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Policy Paper
March 2018

Policy proposal to Reduce Skilled Unemployment in Morocco using Public-Private Partnerships (PPPs):

3R-PPP – Retrain-Rebalance-Reduce-PPP

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PP-18/03

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Thomas Pereira da Silva*

* OCP Visiting Fellow. The opinions expressed hereby are mine and do not necessarily reflect those of the OCP Policy Center. I would like to thank, without implicating, Professor Pierre-Richard Agénor from the University of Manchester for comments on this proposal, as well as Tayeb Ghazi and Badr Mandri for their comments on earlier versions of this paper. All remaining errors are mine.

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Abstract

This proposal seeks to contribute to reduce, in a cost-effective way, Morocco's unusually high, persistent and growing unemployment level for university graduates[1]. It complements and enhances the existing Université Internationale de Rabat (UIR) Public-Private Partnership (PPP). Tertiary enrolment in Morocco has been increasing above what seems to be labor market absorptive capacity. Over the past decade, the share of the unemployed with university degrees as a percentage of total unemployment climbed from 16% in 2001 to 22.4% in 2015. In particular, the skill composition of students exiting the tertiary education system seems to create a skill mismatch (or a "skill gap") vis-à-vis labor demand. Many policy reports and recent research have blamed the lack of adequate skills among university graduates in Morocco. The existing UIR-PPP seeks to address these issues since 2012 by offering student access to a more technical curriculum. We propose to enhance it further by providing a more rigorous screening mechanism, reducing its costs and increasing its effectiveness. We also provide a simulation that measures its contribution to the reduction of the rate of skilled unemployment in Morocco under a set of assumptions, thus allowing policy-makers to assess how efficient the use of public financing in high education PPPs has been.

1. Pereira da Silva T. "High and Persistent Skilled Unemployment in Morocco", OCP Policy Center (October 2017)

Policy proposal to reduce skilled unemployment in Morocco: Strengthening the Public-Private Partnerships (PPP) approach

Morocco displays an unusually high, persistent and growing level of unemployed with university degrees. Tertiary enrolment has been increasing above labor market absorptive capacity despite a labor force participation rate that has been decreasing (from 51.1% in 1990 to 49.08% in 2016). In a nutshell, the skill composition of students exiting the tertiary education system seems inadequate vis-à-vis labor demand. In addition, the public sector has reached its limit as the "employer of last resort" as budgetary spending has been adjusted to ensure the sustainability of public finances. Therefore, there has been an effort to increase the employability of new cohorts of graduates, improving their skills and simultaneously making the most efficient use of scarce public financing, through a public-private partnership (PPP) solution, like the existing PPP at the International University of Rabat.

This proposal proceeds as follows. First, we briefly explain the rationale of the existing PPP of the International University of Rabat. Second, we detail the objective of our own 3R-PPP proposal (Retrain-Rebalance and Reduce Skilled Unemployment); we also explain why and how it would complement the existing one's on-going efforts. Third, we describe the 3R-PPP's main mechanism, its set-up, costs and cost sharing, its risks and stakeholders. Fourth, we assess its effectiveness by measuring its impact on the rate of skilled unemployment; for that purpose, we introduce different scenarios of implementation and detail their results. Fifth and finally, we conclude with a brief set of policy recommendations aimed at reducing skilled unemployment in Morocco.

Before going any further, we assume as a basic justification for any policy / initiative aiming at increasing the supply of skilled labor in the Moroccan labor market that any additional supply of skilled labor will find employment opportunities as the economy further grows and continues to demand these specific types of skills – science, technology, engineering, and math, or STEM. In other words, there is no demand constraint for skilled workers now and in the near future. Anecdotal evidence and HCP reports[1], seem to support this assumption and shows persistent high wage differentials between STEM graduates vis-à-vis non-STEM graduates, very low levels of STEM graduates among the unemployed. More research is needed on this area to analyze current and future demand for skilled labor in Morocco.

1 Morocco between MDGs and SDGs, achievements and challenges (2015), by Ahmed Lahlimi Alami, High Commissioner for Planning

1. The existing Higher Education PPP at the International University of Rabat (UIR-PPP)

A recent new PPP law[2] in Morocco has allowed the establishment of the International University of Rabat (UIR) as a UIR-PPP[3], starting effectively in September 2010, in partnership with the Government of Morocco (GoM). The UIR-PPP consists of a partnership between the GoM, through the "Caisse de Dépot et de Gestion" (CDG), on the one hand, and a consortium of private sector participants on the other. The idea of addressing the issue of poor skills amongst university graduates was already present at the time:

> «The project was initiated in 2005. It began with an assessment: the level of our higher education was declining, the research was less and less captive ... I spent thirty years in France as a university professor and seeing the students, Moroccans we received in France, it was obvious that in the past they were at the head of the pack and with the years, they passed at the back of the pack.»
>
> *Noureddine Mouaddib*[4]

Morocco's tertiary education system is currently increasing its numbers of graduates (with an average tertiary enrollment rate that has climbed from 10.4% in 2001 to 28.14% in 2015). However, quality has been lagging behind and has resulted in a growing unemployment rate for university diploma holders: over the past decade, the share of unemployed with university degrees as a percentage of total unemployment climbed from 16% in 2001 to 23.5% in the third quarter of 2017. In that context, the UIR-PPP aims at offering more specific skills to a limited number of students. According to the UIR data, 3,400 students will enter the university for the 2017/2018 school-year.

The UIR-PPP offers scholarships to eligible students. Such scholarships provide between 20 to 100% of full scholarship financing. About one third of the students at UIR benefit from such scholarships[5]. UIR also offers loans to students through a system of loans (at a very low interest rate).

The UIR-PPP also aims at strengthening the links between the academic and the corporate world. It aims at fostering a win-win partnership that encourages innovative and adequate job creation, aligned with national development and growth strategies. The UIR benefitted from a 57 million Moroccan dirhams or MAD investment by the CDG and a 20-hectare State land donation. The tuition fees of the UIR (excluding mobility abroad) range between around 72 thousand MAD (for the Advanced School of Energy Engineering) to 96 thousand dirhams (for the International School of Dental Medicine).

As the UIR continues to increase its student's intake, it will surely need to further enhance its screening process in order to make an effective use of its public resources and contribute to the government's goal to decrease the amount of skilled unemployed while maintaining the fiscal consolidation strategies of recent years. Another issue to be examined is whether additional students in the UIR-PPP could not contribute to their own financing by repaying their tuition costs. This could provide scope for future expansion of the scheme as well as making its less dependent on public financing through the GDG. Our 3R-PPP proposal addresses these points.

