advertised in the ARIPO Journal. The

researcher/applicant pays a maintenance fee every year (annex 2).



Step 6: How to file with OAPI

OAPI patent registration procedure. As the French-speaking African countries have no national patent offices, researchers and applicants should obtain protection through their regional office (OAPI), which is a member of the International Convention of the PCT.

Filing a non-PCT application. According to OAPI, an applicant who wants to file a patent application should do the following:

- Fill out the request form for the grant of patent.
- A power of attorney document (simply signed), can be filed later, within three months of notification.
- Specification, claims, drawings, and abstract in English or French are required on the day of filing.
- Assignment of invention can be filed within six months.
- Assignment of priority rights with sworn and verified English or French translation can be filed later, within six months.

Filing a PCT application. According to OAPI, an applicant who files a PCT application through the regional route should do the following:

- Fill out the request form for the grant of patent.
- A power of attorney document (simply signed) can be filed later, within three months of notification.
- Specification, claims, drawings, and abstract in English or French are required on the day of filing.
- Assignment of priority rights can be filed within six months.
- A copy of the international PCT advertisement is required on the day of filing.
- A copy of the international search report can be filed later.
- A copy of the international preliminary examination report can be filed later.

Substantive examination request. The substantive examination of a patent application in OAPI is not obligatory. The “novelty grace period” is not stipulated for a patent application in OAPI.

Grant and publication. There is no grant and publication fee. Annuities are payable for pending applications annually from the date of filing, of about US\$1,200.

Fees. OAPI application automatically designates all member states. The cost of filing a patent application is quite high, at US\$4,400–4,600, including publishing for the first 10 claims and the first 10 pages of the specification. For more than 10 claims, about US\$125 is charged per claim and for about 10–50 pages, US\$2,950 and add US\$225 for a batch of 10 pages over 50.

The processing time to grant a patent is about two to three years.

Step 7: How to file through the PCT route

A researcher or applicant who is a resident or national of a PCT-contracting state can file her or his application electronically either through his national patent office or through ARIPO (WIPO 2015). The applications are transmitted to the WIPO bureau.

Most African countries are contracting members of the PCT.

Requirements and procedures. The applicant must be a resident or national of a PCT-contracting state, and the application should indicate that it is intended as an international application. More than one (or all) PCT-contracting states can be designated. A priority date, if any, can be filed. The applicant should submit a file PCT request (Form No. PCT/RO/101) with a:

- Description.
- Claims.
- Drawings.
- Sequence listing (part of description), if applicable.

The fee payment will be made in response to invitation and fee can be paid electronically. The document should be accompanied by a transmittal letter.

For details of the fees and more information about the PCT procedures, go to www.wipo.org.

What are the benefits of using the regional or international route?

According to WIPO (2015), the single filing of a PCT application is made with a receiving office in one language. It then results in a search performed by an international searching authority, accompanied by written opinion regarding patentability of the invention that is the subject of the application. It is followed by a preliminary examination, performed by an international preliminary examination authority. Finally, the relevant national or regional authorities administer matters related to the examination of the application (if provided for by national law) and issuance of the patent.

A PCT application does not, however, itself result in a grant of a patent, as there is no such thing as an “international patent.” A patent grant is a prerogative of each national or regional authority. In other words, a PCT application must be followed up by the national or regional phases.

The PCT procedure essentially leads to a standard national or regional patent application, which may

be granted or rejected according to applicable law in each applicable jurisdiction (WIPO 2015).

Guidelines for African universities and research institutions

The continent’s universities and research institutions should reward and motivate researchers through royalties. This is likely to encourage research and innovation (WIPO 2002; Wright and others 2006; Brant and Lohse 2013). The policies should indicate how the royalties from patents and innovation will be shared after they have licensed the innovation. Some of the royalties should go to the universities or research institutions, while some should go to the researchers themselves. In this way staff are motivated and retained to invent further patentable products or services.

They should also form a technological transfer office with experienced staff who can assess the innovations generated by researchers and choose what to patent. Staff should be professional and able to find private companies that can license the institutions’ inventions (Mihyo 2013).

Conclusions

African researchers are strongly advised to file a patent application before they publish or present their inventions at public conferences. This will help them to get patents easily and benefit from the advantages that strong patents can bring.

They are also advised to use patent information before they start undertaking their research work, as this will help them hugely to:

- Avoid unnecessary expenses in researching what is already known.
- Identify and evaluate technology for licensing and technology transfer.
- Identify alternative technologies.
- Keep abreast with the latest technologies in their field of expertise.
- Find solutions to technical problems.
- Get ideas for further innovation.

