

Opinions about the research and education in France and Japan

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An overview of the global situation of the research and education in both Japan and France will be discussed as well as the possible changes to make for maintaining the academic research attractive to the next generation.

Japan and France: two major countries in the research

Japan and France, two top world's leading power countries, devote a large part of their gross national products to the research at about 3.26 and 2.20%, respectively. The organization of the research leans against recognized agencies: the Japan Society for the Promotion of Science (JSPS) and the Japanese Science and Technology (JST) and the French National Research Survey (CNRS)¹⁾ as well as the National Research Agency (ANR)²⁾ that well reflects the centralized structure of both Japan and France. These agencies financially support the research and give the principal research directions and strategies through some call to offers (project-based funding) allowing the funding of projects including researchers or teams of different laboratories and institutes.

Organization and Structure of the laboratories of research

If the funding of the research appears quite similar, distinct differences exist within the organization and structure of the laboratories at the University. In Japan, the structure of the laboratories is vertically organized mainly focused on the principal investigator (PI) who occupies diverse roles: teacher, supervisor of students, manager, mentor, coordinator of multiple scientific projects in collaboration with the industry and member or chairperson of diverse scientific societies (the Chemical Society of Japan for instance). In addition to all these responsibilities, the professor must also find the energy to write articles conferring him a certain recognition to his/her peers and to be still creative to design new ambitious projects. However, while his/her research activities should be devoted to future and direct applications (at least in chemistry), the PI keeps a certain freedom about the choices of his/her topics and directions of the research projects with the possibility to mobilize several students to explore some unexplored fields (with a high level of risks of failure) that can catalyze the research activities.

Unlike the pyramidal structure of Japanese laboratories where during his/her career, a professor might have the opportunity to easily supervise more than couple hundred students (quite impressive number to French supervisors!), the organization of the French laboratories (joint structures associating the CNRS and the



University and even other research institutes) is much more horizontal with a certain equality of the whole members. The director of a French laboratory, where sometimes more than hundreds of researchers, professors and associate professors can work in the largest structures, is collegially elected by his/her peers, or directly selected by the CNRS and endures a mission of 4-5 years that can be reappointed depending on the evaluation and strategies of the CNRS. While the Japanese laboratories show a distinct scientific identity (that one of the PI), the French ones represent a mosaic of projects and research activities corresponding to the different members or teams of the laboratories that can be formed through collaboration work depending on the funding of the ANR, CNRS or European projects³⁾. Through project-based funding, French laboratories gradually have lost their scientific identity by showing shell structure like leading to off ground/walls organizations associating researchers of different national or/and international labs, merging their forces, ideas, skills, and research efforts. If project-based funding strategies may catalyze the research in the short term, it nevertheless generates some local financial differences and disagreements between teams or/and researchers in laboratories and may raise some issues in the long term. Indeed, project-based funding allows PI to recruit brilliant researchers on short contracts (up to 5 years depending on the budget of the projects) leading to the possible precariousness of these young researchers regarding the scarcity of permanent positions if the research keeps being only funded by projects⁴⁾. Moreover, this leads to a discontinuity of the efforts at the discretion of the funding of the research that can be incompatible to the establishment of ambitious projects that can be accomplished in the long term. Worse, it can even lead to an absence of the transmission of the knowledge, and a diversion of talented people and researchers to other fields than the academic research, which represent multiple losses for the society regarding the educational costs to train the researchers and a breakdown in the transmission of the technical knowledges to the next generations.

Disavowal of the youth for hard sciences

This delicate situation of the academic field (research-based funding and the difficulties to get a permanent position even after selective and long educational background) may contribute to the disavowal of the young generation to opt for a scientific career and more broadly to have an interest in hard sciences. Moreover, their

disdains to hard sciences can also find some reasons in our current models of society valuing the money earned quickly and short-term performance. To opt for a scientific career requires a certain patience and pugnacity that are not compatible with societies where the current values are turned on pleasure and leisure (valid in France, less in Japan where people devote a large part of time to work and take short vacations in contrast to France where workers enjoy at least 5 weeks of full vacations and even more in the educational field) while being also subjected to the diktat of the short time⁵⁾.