2. http://www.enssup.gov.ma/fr/Page/458-partenariat-public-priv%C3%A9
3. http://www.uir.ac.ma/partenaires
4. Founder of UIR: http://fnh.ma/article/economie/universite-internationale-de-rabat-retour-sur-un-ppp-inedit-dans-lenseignement-superieur
5. According to informal sources.

2. A proposal: 3R-PPP for Retrain, Rebalance, and Reform (or Rééduquer, Reéquilibrer, et Réduire)

The objective of the 3R-PPP proposal is threefold: to (i) contribute to improving the screening process of the UIR-PPP by selecting specific students from a pool of pre-qualified students (e.g., the best of those enrolled in non-STEM degrees); (ii) to ensure that students accepted in the UIR-PPP through our "screening", and that are eligible to financing loans, do fully repay them; and to (iii) measure the effectiveness of an enhanced UIR-PPP by providing its quantitative contribution to the government's objective of reducing skilled unemployment in Morocco.

One specific improvement to the UIR-PPP that the proposed 3R-PPP addresses is to enhance the existing screening process. This will be done by strengthening the criteria of the current process and by drawing applicants from a more specific pool of the student population. The goal is to attract the most meriting students in order to provide them with both classroom and on-the-job training opportunities during their academic cycle. Doing so will increase their employment opportunities upon graduates and enhance their chances of obtaining a stable formal salary that will allow them to repay their loans. The loans repayment schedules will need to be negotiated[6] in order to protect students from potential default risks.

Why is the screening process so important to increase skills and reduce skilled unemployment? Many existing reports[7] and the results of our research[8] on high and persistent skilled unemployment in Morocco show that skilled unemployment in Morocco is, as expected, related to the economic cycle, changes in the economy's productive structure, internal and external shocks, and education and labor market structures. But our research specifically highlights the role of a skill mismatch (what we can label a skill "gap") between Morocco's tertiary education outcomes and labor market absorptive capacity. The skill gap can be proxied by what seems to be a preference by employers to hire technical vis-a-vis non-technical degree holders[9].

Employers want to hire skilled students but do not dispose of a truly effective vetting process for hiring. According to informal sources and observed anecdotal evidence, employers have the intuition that generic university degrees are not sufficiently discriminating. Hence, they would use technical vis-a-vis non-technical degrees as a selection criteria to gauge their minimum required level of skills since they believe technical degrees are more competitive, produce students with "stronger" skills and can substitute for the shortcomings in their own vetting process.

Therefore, our proposed 3R-PPP is one possible supply-side measure that addresses, at a low cost for Morocco, the skill mismatch in the short-term – beyond a long-term improvement in the quality of the primary and secondary education systems as a whole. It complements the existing UIR-PPP by strengthening its screening process (see below) while at the same time drawing applicants from a pool of existing students with a non-STEM degree or enrolled in non-STEM courses. Our proposal assumes that this specific set of students represents the most suitable set of the population susceptible to have its skills upgraded at the lowest possible cost. Indeed, a cost-effective way to do skills upgrade through technical and vocational

6. Negotiations involve the loan repayment start date, schedule, and amortization setup. Interest rate on the loan, payment start date, and loan repayment term should be carefully designed in order to avoid potential risks of default.
7. IMF article IV (2016); IMF, (2013), Inclusive growth in Morocco: stylized facts and policies, Morocco - Selected issues, January
World Bank, (2012). Kingdom of Morocco: Promoting Youth Opportunities and Participation
8. Pereira da Silva T. "High and Persistent Skilled Unemployment in Morocco", OCP Policy Center (October 2017)
9. We define "technical" as degrees in Science, Technology, Engineering and Mathematics (STEM) as opposed to non-technical degrees in Humanities and Social Sciences (non-STEM). What seems to be at work is that employers generally use STEM degrees as a proxy to determine a minimum level of desired skills before hiring, in the absence of a proper information set to assess the skills of job seekers.

training is to target the population of students already enrolled in non-technical degrees at universities. There is evidence that the youth and students have accumulated deficits in terms of education, training, technical or non-technical skills development, and vocational integration. Tailored learning readjustments can be put in place for these students to facilitate the entrance into the labor market with a new set of skills that increases their employability. The re-training and rebalancing of skills for these existing, already screened and selected university students could achieve the objective of skills upgrade more rapidly than starting a general selection process of adequate candidate among the general population. Because we assume that this pool of potential already has some basic skills, we believe that our proposal is more cost-effective to enhance vocational training and improve the skill composition of graduates from the UIR-PPP (and potentially from public sector universities) than drawing entrants from the general population.

In addition, our 3R-PPP provides a more targeted financing scheme. In complement to the existing general subsidy (partial or total payment of a student's tuition cost) offered by the UIR-PPP, our 3R-PPP proposes a partial of total loan financing for identified students that would repay their financial obligations after obtained a formal job. In other words, this additional component to the UIR-PPP would act as a banker for selected students and pre-finance their tuition costs.

Therefore, the 3R-PPP complements the UIR-PPP and could increase its efficiency by functioning as follows (see below for more details). It provides a re-training and skills upgrading for students that have already been enrolled in universities but have not acquired the necessary minimum skills demanded by employers. These students are likely to get degrees (proxied by student enrolled in non-STEM courses) that will not allow them to successfully compete for a job in the formal sector upon completion of their university education. We assume that the 3R-PPP program has roughly a three-year duration (TBD). An essential feature of our 3R-PPP is the "screening unit" that will:

A. Identify accurately the pool of students (e.g., among existing students in non-STEM courses or unemployed with a non-STEM degree) that can potentially enter the 3R re-training program; screen the pool to find the best candidates; the criteria will be both academic and financial (i.e. repayment probability of offered re-training programs) and determine each year a cohort of participants;

B. Liaise with the UIR-PPP, the public (GoM) and private (firms and banks) sector to construct the financial envelope to offer bridge-financing opportunities for eligible students; ensure a multi-year financial support that covers the various cohorts in the program;