African researchers can still get royalties from their patent and publish their papers, giving them a “academic” reward—benefiting themselves and their country.

References

- ARIPO (African Regional Intellectual Property Organization). 2014. Processing of Patent Application—Through National and International Route—Harare Protocol. A compendium of ARIPO Basic Documents. 2014 Edition. Harare, Zimbabwe.
- Brant, J., and S. Lohse. 2013. Enhancing Intellectual Property Management and Appropriation by Innovative SMEs. Paris: International Chamber of Commerce.
- Canadian Association for Graduate Students. Undated. A Guide to Intellectual Property Rights for Graduate Students and Postdoctoral Scholars. Ottawa: Canadian Association for Graduate Studies. <http://www.cags.ca>
- De Laet, F. 2005. “Patents: From Protection through Information to Development.” Harare, Zimbabwe: ARIPO.
- Harris, J. 1998. Clones, Genes, and Immorality: Ethics and the Genetic Revolution. Oxford: Oxford University Press.
- Idris, K. 2003. Intellectual Property: A Power Tool for Economic Growth. Overview. Geneva: World Intellectual Property Organization.
- ICC (International Chamber of Commerce). 2011. Intellectual Property: Powerhouse for Innovation and Economic Growth. Paris. www.iccwbo.org
- IP Australia. Undated. A Guide to Applying for Your Patent: Robust Intellectual Property Rights Delivered Efficiently. Canberra, Australia. <http://www.ipaustralia.gov.au>
- KIPI (Kenya Industrial Property Institute). 2007. Guideline for the Examination of Patents, Utility Models, and Industrial Designs. Nairobi, Kenya.
- Mihyo, P. B. 2013. “University-industry Linkages in Eastern and Southern Africa: Prospects and Challenges.” *African Review* 5 (1): 43–60. <http://dx.doi.org/10.1080/09744053.2013.832066> October 2013.
- OAPI (African Intellectual Property Organization). Undated. Patent registration PCT National Phase and Non-PCT patent application. Yaoundé, Cameroon. <https://www.ip-coster.com/IP Guides/patent-pct>
- UNECE (United Nations Economic Commission for Europe). 2011. Intellectual Property Commercialization: Policy Options and Practical Instruments. New York and Geneva: United Nations.
- Wellings, P. 2008. Intellectual Property and Research Benefits. Lancaster, UK: Lancaster University.
- WIPO (World Intellectual Property Organization). 2002. Research and Innovation: Issues in University– Industry Relations. Geneva. <http://www.wipo.int/smes/en/documents/pdf/fp6.pdf>
- _____. 2013. World Intellectual Property Indicators: Economics and Statistics. Geneva. <http://www.wipo.org>.
- _____. 2015. Guide to Using Patent Information. Geneva.
- _____. Undated. “How can the patent information be obtained?” Geneva. <http://www.wipo.int/sme/en/ip-business/patents/where.htm>
- _____. Undated. PCT procedure and fees. Geneva. www.wipo.org
- _____. Undated. Introduction to Patent and Patent Information. Geneva. www.wipo.int/edocs/pubdocs/en/patents/450/wipo-pub-140pa.pdf
- Wright, M., and others. 2006. “University Spin-out Companies and Venture Capital.” *Research Policy* 35 (4): 481–501.
- Zeng S. X., X. M. Xie, and C. M. Tam. 2010. “Relationship between cooperation networks and innovation performance of SMEs.” *Technovation* 30 (3): 181–194.

Annex 1. Mountable wood-saving stove description

The invention concerns a wood-saving stove, comprising a combustion chamber, a stand on top of it for a cooking vessel, a cooking vessel, and a jacket the combustion chamber at least partially. Such cooking vessels are, for example, available in the form of recycled colored buckets. Sections of the population in underdeveloped countries use these for preparing their hot meals. Optimally using the firewood is a big problem in the climatic zones, near the coast.

The task of the present invention is to provide a wood-saving stove, which can be transported economically, even to the remotest areas, and enables the people of such areas where wood is scarce to better use the firewood. This task is realized through the characteristics of the patent claim 1. Favorable embodiments of the invention are described in the sub-claims 2 to 13. Furthermore, the invention aims to provide the stove to the interested segments of populations at the least possible cost. This is realized through the features of the claim 14. An advantageous embodiment of the assembly kit is described in claim 15. The invention is described in two chosen designs with the reference to a drawing an example, whereby further details can be taken from the drawing. Parts with the same functions are provided with the same reference number.

