

Science for development and EU-Africa advanced training partnerships: the
case of *TropiKMan PhD programme*

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Abstract

Science for development is the goal of many EU-Africa advanced training partnerships but few promote North-South-South relations and attempt to bridge science and management as explicitly as the new PhD programme described here, leveraging the tropical knowledge accumulated in Portuguese-speaking countries and their areas of regional integration. By training highly qualified PhD professionals in two Lisbon and four African universities, the *Tropical Knowledge and Management* programme aims to link research and business networks in a multicultural environment.

Introduction

The platform offering a Doctoral Program in Tropical Knowledge and Management (*TropiKMan PhD*) followed joint research projects, co-supervision of Masters and Doctoral students and exchange of lecturers among research institutions and universities of Portuguese-speaking countries, as presented by the second author at a recent meeting of the *Association of Portuguese-speaking Universities* held in Macau, China (de Macedo *et al.*, 2014).

With a focus on the Southern Africa Development Community (SADC), the platform builds on research in natural, environmental, biological, biomedical, veterinarian and management sciences. The programme offers advanced training in priority research areas for North-South-South (N-S-S) relations and links those to business opportunities in tropical countries. In the first year of the programme, students have to attend five required, three specialization and three Nova Doctoral School courses, plus a set of three one-month laboratory or group rotations (Figure 1). Over the following three years, they specialize in Agribusiness and Governance for Development, Agrobiotechnology and Health

Sciences in order to develop a doctoral dissertation in a multi-cultural and multi-disciplinary environment shared by students, lecturers and supervisors.

Starting from biological, environment and agronomical sciences, *TropiKMan PhD* establishes a map to management which goes through history and heritage so as to provide a perspective that is no longer imprisoned in the frame of solitary disciplines. In this program, N-S-S internationalization is seen as an advantage in facing the challenges of an interdependent world where real action of global significance can take place anywhere. While the global financial crisis has threatened traditional responses to policy interdependence, it has also broadened its geographical scope from advanced countries to emerging markets and developing economies (de Macedo ed., 2015, chapters 1 and 4).

While agriculture, environment and health issues in tropical regions are framed by unique conditions of climatic, environmental, geographical, economical, societal and cultural nature, they are no longer so distant from the world average and require the capacity to conceptualize and resolve problems in a holistic approach. The October 2012 issue of *Monocle* (a quintessentially British Magazine, run by a Canadian journalist with a French sounding name) carried a cover story titled "Generation Lusophonia: why Portuguese is the new language of power and trade". The lead article, titled "Something in common", stated that "there is a huge potential to unleash if powers can be combined. Could now be the time?" and concluded that "the rest of the world would benefit from a bit of Lusophilia". Indeed, Japan and Turkey have joined the Community of Portuguese-speaking Countries (CPLP) as observers. Moreover, the US appears largely indifferent to the Commonwealth of Nations, whereas Brazilians have been a driving force of CPLP. All this creates a strong demand for professionals prepared to work in universities and research institutes from EU or African countries, international organizations, aid agencies, government institutions or in the private sector, while being aware of the potential of N-S-S cooperation.

This tropical knowledge requires the ability to embed scientific knowledge in a management and entrepreneurial attitude. In Portugal, this mission was carried out by the Tropical Research Institute (IICT), established in the 1890s, and

reformed in the early 2000s to reflect the vision of the late Mariano Gago (de Macedo, 2016) and his long-time adviser Jean-Pierre Contzen, a fellow of the Royal Academy of Belgium and of the Lisbon Academy of Science (ACL); this emphasised in the memorial at the ACL joint session of 26 November 2015 (de Macedo, 2015b).

The *TropiKMan PhD* is offered by an international consortium led by Nova School of Business and Economics (Nova SBE), in co-chair with the School of Agriculture of the University of Lisbon (ISA-ULisboa) - to which most of the activities of IICT migrated in 2015. The Faculties of Social and Human Sciences and of Science and Technology at Nova University are active participants, but the Institute of Tropical Hygiene and Medicine (IHMT) is the other main partner (de Macedo, 2014). This team gathers its international dimension by partnering with Universities of Angola (University José Eduardo dos Santos . UJES), Cabo Verde (University of Cape Verde . UniCV), Mozambique (University Eduardo Mondlane . UEM) and South Africa (University of Pretoria . UP).