C. Sign the financial contract with the student enrolled in the re-training program.

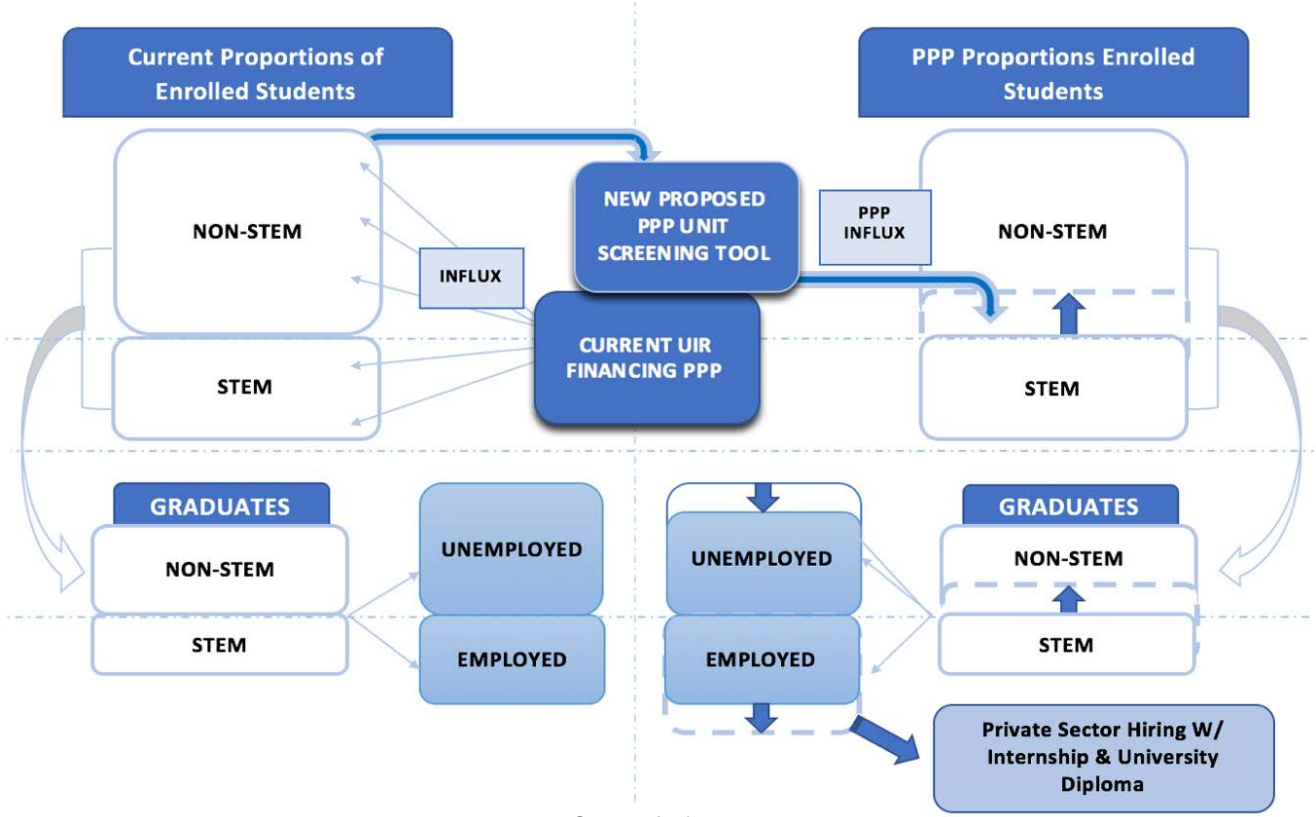
D. Monitor the students after graduation; ensure that the scholarships are fully repaid on time.

Hence, in order to perform its screening function and to determine the repayment capacity and probability of student, this "screening unit" will have to function as and use financial analysis techniques related to those of credit bureaus and banks that have to select good creditors to offer loans and assess the credit quality of borrowers, etc.

In sum, this 3R-PPP develops a re-training program to strengthen the skill composition (e.g., vocational training and technical degrees) of (preferably) current university students enrolled in non-STEM degrees. It aims at increasing the skills of the workforce, in particular of non-STEM degree enrolled students before

they enter the labor market. It does that by mobilizing both public and private sector financing to provide a mechanism for students currently enrolled in non-STEM degrees to acquire more STEM-related skills, thus increasing their employability (Figure 1). Finally, it also ensures that students that are selected are capable to repay their financial obligations.

Figure 1: 3R-PPP Design



Source: Author

3. 3R-PPP Mechanism, Screening, Costs, Risks and Stakeholders

a. Main mechanism

The main mechanism of the 3R-PPP is the pre-financing by the GoM-CDG of the retraining cost for eligible students currently enrolled in non-STEM curricula at selected universities and the financing of the cost for operating the 3R-PPP unit by the private sector.

The CDG-GoM will offer loans to selected students to pre-finance the cost of their re-training through the program. The GoM will also ensure half of the refund of loans of students that drop-out from the program and/or do not fully repay their loans.

The private sector will have the possibility (and or obligation depending on the final negotiation agreement) to access academic performance of students enrolled in the program before their graduation and to offer them summer internships, apprenticeship opportunities during their university years, and job opportunities

upon graduation. It will offer loans at market rates to finance both the cost of their re-training through the program. The private sector will contribute to the funding of the operating costs of the 3R-PPP unit. The private sector will also ensure half of the refund of loans of students that drop-out from the program and/or do not fully repay their loans.

Students enrolled in the program will initially need to already be enrolled in non-STEM degrees in selected universities; they will complete their regular credits there plus the credits of the re-training program; they will have the obligation to repay in full the loans offered by the private sector (once employed in the formal labor market).

b. Screening

Currently, the UIR-PPP allows application from any potential student following a screening process [10] that takes into account the following criteria:

1. Identification (ID)
2. Cursus scolaire (the student's past curriculum)
3. Résultats scolaires (the student's past grades)
4. Proposition de formations (the student's degree objectives)

We consider that this process can be strengthened. For us, the most important component of the 3R-PPP is the careful selection of future beneficiaries from the pool of non-STEM degree holders through a screening algorithm/device that selects eligible students to access STEM-type training programs at public or private universities (such as EGE[11] or University Hassan II, for example) and recognized TVET institutions (in line with article 31 of the constitution). Their eligibility will be based on a set of specific requirements (below) in order to ensure efficient training (low rate of drop-outs), by targeting motivated university students. Therefore, our 3R-PPP will have the following "screening" criteria:

- Acceptance into non-STEM degree at selected and partner universities (TBD); be enrolled in a non-STEM degree with concentration choices that are somehow related to or that can be complemented by STEM programs
- High School Grades (marks / "GPA")
- "Background check" and interview essays for motivations
- Baccalaureate or "high school diploma" score
- Work Experience (in both formal and informal sector)
- "Means" testing of student and/or of family to "prioritize" students from poor/lower-income families

This screening device is the most critical tool to ensure 3R-PPP's objectives. Students who apply to enter 3R-PPP will be screened to ensure a cost-efficient use of the GoM resources by retraining only the "best and most deserving" students from a larger pool of non-STEM students in order to reequip them with the adequate set of skills deemed to be in demand by the labor market. This device will also be key to ensure the financial analysis of the student's repayment capability and willingness, once he or she gets a formal job after the completion of its re-training program.