The individual figures show:

Figure 1 A diagram of the vertical section according to one of the first designs of the wood-saving stove, as per the invention.

Figure 2 Sheet metal blanks of individual parts of the wood-saving stove as per the first embodiment.

Figure 3 Further sheet metal blanks of the wood-saving stove as per the invention, according to the first embodiment.

Figure 4 A diagrammatic vertical section in accordance with the second embodiment.

Figure 5 Top view of the wood-saving stove as per the invention.

Figure 6 A perspective view of the wood-saving stove as per the invention.

Figure 7 A front view of the wood-saving stove as per the invention.

Figure 8 Sheet metal blanks of the jacket in accordance with the second embodiment.

Figure 9 The sheet metal blank of the divider.

Figure 10 An arrangement of the sheet metal blanks on a sheet metal plate.

Figure 11 A sheet metal blank of the inner jacket.

Figure 12 Sheet metal of the combustion chamber.

Figure 1 shows the vertical section through the wood-saving stove 1 as per the invention. The outer envelope of the wood-saving stove is formed by the jackets 5. It is divided into an upper

jacket 6 and the lower 7. The lower jacket 7 is joined below by means of a bottom plate 9. The upper closure is fashioned by the divider 10, to which the combustion chamber 2 is suspended. The combustion chamber 2 serves to burn small logs of wood 31. The necessary combustion air flows in through the air inlets 8 provided in the lower jacket 7. Thereby, it is first directed downward by means of the air baffle 11, 12 corresponding to the flow of the supply air 30, which is marked as interrupted. A part of the air flows through the back-flushing air inlet 29 in the baffle 12, in order to prevent an accumulation of air. While sweeping the air baffles, the incoming air gets heated up. It then enters combustion chamber 2 from the side and from below.

The wood log 31, which comprises primarily individual rods in the form of threaded tree rods, is thus first kept on the grate 32 till its complete combustion. The air baffles 11, 12 are also fixed at the divider 10 with the help of threaded tree rods, whose ends extend beyond the divider 10, whereby the protruding ends form the stand 3 for keeping the cooking vessel. This supports the cooking vessel 4. For putting in more logs of wood 31, there is a wood piece supply 13, which is mounted with horizontal swivel, so that the loosely hanging combustion chamber 2 can be taken out of the lower part of the stove.

Consequently, the wood-piece supply 13 forms an opening in the wall of the upper jacket 6. The upper jacket 6 can be closed by the lid 15, which is designed in the shape of a pan 16 for enhancing the utility value. The exhaust air leaves the stove through the exhaust air outlets 14, which are designed as convexities of the upper edge of the upper jacket. Thereby, the pan 16 is swept by the warm exhaust air coming from below, so that there is a surprisingly heat transfer.

Thus, a wood-saving stove is made available with dramatically improved efficiency over other known stoves, whose efficiency is just half. The special advantage of the wood-saving stove as per the invention is that it can be mounted easily from individual sheet metal blanks as per the drawing 2 and 3 by using additional screws and bolts but without any special tools. Even laymen can do this easily. The sheet metal blanks have surprisingly low wastage and can be assembled together tightly in a dispatch unit, which causes low manufacturing and transportation cost vis-à-vis the state of the art technology. The stove has a hexagonal base 28, which can be manufactured almost free of wastage by using suitable manufacturing techniques, for example by punching out sheet metal as per the blank 17 and then assembling the bottom 9. For this purpose, only the fishplates 33 need to be bent upwards perpendicularly at the folding lines 34. The lower jacket 7 is formed from the sheet metal blanks 18 and 19. Even these blanks are to be edged accordingly at the folding lines 34 of the hexagonal shape. The mounting holes 35 serve to fix fishplates of the other sheet metal blanks with the other sheet metal blanks with the help screws.

At the sheet metal blanks 22, which form the divider 10, the sheet metal blanks 20 and 21 are fixed after suitable folding, at the air baffles 11 and 12 by using the mounting hole 36 in the

sheet metal blank screw surface thereby extend beyond the surface of the divider 10 and form the stand for the cooking vessel 3, not seen in figure 2 (figure 1). In the sheet-metal blanks 18 and 19, the air inlet openings 8 are provided in the upper margin area, as also the black flushing air openings 29 are placed in the air openings 29 are placed in the sheet blank 21 of the air baffle 12.