While being extremely gifted (regarding the selective and competitive admission to enter university), Japanese students conduct their research project with efficiency and seriousness with however (for some of them) a lack of spontaneity due probably to their tendency to stick to and respect the organization of the annual research plan. Interestingly, only few of them opt for scientific careers in the academic field (highlighted by the large decrease of the number of PhD students in these recent years), and only a few students show a lack of interests to the research (despite their skills and talents) by choosing a work different than Chemistry after their graduation.

While being less talented (except probably the students from Grandes Ecoles who are the tree that hides the forest in France) as PISA (Program for International Student Assessment) scores show⁶⁾, students in French Universities express a strong desire to learn via their research projects whose evaluation represents an important criterium for their graduation and thus can obtain good research results despite their short internships (up to 2 and 6 months for both undergraduate and graduate students).

Possible changes

How to increase the attractiveness of the students to work in academic field? Awakening to science through teaching lectures and active learning starts in elementary schools in Japan that must be contrasted to France where teaching of Chemistry is only done at junior high school's level. Education at an early age constitutes the fundamental bases to build up and mold the next generations to science, while making them aware of current societal problems: global warming, contamination of water, scarcity of resources..., that may hopefully be solved with new materials and technologies (?).

Japanese universities are well organized, except their calendars that should start in September as those of overseas universities. In addition, a reevaluation of research projects (by allocating enough credits) may be undertaken for possible changes in the mentality, motivation, and attitude of some students (those reluctant to do their research duties or showing a lack of interests to them). Another possible calendar change would be to separate periods for both theoretical lectures and research projects as well as to clearly discriminate the job-hunting period (that should be done after the graduation) and the research project (it is hard to have several irons in the fire!). Such organization, similar as that to France, avoids a dispersion of the efforts for the students, as well as it should also

facilitate their supervision. In addition, it may give the opportunity for students to do their research projects in overseas universities allowing them to acquire other methodologies as well as enlarging their horizons. Those exchanges of people, important in the research field, would enhance the attractiveness of students to opt for a career in academia and undertake a PhD thesis. The latter must be considered as a first working research experience for which the students should receive a salary as it is the case in France and other countries.

Japan demonstrated a unique ability to undertake rigorous and effective reforms for the good of its society and the conservation of its resources: in the Tokugawa era with the safeguarding of the wood resources and large scale reforestation plans or the impressive industrial transformations in the Meiji era⁷⁾, and currently during the pandemic we are still currently experiencing, remote work is now commonly practiced (unthinkable to do before the pandemic while it was quite common to operate in France). Thus, I am quite certain that Japanese universities will find the resources to do the right changes (if there are necessary?) with efficiency and seriousness that well characterize this land of the rising sun to place it under a radiant and perennial sun for the research. I express much more concerns for my own country, which already shows its decline, to conduct the appropriate and necessary reforms to recover its golden age of research!

- 1) <https://www.cnrs.fr/en>
- 2) <https://anr.fr/en/>
- 3) O. Martin, *Sociologie des Sciences*, ed: Armand Colin (2005)
- 4) <https://roqueesr.fr>
- 5) P. Papon, *Bref récit du futur Prospective 2050*, ed: Albin Michel (2012)
- 6) <https://www.oecd.org/pisa/>
- 7) J. Diamond, *Collapse: How societies choose to fail or succeed*, ed: Viking press (2004)



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Since April 2018, while being a seconded employee from a French university (the University of Orléans, located at about 130 km from Paris), Régis GUEGAN works as an associate professor for Waseda University (Tokyo), where he is teaching to international students in chemistry major and supervising both international and Japanese students for their research. He obtained his PhD from the University of Rennes I (France) in 2006 and obtained a permanent position as associate professor at the University of Orléans in France (2007-), where he taught more than 10 years to undergraduate and graduate students. In his career, he was awarded a JSPS postdoctoral fellowship at the University of Tokyo (2006-2007) and several invited researcher programs from the Canon Foundation in Europe and the JSPS, allowing him to stay and work in Japan in 2010, 2013 and 2015. In 2020, he was awarded from Waseda University for his research works (High Publication Research Award). His research activities aim at understanding the stability and the microstructures of colloidal systems, as model systems for physical problems in soft matters and as potential routes for the preparation of hierarchical advanced materials for diverse applications (supercapacitors, smart materials for water remediation strategies...).