10 http://www.uir.ac.ma/Candidature
11 EGE : Ecole de Gouvernance et d'Economie (EGE Rabat)

In addition, a possible summer internships or apprenticeship program with the private partners of the UIR-PPP can provide (i) students with more specific skills and on-the-job experience and (ii) potential employers with valuable information about the observed skills of potential and or future hires. An independent institution should also be involved in order to monitor and evaluate (M&E) the student, university/education provider, and employer performances. In the case of Morocco, organizations such as the Conseil Superieur de l'Enseignement, la Formation Professionelle, et la Recherche Scientific (CSEFPRS[12]) possess the qualifications, accreditation, and capacity to pursue such M&E functions.

c. Estimated Cost

In order for this type of PPP to be successful, as mentioned above, a specific 3R-PPP "screening unit" will need to be constituted to conduct the screening; identify the best students; collect the applications; and monitor the student's progression throughout the program (e.g., keeping records of their grades, attendance, performance outside the education institution, etc.). In parallel, the unit should follow labor market outcomes and the participating university's service delivery in order to adjust for changes in hiring conditions and demand for new skills.

A cost estimate for the functioning of this specific 3R-PPP "screening unit" is proposed below. Naturally, during and after the start of the program, updates of costs will be needed in order to prepare and plan for potential budget requests. The scholarship program costs at EGE, Hassan II University, and UIR-PPP, for example, can be partially covered by corporate donations. But the 3R-PPP funding mechanism differs from this donation-type model since students who participate in the PPP are required (by contract) to fully reimburse the loans. For example, Table 1 provides a tentative annual average estimate of the operating cost of the 3R-PPP unit, assuming 5 staff and screening of about 6 thousand non-STEM students per year at a unit cost of MAD 5K each and re-training costs of MAD 25K each per year on average for the 10-year duration of the program.

Table 3.1: 3R-PPP unit operating cost

	Units	Amount (MAD)	Total
Fixed costs			1,100,000
Personnel	5	200,000	1,000,000
Material & Software			100,000
Variable costs			207,633,607
Screening	6,000	5,000	43,042,698
Training	3,000	25,000	164,590,909
Contigency (Drop-outs)			10,436,993
Total			219,170,600

(Total are averages for 10 years, see Table 5.1 below for details)
Source: Author

12 http://www.csefrs.ma

d. Risk

The main risks for the 3R-PPP initiative are: (1) a higher-than-expected rate of drop-outs from the program; (2) unwillingness to repay financial obligations; and (3) the incapacity to repay financial obligations at the completion of the re-training program resulting from the lack of job offers upon graduation. Our assumption is that the legal risk will be covered by the contract signed, that drop-out rates will remain low; and that unemployment after our proposed partnership will also be very limited given the rigorous screening process to equip students with the specific skills[13] in demand by employers. Nevertheless, the financing cost of the 3R-PPP does incorporate the cost of drop-outs and failure.

Finally, the risk of not getting a job upon graduation is also low since the best students already enrolled in non-technical degrees are selected so that the 3R-PPP retrains or further train them into more technical degrees. The procedure is expected to be efficient because of its relatively high screening requirement and "lower" retraining cost (e.g., selected students are already attending university which justifies the easy access to their grades in high school and during university). In addition, our assumption is that the high motivation of participant students (as a result of summer internship and employment prospects that creates incentives) should also help (Figure 2).

e. Stakeholders

The proposed PPP structure will work with incentives for the three major stakeholders, the CDG-GoM, the private sector and students.

On the GoM side, the participation will involve: (i) ministries of Education, Finance, and Labor, and the CSEFPRS-INE (ii) banks in partnership with the corporate sector, (iii) public universities and technical and vocational education training (TVET) programs. The main incentive for the public sector is to efficiently use its subsidies and make them contribute to the reduction of skilled unemployment. The GoM's cost is the subsidy provided to the loans towards non-STEM students enrolled in the program. For the government and public sector, incentives are also at a more macro-level: if the program succeeds, we predict a reduction in skilled unemployment as a result of the 3R-PPP. Partnering with the corporate and private sector could therefore lead to higher labor force participation rates, coupled with more efficiency in the operationalization of its higher education strategies. Given the lower bureaucracy and high financial participation from the corporate donors (similar to the scholarship programs at EGE and UIR for example), such a partnership would allow the government to refocus its resources and policies on other areas such as Early Childhood Development (ECD) and Basic Education.

On the private sector side, firms and banks can secure high performing students as future employees. These firms' main incentive is to benefit from this human capital through the hiring of adequately skilled workers that they have trained both through a specific and agreed-upon curriculum as well as on-the-job training. Their cost is the possible contribution to the program's funding once they begin benefitting from its outcome. Therefore, for the private sector, the incentives come from the added skilled workers hired for summer internships, apprenticeship programs, and formal contracts upon graduation. The potential for higher productivity as a result of the specific skills transmitted to the non-STEM cohort, through the 3R-PPP program while partnering with high performing universities, increases the returns at both the micro-

13 The "skills of tomorrow" will need to be discussed and agreed upon by the different actors and stakeholders. https://www.brookings.edu/wp-content/uploads/2016/05/Brookings_Skills-for-a-Changing-World_Advancing-Quality-Learning-for-Vibrant-Societies-3.pdf