In figure 3 the sheet metal blanks of the upper part of the stove are depicted. The wood piece supply 13 is formed from the sheet metal blank 24 after proper folding. It is fixed at the boring 37 in a movable way with the help of the screw driver 10. It passes through an opening in the jacket 6 formed by notches 38 in the blank 25.

The combustion chamber 2 is formed from the two sheet metal blanks 23, by bending them into two U-shaped parts along the folding lines 34. The sheet section 26 forms lid 15 or the pan 16, which can be moved with the help of the sheet metal section 27, which functions like a handle.

Sheet metal blank 25 is used for making the upper jacket 6. At the upper edge, the exhaust gas outlets 14 are formed in the form of convexities. The figures 4 to 11 depict a second proffered embodiment of the wood-saving stove as per the invention. The vertical section in the figure 4 shows the schematic structure. In contrast to the first embodiment, the jacket 5 consists of only one part. The cooking vessel stand 3 comprising the shaft of screws supports the cooking vessel 4, whose upper margin 43 is formed as a collar 44. The collar 44 supports itself at the upper margin of the jacket 6. The collar 44 is so wide, that the cooking vessel 4 can be comfortably lifted out of it through the upper jacket 6. By means of an additional plate arranged inside, which forms an inner jacket 42, the outer jacket 5 gets heated up slightly, so that one can touch it without risk, and such as to avoid any burns effectively. The divider 10, the combustion chamber 2 is suspended. Its bottom 45 is formed by the folded extensions of the side walls.

Both the parts of the bottom 45 are inclined toward each other, so that the fire comes on the middle. In the view shown in figure 5, Hexagonal top view of the saving stove can be seen. This shape can be produced in a simple way by bevelling the sheet metal blanks. The combustion chamber 2 with rectangular top view is arranged in such away in the cover plate 10, so that the edge 49 of the combustion chamber 2 lies opposite to the center of the outer surface of the hexagonal jacket 5. Thus, the distance to the wood piece supply 13 is reduced. The jacket 5 is formed by the sheet metal blanks 47 and 48. In addition, an exhaust manifold pipe 41 can also be provided, which enables a connection with the chimney of the house, as shown in the perspective view of the wood-saving stove in figure 6. Figure 7 shows the front view of the wood-saving stove. The figures 8 to 12 essentially represent the sheet metal blanks. Both the sheet metal blanks 47 and 48 from the jacket 5 folding and joining. Figure 9 shows the sheet metal blank of the divider 10 with external fishplates 50. The fishplates are bevelled at right angles before joining.

The hexagonal shape of the wood-saving stove leads to less wastage, as illustrated in figure 10, with the help of a pattern for divider 10 made of sheet metal 53. The steel metal blank shown in figure 11 for the inner jacket 42 also achieves low wastage. The same is also true for the complementary sheet metal blanks 51 and 52 for the combustion chamber 2, as shown in figure 12. In this way, a wood-saving stove is made available for the first time, which can also be economically transported to the remotest areas of the world and can be operated and assembled easily by laymen without making use of special tools. In the corresponding climatic zones, it can help to mitigate the scarcity of wood, because it uses available wood about twice as efficiently as the latest state-of-the-art stoves.

List of reference number

1. Wood-saving stove
2. Combustion chamber
3. Stand for cooking vessel
4. Cooking vessel
5. Covering jacket
6. Upper part of jacket
7. Lower part of the jacket
8. Air inlet opening
9. Bottom
10. Divider
11. Air inlet opening
12. Air baffle
13. Wood-piece supply
14. Exhaust air outlet opening
15. Lid
16. Pan
17. Sheet-metal blank
18. Sheet-metal blank
19. Sheet-metal blank
20. Sheet-metal blank
21. Sheet-metal blank
22. Sheet-metal blank
23. Sheet-metal blank
24. Sheet-metal blank
25. Sheet-metal blank
26. Sheet-metal blank
27. Sheet-metal blank
28. Hexagonal base
29. Back-flushing air opening

30. Supply air flow
31. Wood logs
32. Grate
33. Fish plates
34. Folding lines
35. Mounting opening
36. Mounting opening
37. Boring
38. Notches
39. Space (above)
40. Space around
41. Exhaust manifold pipe
42. Inner jacket
43. Margin
44. Collar
45. Bottom Sheet-metal blank
46. Rivet
47. Sheet-metal blank
48. Sheet-metal blank
49. Edge
50. Fishplate
51. Sheet-metal blank (combustion chamber)
52. Sheet-metal blank (combustion chamber)
53. Sheet metal