The crucial first step in the implementation of *TropiKman PhD* was the assignment of 18 fellowships by the Portuguese Foundation for Science and Technology (FCT), to nationals of Angola, Cape Verde, Guinea Bissau, Mozambique, São Tomé e Príncipe and East Timor who have completed their Masters and are fluent in English. The Portuguese Cooperation Agency (CICL) in partnership with the International Rice Research Institute (IRRI), via the Portuguese contribution to the CGIAR consortium, a global agricultural research partnership based in Washington, D.C, also offered four fellowships. Beyond the PhD scholarships available, the program is open to interested applicants of any other nationality.

Recognizing the relevance that this network and training offer to the internationalization of CPLP universities, its executive secretariat has recently provided institutional support to such a doctoral program aligned with the priorities for science, technology and higher education of the nine member countries, six of which are in Africa. This was a long time coming, as the concept of *mutual knowledge* had been introduced in the 2006 Bissau

Declaration on the Millennium Development Goals in CPLP, complementing the mutual friendship in the CPLP treaty of 1996. During these years, higher education also became a powerful channel of globalization, involving new partnerships from business associations to central banks (de Macedo, 2015a). For example, in April 2008, Nova SBE's Center for Globalization and Governance (CG&G) joined forces with IICT and ACL to promote this mutual knowledge. Other relevant partnerships of IICT in that connection involved the Institute for Experimental and Technological Biology (IBET) and the platform SKAN . Sharing Knowledge Agrifood Networks led by INOVISA, the innovation center at ISA-ULisboa.

The agreement between ACL, IICT and Nova SBE involved advanced courses which pioneered some of the ones now offered in *TropiKMan PhD* especially attention to perspectives from emerging markets and from natural sciences, especially neuroscience, with respect to the North Atlantic financial crisis. In 2009, a letter to Queen Elizabeth written by the British Academy sought to explain the financial crisis but neglected those perspectives. This led to the project of writing a letter to fictional Queen Lusophonia (de Macedo ed., 2015, chapter 2). The consequences of cultural (tribal) perspectives for the efficiency of peer pressure mechanisms and multilateral surveillance mechanisms were emphasized in that connection.

Similarly, the economic complementarity between CPLP members and regional organizations such as SADC and UE, already mentioned, but also Association of Southeast Asian Nations - ASEAN, Economic Community of Central African States - ECCAS, Economic Community of West African States - ECOWAS and Mercado Comum do Sul - MERCOSUL has been increasingly recognized. The potential of this Portuguese-speaking market (Araujo and Figueiredo, 2014) was also noted by the Strategic Council for Open Economy, chaired by the Prime Minister, which has gathered cabinet members, leaders of business associations and the Portuguese Agency for Foreign Trade and Investment (AICEP) since 2011 (de Macedo ed., 2015, chapter 10).

Curricular Structure of TropiKMan PhD

The doctoral programme in Tropical Knowledge and Management - *TropiKMan PhD* requires full time study. It complies with the Bologna process and includes 240 ECTS with three possible specializations, as mentioned at the outset and summarized in Figure 1 and Table 1.