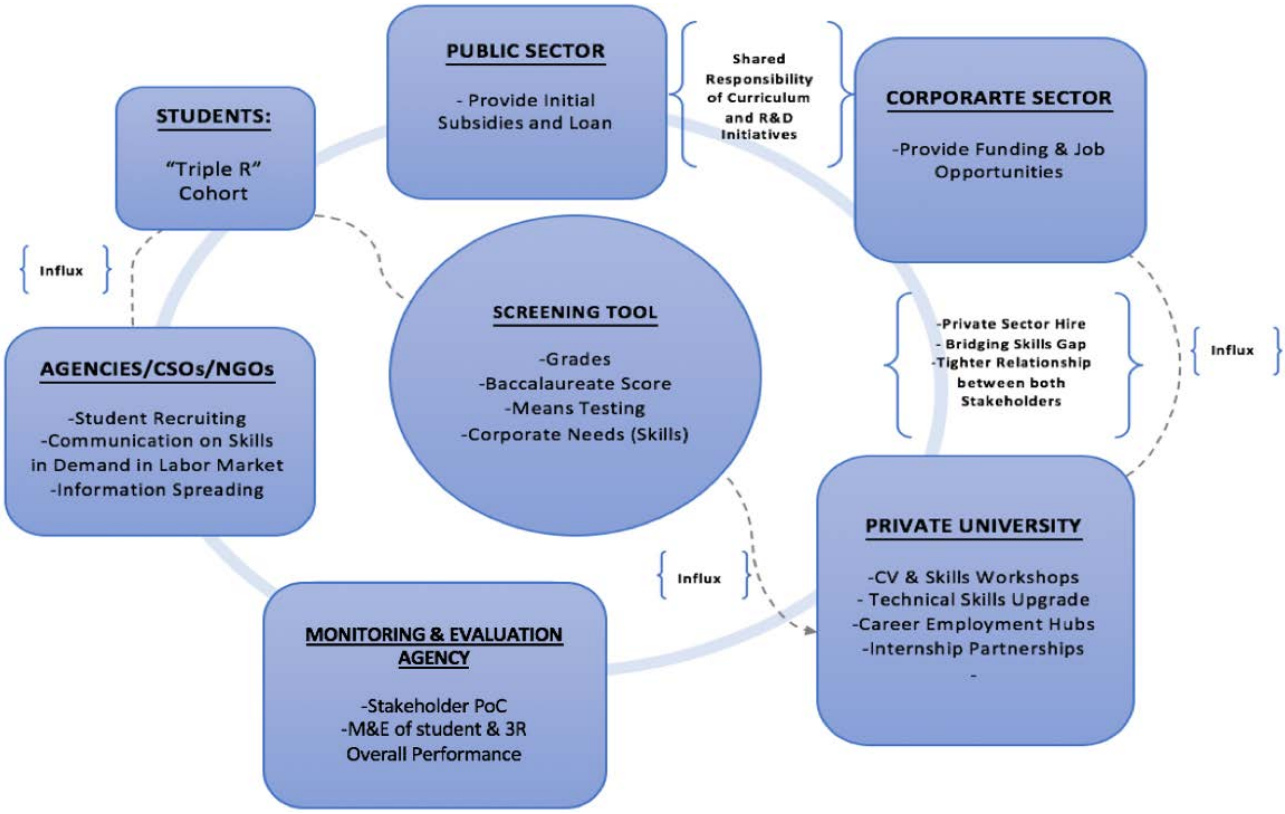
enterprise level but also for the economy as a whole. The private sector should also benefit greatly from such an arrangement since it shares the responsibility with the GoM on future curriculum design.

On the student side, enrolled participants in the 3R-PPP are more likely to find a job at the end of their graduation. The incentives for students accepted into the program will be to upgrade and recycle their skills at a subsidized cost (that of their full scholarship and retraining program). For students, the incentives are related to: (i) the positive externalities resulting from joining the formal labor market early on and with specific skills acquired in the soft-STEM retraining, rebalance, and reduce (3R-PPP) program, (ii) on-the-job training resulting from internship and apprenticeship opportunities provided during a semester of the 3R program or summer breaks, and (iii) a better understanding of the complex and shifting labor market structure through career guidance initiatives.

In addition, in order to reduce skilled unemployment, private universities and TVET institutions will partner with the corporate sector in order to create business incubators (or HUBs) for students to be appointed to practical and useful school assignments that complement employer needs. They will also partner with the government and corporate sector to draft specific course syllabi that reflect the challenges of skill shortages in the labor market. The technical courses and programs offered will thus respond more directly to the needs of both private and public-sector employers. These institutions (private universities and TVET programs) will thus need to further develop partnerships with small and medium sized enterprises (SMEs). Such incubators will then better prepare students for entrepreneurial ventures connecting them with appropriate networks in the formal labor market.

Finally, in order for this type of initiative and program to scale up appropriately, the participation of both CSOs and NGOs will be essential. Although the pool of students entering 3R-PPP is already one that has been pre-selected into universities, many students having abandoned the education system miss out on this type of opportunity and thus are not able to benefit from more pragmatic human capital investment opportunities. The role of both CSO and NGO should be to properly inform the population of this type of program, explain the reasoning behind the screening mechanism, better prepare at-risk students in their early years, and perhaps even increase awareness on these types of programs.

Figure 2: 3R-PPP Design



Source: Author

4. Measuring effectiveness of our 3R-PPP: Scenarios for simulating its impact on skilled unemployment

In addition to our proposed 3R-PPP "screening process" proposal – assuming it becomes an additional feature of the UIR-PPP and is integrated into its own screening process-- we can offer a more quantitative forecasting of the impact of this initiative on the rate of skilled unemployment in Morocco. This section proposes a simulation exercise to show its effectiveness in the reduction of skilled unemployment in Morocco.

We use the result of our research on factors explaining skilled unemployment and particularly the role played by the existence of a "skill gap" outcome from the tertiary educational system. We consider the 3R-PPP screening mechanism as a policy instrument that is capable of changing the composition of skills and therefore eventually affect the rate of skilled unemployment in the economy. We take as an assumption that the UIR-PPP forecasts 3400 incoming students for 2017-2018 and that our proposal starts by adding about 3000 students to the existing scheme.

Our program will screen and select non-STEM students (which we call "trainees") by extracting them from a pool of student enrolled in these courses to "recycle" or "upgrade" their skills. These students will be able to follow, in addition to their regular courses, specific re-training courses that will complement their skills with more "STEM-related" degrees. As mentioned above, these students will also benefit from

professional training (through business incubators, apprenticeship and summer internship programs) in order to increase their employability and attractiveness for future employers.

The simulation will consist in projecting the evolution of the rate of skilled unemployment using the existing trends. Our model uses a set of control variables[14]. The key instrument affecting the skill composition in the economy being the ratio between STEM and non-STEM students. Our simulation will use the growth rates in the level of "recent STEM graduates" and "the stock of non-STEM students".

The goal is to compare the impact of changes in all these variables regrouped in three scenarios on skilled unemployment. The special interest variable is the role of "trainees" as they affect the ratio between STEM and non-STEM students over and above the natural growth rates of these two categories and hence, the skill composition in the economy. Thus, when the ratio of STEM versus non-STEM students increases, we believe the skill composition also improves.

We also calculate the cost of screening and of re-training for the existing pool of non-STEM students and consider that the 3R-PPP achieves its objective. Nearly all retrained non-STEM students become equipped with proper skills which ensures a higher probability of getting a job offer. Finally, for a given cost of operating the program, the rate of skilled unemployment can be reduced. We compare the overall cost of the program in each scenario (as a percentage of GDP) with its capacity to reduce skilled unemployment.

Naturally, these simulations are only an illustration through scenarios of the impact of our proposed 3R-PPP. Nevertheless, because they are also the result of a documented research on the factors explaining skilled unemployment in Morocco, they could be seen as a component of a Cost-Benefit Analysis (CBA) that public policy-makers could use to assess the efficiency of their policies in higher education and of the allocation of public funding to the sector.

a. Assumptions:

We construct four scenarios: a baseline and three scenarios where our key variables change: in Scenario 1, we put in place the 3R-PPP with a program for re-training non-STEM students. In Scenario 2 we simply rely on the effect of higher growth and positive tail-winds from the economic cycle with no 3R-PPP; and in Scenario 3 we put in place a more aggressive 3R-PPP.