Patent claims

1. Wood-saving stove (1), comprising a combustion chamber (2), a stand arranged on top of it for a cooking vessels (3), a cooking vessel (4) and a jacket (5) partly covering the combustion chamber (2), characterized by the fact that it is designed and assembled from the sheet metal blanks (17, 18, 20, 21, 22, 23, 24, 25, 26, 27) and has a hexagonal base (28).
2. Wood-saving stove as per claim 1, characterized by the fact that it is made of screw and/or rivet embodiment.
3. Wood-saving stove, as per claim 1 or 2, characterized by the fact that it is formed by the jacket (5) in the region of the stand for the cooking vessel (3) is divided by a divider (10) in a region (39) enclosed by the upper jacket part (6) and in region (40) enclosed by the lower jacket part (7).
4. Wood-saving stove, as per one of the claims mentioned above, characterized by the fact that the lower jacket part (7) has air inlet opening (8), primarily upward.

5. Wood-saving, as per one of the claims mentioned above characterized by the fact that the upper jacket (7) is formed by means of a bottom (9)
6. Wood-saving stove, as per one of the claims mention above, characterized by the fact that between the combustion chamber (2) and the lower jacket part (7), air baffles (11, 12) are provided, especially with back-flushing air openings (29), primarily at the divider (10).
7. Wood-saving stove, as per one of the claims mentioned above, characterized by the fact that between the cooking vessel stand (3) and the divider (10) a wood-piece supply (13) opening in the combustion chamber (2) is provided, whereby the combustion chamber (2) preferably has a rectangular, especially square top view, whereby the wood-piece supply (13) is arranged in the jacket (5) preferably facing an edge of combustion chamber (2).
8. Wood-saving stove, as per one of the claims mentioned above, characterized by the fact that the upper and/or the lower jacket part (6, 7) is designed double-walled
9. Wood-saving stove, as per one of the claims mentioned above, characterized by the fact that the upper jacket part (6) shows exhaust-air outlets (14) and/or a lid (15), which is primarily designed as a pan.
10. Wood-saving stove, as per one of the claims mentioned above, characterized by the fact that an exhaust manifold pipe (41) is planned, to be connected preferably to the chimney of the house.
11. Wood-saving stove, as per one of the claims mentioned above, characterized by the fact that in the combustion chamber a cooking vessel (4) is arranged, whose upper margin (43) is designed as a collar (44) with a diameter, which is greater than the inner diameter of the upper jacket part (6)
12. Wood-saving stove, as per one the claims mentioned above, characterized by the fact that the combustion chamber (2) is made of rust-proof steel material and preferably has a combustion chamber blank end (45), which is designed inclined in the middle.
13. The kit for assembling a wood-saving stove as per one of the claims mentioned above, is characterized by the fact that it primarily consists of sheet metal blanks.
14. Assembly kit as per claim 13, characterized by the fact that it contains the additional necessary bolts, nuts, and/or rivets as well as the instructions for assembly and the necessary tools.