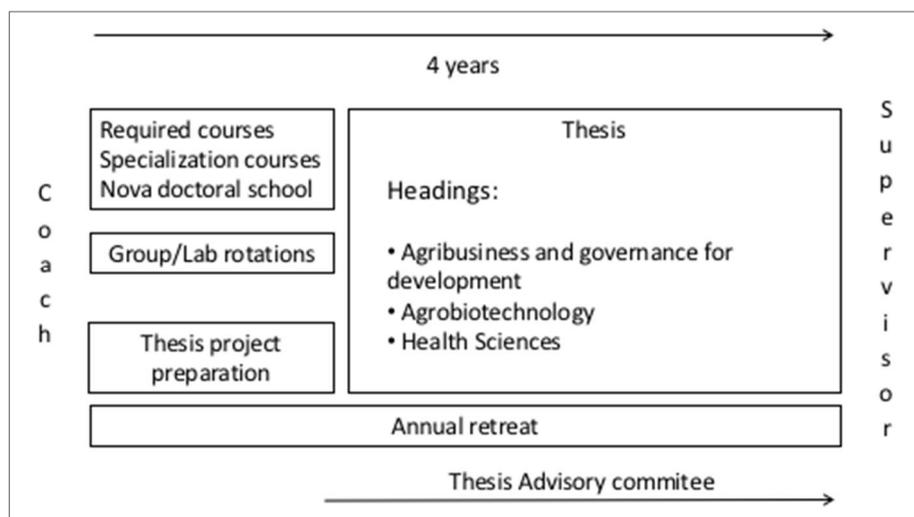


Figure 1. Structure of TropiKMan PhD (adapted from de Macedo *et al.* 2014)

In the first semester, students take core interdisciplinary courses; the so-called *required courses* (15 ECTS), introducing the group to the doctoral program context, and levelling its background, to be acquired in a modular structure, each module ending with an evaluation. It is also during the first semester that students will start tailing their doctoral program with coaches assistance to attend specialization courses (9 ECTS) and complementary and transferable activities from Nova Doctoral School (6 ECTS), to support personal and professional development. The timing of courses attendance is flexible and planned with the coach. Each one of the following required courses is worth 3 ECTS:

Course	Description
<i>African Development Successes: history and prospect</i>	a) interactions between globalization and governance (G&G); b) understanding economic, social and political forces that affect G&G; c) G&G interaction in emerging markets;

	<p>d) economic thought on development and pattern of world economic development;</p> <p>e) policies related to global and regional governance.</p>
<i>Science and business for development and N-S-S triangular cooperation (S&D4D)</i>	<p>a) S&B4D with tropical countries;</p> <p>b) new strategies for development;</p> <p>c) different perspectives;</p> <p>d) partnerships for development;</p> <p>e) role of private sector, NGOs and public opinion;</p> <p>f) health and agriculture solutions;</p> <p>g) results and impact.</p>
<i>Neglected Tropical Diseases</i>	<p>a) major infectious diseases amongst emerging and neglected diseases;</p> <p>b) epidemiology;</p> <p>c) pathophysiology and clinical immunology;</p> <p>d) common and specific clinical manifestations;</p> <p>e) diagnosis of emerging and neglected diseases;</p> <p>f) therapy of neglected diseases;</p> <p>g) applied research and emerging and neglected diseases.</p>
<i>Trends in Agronomics and Environment for Tropical Regions</i>	<p>a. Food security and safety;</p> <p>b. Nutritional security;</p> <p>c. Microbial biodiversity;</p> <p>d. Climate-smart agriculture;</p> <p>e. New challenges for food production;</p> <p>f. Development and use of mechanization and new technologies;</p> <p>g. Links between farmers and markets.</p>
<i>Agribusiness Management and Economics.</i>	<p>a. Market structure and performance in the food system</p> <p>b. Efficiency in operations within the agribusiness sector</p> <p>c. Supply chain management and design</p> <p>d. Cooperative marketing and management</p> <p>e. Agricultural credit markets and financing instruments</p> <p>f. The changing business environment of agriculture.</p>

The selection of the specialization courses will determine the heading of

specialization of each thesis, according to table I. The approval in each course awards 3 ECTS toward program completion. At the end of the first semester coach and student will plan group/lab rotations (20 ECTS) from the second semester onwards. These are one month stays with research groups envisaging broadening students' sights toward the choice or elaboration of the research thesis program. Group leaders from the host institutions inform the program secretariat of their availability to provide a rotation program. Based on a list of available rotations, each student selects three; students can also seek those directly from researchers of host institutions.

By the end of first year, students complete their PhD research project (5 ECTS) and choose their supervisors among the consortium institutions. All research projects from each cohort are presented and discussed at the *annual retreat* (5 ECTS). The onset of the second year coincides with the start of the thesis (180 ECTS), which takes three years, and is examined by the thesis advisory committee one year after, to evaluate the achievements and verify the adequacy of the research plan.