We use the following assumptions: according to past data from 2001 to 2014/15, the average GDP real growth rate had a mean of 1.07% p.a. with a maximum at 4.99% and a minimum at -4.15%. The average degree of openness was about 65%, and the number of STEM graduating university increased by nearly 7% a year while the amount of non-STEM enrolled students increases by nearly 11% a year. In the assumptions used for our projections (Table 4.1) over the period 2017 to 2027, we increase slightly the base average GDP growth rate to 2.4% p.a. in all scenarios but one, scenario 2 where we increase it to an average of 3.2% p.a.. We also keep the degree of openness to an average of 65% in all scenarios but one, scenario 2 where we also increase it to an average of 69%. We also keep the number of STEM graduating university to increases by 7% a year while the increases of non-STEM enrolled students by 11% a year in all scenarios but one, scenario 3 where we invert the average increases to signal a shift in the outcomes of the tertiary education system. Finally, for scenario 3 we also increase the average price of phosphate (the proxy for a positive external shock with revenue effects) by a permanent increase of 5% p.a..

14 Real GDP growth; the price of phosphate; economic openness; and government consumption.

Table 4.1: Assumptions of our simulation exercises (Baseline, Sc.1., Sc.2. and Sc.3.).

Scenarios Hypothesis				
Variable	Baseline	Sc. 1	Sc.2	Sc. 3
Real GDP Growth, percent per year	2.4	2.4	3.2	2.4
Production Structure (Openness), X+M/Y	65%	65%	69%	65%
Actual STEM Univ. Graduates, annual growth rate in percent	7%	7%	7%	11%
Stock of non-STEM Enrolled Students, annual growth rate in percent	11%	11%	11%	7%
Phosphate Price (USD), change in percent	0%	0%	5%	0%
Inflation, percent per year	2%	2%	2%	2%

Source: Author

b. Baseline scenario:

The baseline simulation uses the assumptions above and assumes "no treatment" (or the absence of 3R-PPP). It continues the relatively favorable macroeconomic trends of the past (i.e., an average 2.4% real GDP growth rate p.a. over the 10-year period, openness levels of 65%, and phosphate prices around 940 MAD). The result of this baseline scenario on skilled unemployment is an increase of around 40 thousand skilled unemployed between 2017 and 2027. This baseline scenario shows that if the skills composition in the economy as depicted by the growth pattern of newly graduated STEM students over the stock of enrolled non-STEM does not change in favor of more skills, i.e. the STEM-type curricula, skilled unemployment will reach 255 thousand by 2017 in comparison to 217 thousand in 2017 (Table 4.2).

Table 4.2: Baseline scenario, no 3R-PPP (no treatment)

Baseline - No 3R-PPP, noTreatment				
Variable	2014	2017*	2022*	2027*
Baseline Graduate Unemployment Rate (estimate)	1.80	1.84	1.93	2.00
Skilled Unemployed (in thousands)	213	217	237	255
Activity (Real GDP Growth)	1.07	2.16	2.41	2.66
Recent STEM Univ. Graduates	28,936	37,799	53,014	74,355
Stock of non-STEM Enrolled Students	374,485	610,944	1,029,476	1,734,727

All dates followed by a * represent data that is projected using HCP data and growth estimations calculated by the author

Source: Author

c. **Scenario 1 -** Introduction of the 3R-PPP with selection of trainees (from the pool of non-STEM students) into the re-training program:

In this scenario, the 3R-PPP is activated to address the skill gap in the economy. Starting in 2017, the 3R-PPP will select and enroll 3,000 (three thousand) trainees from non-STEM programs and increase the intake to 11 thousand by 2027 (Table 4.3). If all other variables remain unchanged (following their historical trends since 2001 per our assumptions), our intervention produces a decrease in skilled unemployed by roughly 20 thousand from 205 thousand in 2017 to 182 thousand in 2027 (Table 4.4).

Table 4.3: Introduction of the 3R-PPP with selection of trainees

Training Section	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Pool of Screened Stds	607,944	671,318	741,163	818,191	903,192	996,543	1,099,162	1,212,070	1,336,398	1,473,402	1,624,476
Trainees	*3000*	*3500*	*4000*	*4500*	*5000*	*6000*	*7000*	*8000*	*9000*	*10000*	*11000*
Fixed Cost (admin) (millions of	1.00	1.020	1.040	1.061	1.082	1.104	1.126	1.149	1.172	1.195	1.219
Screening Cost (millions MAD)	30.4	33.6	37.1	40.9	45.2	49.8	55.0	60.6	66.8	73.7	81.2
Trainees Costs (millions MAD)	76.5	89.3	102.0	114.8	127.5	153.0	178.5	204.0	229.5	255.0	280.5
Cost of Program (millions MAD)	107.9	123.8	140.1	156.7	173.7	203.9	234.6	265.8	297.5	329.9	362.9
Contingeoncy cost (millions MAD)	5.4	6.2	7.0	7.8	8.7	10.2	11.7	13.3	14.9	16.5	18.1
TOTAL COST (millions MAD)	113.29	130.03	147.10	164.56	182.43	214.13	246.31	279.04	312.37	346.36	381.09
% of GDP	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%

Source: Author

Table 4.4: Results of Introduction of the 3R-PPP with selection of trainees

Scenario 1 - 3R-PPP Treatment				
Variable	2014	2017*	2022*	2027*
Baseline Graduate Unemployment Rate (estimate)	1.80	1.73	1.56	1.43
Skilled Unemployed (in thousands)	213	205	191	182
Activity (Real Annual GDP Growth)	1.07	2.16	2.41	2.66
Recent STEM Univ. Graduates	28,936	40,799	83,212	167,689
Stock of non-STEM Enrolled Students	374,485	607,944	996,543	1,624,476

All dates followed by a * represent data that is projected using HCP data and projections calculated by the author

Source: Author

d. **Scenario 2 -** Higher growth and more openness are simply not enough:

The 3R-PPP has a cost of about 0.05% of GDP per year over a 10-year period. Therefore, in order to understand the cost-effectiveness of the 3R-PPP, we test whether the positive results of the treatment in Scenario 1 can be obtained simply at no extra cost under more favorable macroeconomic conditions. In Scenario 2, real GDP growth increases by 3.2% each year on average – reaching 3.9% in 2027 from 2.4% in 2017. In addition, we increase the degree of openness of the economy by from 65% on average in 2017 to 69%. These three boosting factors to the economy generate a slowdown in the rate of increase of total skilled unemployed (from 213 thousand in 2017 to 232 thousand in 2027), see Table 4.5 below. While a more positive macroeconomic environment manages to slightly stabilize current skilled unemployment levels, these favorable conditions are not sufficient to revert the high level of skilled unemployment.