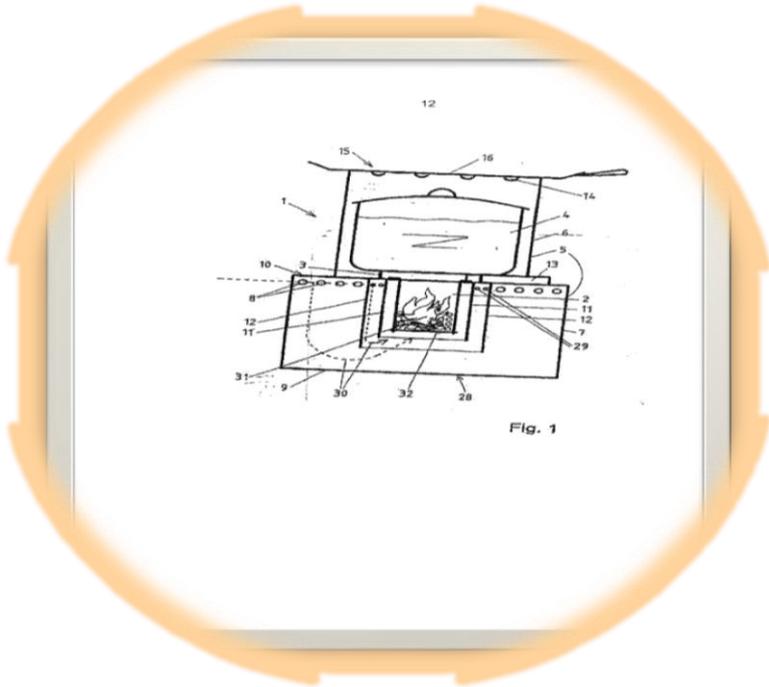


Fig. 1

Annex 2. ARIPO patent fee

| | Type of fee | Amount (US \$ or, where Rule 11 (3)(a) applies, the equivalent) |
|-----|---|---|
| 1. | Application fee | 250 |
| 2. | Designation fee per country designated | 75 |
| 3. | Examination report fee ¹ | 250 |
| 4. | Search report fee ¹ | 250 |
| 5. | Publication fee | 300 |
| 6. | Surcharge for each additional page after 30 pages | 15 |
| 7. | Surcharge for each additional claim after 10 claims | 40 |
| 8. | Grant fee | 300 |
| 9. | Annual maintenance fee in respect of each designated state | |
| | 1st anniversary (2 nd year from filing date) | 40 |
| | 2 nd anniversary | 60 |
| | 3 rd anniversary | 80 |
| | 4 th anniversary | 100 |
| | 5 th anniversary | 120 |
| | 6 th anniversary | 140 |
| | 7 th anniversary | 160 |
| | 8 th anniversary | 180 |
| | 9 th anniversary | 200 |
| | 10 th anniversary | 220 |
| | 11 th anniversary | 240 |
| | 12 th anniversary | 260 |
| | 13 th anniversary | 280 |
| | 14 th anniversary | 300 |
| | 15 th anniversary | 320 |
| | For each year thereafter an additional US \$50 per designated country | |
| 10. | Surcharge for late payment of annual maintenance fee | 100 |
| | and for every month or fraction thereof that the fee remains unpaid | 50 |
| 11. | Correction of errors: | |
| | the first error | 50 |
| | any additional error | 20 |
| 12. | Consultation of registers | 10 |
| 13. | Request for copies of extracts from register or from files: per page | 5 |
| 14. | Certified copy of ARIPO patent application or granted patent, plus five per page of the certified copy | 100 |
| 15. | Transmittal fees for an international application filed with the ARIPO Office as the receiving office under the Patent Cooperation Treaty (PCT) | 50 |
| 16. | Preparation of abstract | 100 |

| | Type of fee | Amount (US \$ or, where Rule 11 (3)(a) applies, the equivalent) |
|-----|---|---|
| 17. | Conversion to a national patent application | 100 |
| 18. | Conversion to an ARIPO utility model application | 100 |
| 19. | Registration of assignments, transmissions, alteration of registered particulars, and so on | 100 |
| 20. | Request for any extension | 50 |



Acknowledgement

This knowledge series intends to summarize good practices and key policy findings on managing for development results (MfDR). African Community of Practice (AfCoP) knowledge products are widely disseminated and are available on the website of the Africa for Results initiative, at: www.afrik4r.org/page/resources.

This AfCoP-MfDR knowledge product is a joint work by the African Capacity Building Foundation (ACBF) and the African Development Bank (AfDB). This is one of the knowledge products produced by the ACBF under the leadership of its Executive Secretary, Professor Emmanuel Nnadozie.

The product was prepared by a team led by the ACBF's Knowledge, Monitoring, and Evaluation Department (KME), under the overall supervision of its Director, Dr. Thomas Munthali. In the KME Department, Ms. Aimtonga Makawia coordinated and managed producing the product while Dr. Barassou Diawara, Mr. Kwabena Boakye, Anne Francois and Frejus Thoto and other colleagues provided support with initial reviews of the manuscripts. Special thanks to colleagues from other departments of the Foundation who also supported and contributed to this paper. The ACBF is grateful to the AfDB for helping produce this case study under grant number 2100150023544.

The ACBF is also immensely grateful to F. K. Mpanju, the main contributor, for sharing the research work contributing to this publication. We also thank Professor G. Nhamo, Ms Tesha, and Dr. Kirenga whose insightful external reviews enriched this knowledge product. The Foundation also wishes to express its appreciation to AfCoP members, ACBF partner institutions, and all individuals who provided inputs critical to completing this product. The views and opinions expressed in this publication are the reflections of the author. They do

not necessarily reflect the official position of the ACBF, its Board of Governors, its Executive Board, or that of the AfDB management and board