While writing their dissertation, students are urged to attend at least twelve seminars per year, attend and present their works in international conferences as well as publish their results in international refereed journals. Unless there is a written justification by the supervisor, during the thesis years, students must attend the *annual retreat*, where they should present their PhD project in progress. The first retreat, held at Nova SBE on July 1, 2016, reached the objective of bringing together the various stakeholders of the program.

Table I. Three areas of specialization in *TropiKMan PhD*

	Agribusiness and Governance for development	Agrobiotechnology	Health Sciences
a	Africa vs. Brazil, China and other emerging markets		
b	Management across cultures		
c	History of Portuguese Speaking Countries		
d	Heritage of Portuguese Speaking Countries		

e	Strategy and business model development in the agrofood sector	Strategy and business model development in the agrofood sector	
f	Principles & Practices of Biosafety	Principles & Practices of Biosafety	Principles & Practices of Biosafety
g	Ethnobotany	Ethnobotany	Ethnobotany
h	Translational research	Translational research	Translational research
i		Tropical Soils Microbial Biodiversity	Tropical Soils Microbial Biodiversity
j		One Health	One Health
l		Bioethics in low income settings	Bioethics in low income settings
m		Tropical Forest Ecology and Restoration of Degraded Land	
n		Advances in Green biotechnology	
o		Genetic Resources and biodiversity	

During the thesis stage, students are also expected to make one research visit to their countries, in the framework of their projects, and interact with local supervisors from the consortium. On the fourth year of the program, a dissertation is written and discussed by a jury appointed by the Executive Committee (EC), as described below.

Governance and monitoring

The *TropiKMan PhD* is governed by three committees. The Executive Committee (EC) is composed by a senior researcher from each institution participating in the consortium, together with director and coordinator that are currently the authors. The EC is responsible for general operating policy, procedures and related matters, budget and selection of candidates. Annual plenary meetings of the EC have been held and frequent bilateral discussions between the scientific coordinator and other EC members have taken place to evaluate progress and propose improvements to be approved at formal EC meetings. Annual progress reports of the doctoral program will be delivered to FCT and disseminated by the consortium team.

The competencies of the EC are: accept candidates to the program and confirm those which will proceed to the research thesis stage; the approval of the program's curricular plan and its submission to the science councils of the consortium's members, when necessary; the appointment of coaches to guide each student through the curricular component; to analyze the evaluations of the courses by the students; to monitor the quality of the courses by promoting their evaluation by the students; the approval of the PhD research projects, supervisors and advisory committees (AC); the acceptance of dissertations and approval of jury members, as well as of scheduling the defenses.

Each thesis AC is composed of the supervisors and two other members, selected from the consortium institutions. In the end of the second year of the doctoral program, an examination of the research project achievements and the prediction of its progress will be performed by the AC. The student will in advance provide the AC with a progress report and deliver a 20 min presentation, to be discussed. The evaluation will be communicated to the EC by the scientific coordinator.

The External Advisory Committee (EAC), in turn, supervises the overall quality of the program and includes experts such as Rui Malhó from the Faculty of Sciences at the University of Lisbon and ACL, Etienne Hainzelin from CIRAD, and Huub Loffler from WUR. EAC meets with EC, via its president, formally once a year, will intervene in administrative or scientific argument resolution mechanisms and will assist the EC in the establishment of the student recruitment criteria, in the methodology to control of individual academic plans validating the quality of the doctoral program. It will also monitor the program by evaluating EC annual reports and approving recommendations, which to be delivered to FCT via the program director and the scientific coordinator who interact with the EAC to collect suggestions and discuss the program progress.

A Pedagogic Committee (PC) will be created, where one elected student representative per cohort, one representative of coaches and one representative of supervisors will have place. The PC will meet once per

semester to evaluate the progress of the program, foster researchers/students dialogue, and collect and analyze students' suggestions and find solutions to improve the program. A report of each of these meetings will be prepared by the appointed rapporteur (coach or supervisor) and delivered to the project manager. In turn, the project manager will communicate this information to the executive board. Since *TropiKMan PhD* will have students with different starting academic backgrounds, monitoring will be attentive to specific difficulties of each student in progressing in the curricular courses. These difficulties will be identified by the personal coaches who, after consultation with the EC, will suggest additional short term activities.