Table 4.5: Results with higher growth and more openness

Scenario 2 - No 3R-PPP, Reliance on Economic Growth				
Variable	2014	2017*	2022*	2027*
Baseline Graduate Unemployment Rate (estimate)	1.80	1.81	1.82	1.82
Skilled Unemployed (in thousands)	213	213	224	232
Activity (Real Annual GDP Growth)	1.07	2.37	3.12	3.87
Recent STEM Univ. Graduates	28,936	37,799	53,014	74,355
Stock of non-STEM Enrolled Students	374,485	610,944	1,029,476	1,734,727

All dates followed by a * represent data that is projected using HCP data and projections calculated by the author

Source: Author

e. **Scenario 3 -** Implementing the 3R-PPP with more trainees while rebalancing the outcomes of the tertiary education system:

Similarly to scenario 1, this scenario focuses specifically on the gap component but now with more trainees and a rebalancing in the functioning of the tertiary education system. Here, real GDP growth rates are kept to their average as per the baseline 2.4% between 2017 and 2027; openness levels remain unchanged at 65% the same way phosphate prices are fixed at 940 MAD. However, in this scenario, we change the growth rates of recent STEM diploma holders and non-STEM student body so that the amount of STEM diplomas increases from 7% to 11% between 2017 and 2027. We also modify the growth rate of non-STEM enrollment from 11% to 7% for the same period. Similarly to scenario 1, trainees (non-STEM enrolled students) participate in the 3R-PPP program (from 3,000 in 2017 to 11,000 in 2027). The results show that although real GDP growth rates and external factors remain unchanged, the number of skilled unemployed decreases by 128 thousand between 2017 and 2027, considerably more than in scenarios 1 and 2.

Table 4.6: 3R-PPP with more trainees while rebalancing the outcomes of tertiary education

Training Section	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Pool of Screened Stds	591,432	635,247	682,066	732,132	785,702	842,558	902,963	967,200	1,035,576	1,108,422	1,186,096
Trainees	*3000*	*3500*	*4000*	*4500*	*5000*	*6000*	*7000*	*8000*	*9000*	*10000*	*11000*
Fixed Cost (admin) (millions of	1.00	1.020	1.040	1.061	1.082	1.104	1.126	1.149	1.172	1.195	1.219
Screening Cost (millions MAD)	29.57	31.76	34.10	36.61	39.29	42.13	45.15	48.36	51.78	55.42	59.30
Trainees Costs (millions MAD)	76.50	89.25	102.00	114.75	127.50	153.00	178.50	204.00	229.50	255.00	280.50
Cost of Program (millions MAD)	107.07	122.03	137.14	152.42	167.87	196.23	224.77	253.51	282.45	311.62	341.02
Contingeoncy cost (millions	5.35	6.10	6.86	7.62	8.39	9.81	11.24	12.68	14.12	15.58	17.05
TOTAL COST (millions MAD)	112.43	128.13	144.00	160.04	176.26	206.04	236.01	266.18	296.57	327.20	358.07
% of GDP	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%

Source: Author

Table 4.7: Results 3R-PPP with more trainees while rebalancing the outcomes of tertiary education

Scenario 3 - PPP Treatment and Enrollment Structure Shift				
Variable	2014	2017*	2022*	2027*
Baseline Graduate Unemployment Rate (estimate)	1.80	1.66	1.20	0.66
Skilled Unemployed (in thousands)	213	196	148	85
Activity (Real Annual GDP Growth)	1.07	2.16	2.41	2.66
Recent STEM Univ. Graduates	28,936	41,858	94,807	206,474
Stock of non-STEM Enrolled Students	374,485	591,432	842,558	1,186,096

All dates followed by a * represent data that is projected using HCP data and projections calculated by the author

Source: Author

5. Conclusions & Further Policy Recommendations:

Under the assumption mentioned earlier of the absence of demand constraint for skilled workers in Morocco, our simulation results indicate that the 3R-PPP can indeed contribute to a reduction of about 1.2 percentage points of the rate of skilled unemployment at a cost hovering between 0.01% to 0.03% of GDP. The cost sharing arrangement between the GoM, the trainees-students and the private sector is 2.4%, 75.1%, and 22.5%, respectively, see Table 5.1 below.

The total average cost of the program is about MAD 220 million per year; the potential reduction of unemployed with university degrees can be about 90 thousand; the cost per job created (or unemployment avoided) is about MD 2.3 million. These costs have to be compared to the existing costs of enrollment at the UIR-PPP: about MAD 130 thousand per student for tuition not taking into account other costs.

While in any event, this cost is significant, it is not a public subsidy, if, as indicated in the cost sharing arrangement, the selected students repay the cost of their loans. The only public subsidy corresponds to the cost of pre-financing the program and the assumption of financing half of the cost of drop-out participants. If the private sector refunds the other half, the final incurred cost for the GoM could end up being around 0.001% of GDP per year, or about MAD 5.2K in total or about 32K per job created.

Table 5.1: Cost and sharing arrangements for the 3R-PPP

			Uses of Resources	Sources of Financing		
			in MAD			
	Units	Amount (MAD)	Total	GoM	Students	Private sector
Fixed costs			1,100,000			
Personnel	5	200,000	1,000,000			1,000,000
Material & Software			100,000			100,000
Variable costs			207,633,607			
Screening	6,000	5,000	43,042,698			43,042,698
Training	3,000	25,000	164,590,909		164,590,909	
Contigency (Drop-outs)			10,436,993	5,218,496		5,218,496.4
Total			219,170,600	2.4%	75.1%	22.5%

Source: Author

Despite its initial positive prospects, there are still a number of uncertainties regarding the parameters of this exercise. Therefore, our main recommendation would indicate that initiating this type of 3R-PPP on a small scale (as a pilot project) could produce useful information for policy-makers. It would allow to test the screening process and assess the real operating costs of this 3R-PPP.

Meanwhile and in addition, increasing the pool of skilled labor would need also to go pari passu with a steady increase in the demand for skilled labor that would make the economy join a virtuous cycle of higher productivity and higher growth. In that context, there are some general macro policies and specific micro sectoral (education and labor market) considerations that are implicitly suggested in a broader context to make our proposal more effective:

On the macroeconomic front:

Allow for higher export diversification of the economy. This could and can be done by opening up the country's export markets while increasing sophistication of products, expansion of exporting clients and products. Some on-going initiatives are in place (e.g., tourism, services, etc.) and could be strengthened. In particular, encouraging and incentivizing the development of new technologies and a renewable energy sector with the participation of the private sector would help. The expected result is to increase the demand for skilled workers in new developing sectors of the economy.