Present and prospect

The *TropiKMan PhD* first cohort started in October 2015 and was composed of seven students all nationals from Mozambique, three women and four men in their early thirties. Six of them already are collaborators of Mozambican higher education institutions: University of Lurio (2), University Eduardo Mondlane (2), Pedagogic University (1) and Polytechnic Institute of Manica (1). The seventh is a younger student who just finished a Masters degree in Portugal.

The topics of their thesis encompass the three areas of *TropiKMan PhD*, and focus in local issues, thus being able to have impact in the home country context of the students.

Research topics

1. Fire and Biodiversity Dynamics of Legume Tree Species From the Miombo Woodlands in Mozambique
2. Impact of New Packages of Technologies on rice productivity and profitability in Mozambique
3. Identifying candidate genes for improved nodulation and shoot biomass production among Mozambican cowpea (*Vigna unguiculata* sp) varieties grown under osmotic stress condition
4. Patient and Community Knowledge and Practices at managing cervical cancer and HIV/AIDS in Southern Mozambique
5. Assessment of deforestation implications in the Miombo woodlands and the possibility of use residual biomass as a renewable energy

6. Development of molecular tools for Marker Assisted Selection (MAS) of Blast and bacterial blight resistance in rice"

7. Technology Transfer in Rice Crop: from research to farmer in Mozambique

The second edition of *TropiKMan PhD* will start in September 2017, as the candidates were selected just after the first annual retreat. Seventeen applications were received from Angola, Cabo Verde, Mozambique and São Tomé e Príncipe, meaning that the geography of the program is broadening - as intended. Moreover, to foster and strengthen international research networks among consortium members, thus consolidating one of the goals of *TropiKman Ph.D.*; the co-supervisors of the dissertations are affiliated to different institutions of the hosting consortium, each team of supervisors being composed of at least one supervisor from a Portuguese and an African school. In addition, and enhancing the relationship with IRRI beyond grant sponsorship, the latter institution will also be involved in the supervision of two PhD theses.

The international research network being shaped toward *TropiKMan PhD* was further boosted during this first edition, where five lecturers (three from UEM, one from FCA-UJES and one from UniCV, 2 female and 3 male) participated in teaching, in collaboration with colleagues from ISA-ULisboa and IHMT. It is worth mentioning that only one participated via video-conference while the other four were in residence, so that they had contact with other colleagues to consolidate their research networks, in addition to teaching.

It is vital to note that new partnerships and collaboration topics are emerging, fostered by interactions with the host institutions of *TropiKMan PhD* students. The emerging areas of focus include among others; tropical soil microbiology, involving ISA-ULisboa, the School of Agriculture of the University of Lurio (FCA-UniLurio) in Mozambique, the Agriculture Research Center in South Africa and IRRI, and others being reshaped among the lecturers of the program, like the one toward the rice research program in Angola, with ISA-ULisboa, FCA-UJES, Instituto de Investigação Agrária de Angola and IRRI. A capacity building program for higher education lecturers, monitors and researchers is also being developed, focused on soft skills, project development, management and

implementation, and scientific writing. This program is being developed in collaboration with FCA-UniLurio and FCA-UJES.

Final Remarks

TropiKMan PhD offers advanced training in priority research areas for North-South relations and the development of tropical countries in a management perspective. Its international character contributes to the internationalization and strengthening of the consortium institutions as well as those linked to its students, providing a vast network of contacts in Portugal and in the tropical world to its lecturers, students and colleagues.

In fact, this program's scope goes far beyond the training of highly qualified PhD professionals, able to contribute to improve the context of their countries, but also aims to impact the institutions of all its actors, promoting an effective research and higher education but also business network that will add value to each of them.

The multiculturalist background of *TropiKman PhD* actors is one of its strengths and at the same time one of its greater challenges.

Subsequent years of the programme should consolidate its goals of geographic presence and individual and institutional capacity building of participant countries as well as to promote tropical knowledge from lusophone countries, disseminating the best science for global lusophonia.

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