Improve the data quality. A more transparent, comprehensive, and easily available statistical data collection will allow for a better understanding of the skills gap with labor demand. This type of study is paramount to understand where the future demand for skills comes from to better elaborate the curriculum of universities and training centers.

In addition, elaborating a more adequate wage (minimum) indexation mechanism would better reflect the specific skills and degree in demand by the labor market. Evidence for Morocco shows that more market based minimum wage lead to a reduction in unemployment, informality, and thus negatively affects skilled unemployment. In addition, improving hire and dismissal regulation in the formal labor market could alleviate search-and-match frictions between workers and firms. One possible avenue would be to combine Morocco's new growth strategy with innovative approaches using high-end technological search program to address, for example, the above-mentioned skills gap.

On the sectoral front:

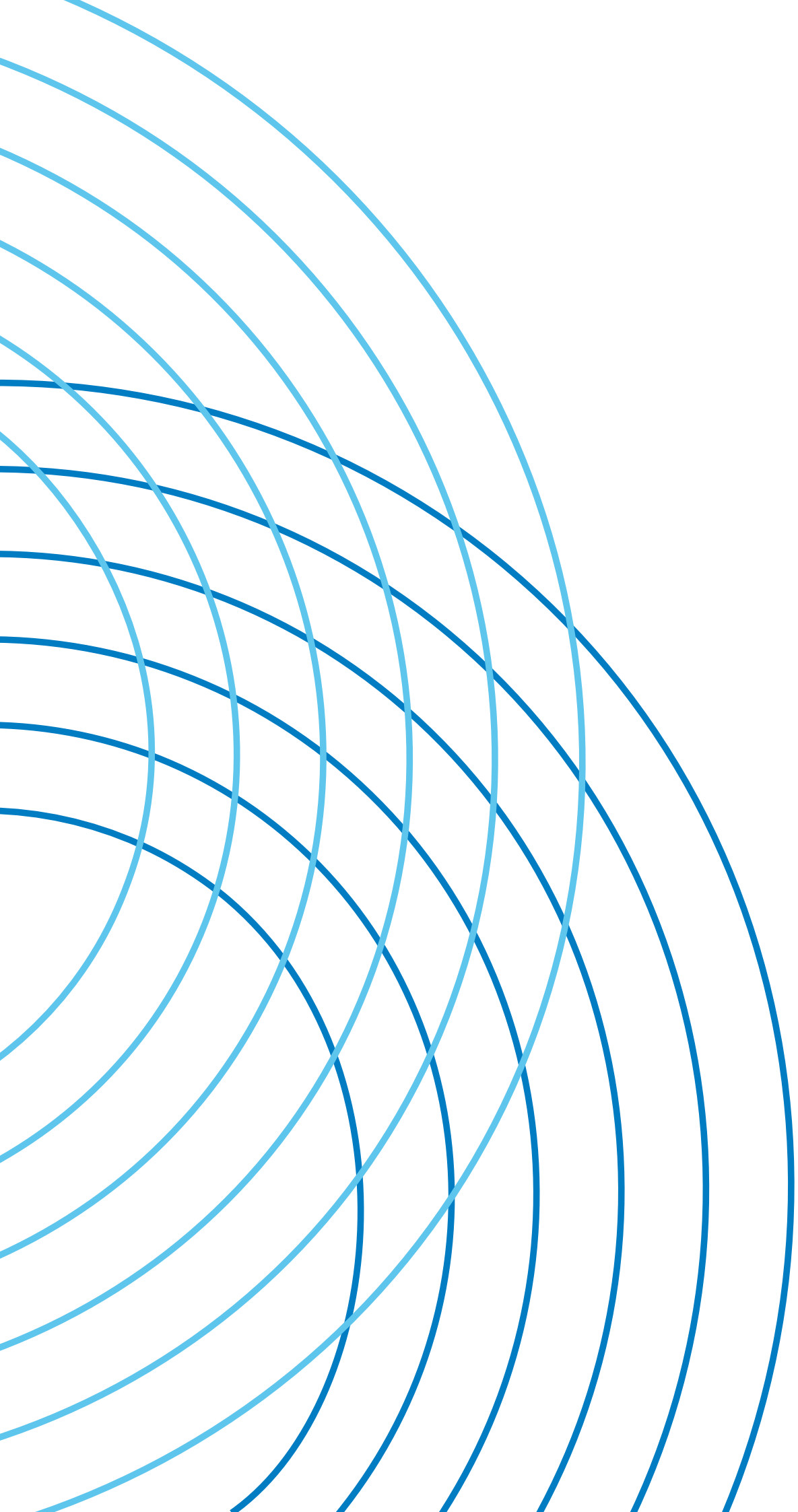
Under the assumption that the oversupply of non-STEM degrees is a result of "poor"-quality primary and secondary level education, improving their quality could be key to adapt to a new shifting global context. For that, innovative approaches to primary and secondary education is needed in order to facilitate the accumulation of proper skills from an early age. There is already a consensus on the major issues that the Moroccan education system is facing: teacher quality and incentives, school governance, and social environment and influences.

Improving legislation to reduce gender and geographical biases in recruitment practices will also allow for labor force participation rates to increase (given the very low levels of female labor force participation rates as well as large participation rate differences between regions). This could allow Morocco to inch closer to its potential growth figures by attracting skilled workers towards new and developing urban centers, addressing the issues of high population density, inadequate infrastructure, pollution, or crime.

Finally, increase accessibility to and the quality of STEM and Technical Vocation Education Training (TVET) programs. In a context where there seems to be an oversupply of less or inadequately skilled workers, as proxied by social science degrees, providing more opportunities for students to enroll in quality STEM and TVET programs will allow for the labor market demand for skilled STEM degrees to be matched more appropriately and effectively.

As tertiary enrolment rates continue to climb in Morocco and around the globe, new, innovative, and cost-effective mechanisms are needed to tackle increasing skill gaps and unemployment, especially among youth. Various approaches have attempted to address the growing number of students accessing tertiary education without necessarily addressing their growing skill gap. These approaches range from policies

that involve large public-sector spending in higher education resulting in excessive public deficits to private student-loan schemes that put excessive financial burden on students. Our proposal looks for a practical and contextualized solution for Morocco. Our 3R-PPP seeks to find a middle ground that (i) shifts the financial burden away from one specific stakeholder, and (ii) reduces moral hazard by involving the recipient of the benefit (the student) in its financing. We also provide a simulation that measures the program's contribution to reducing skilled unemployment by increasing the employability of new cohorts of graduates in Morocco. The simulations allow for a better assessment of how efficient the use of public and private financing in education can be, particularly when organized as a shared profit-and-risk scheme. Our 3R-PPP might shed further light on what works and what does not in terms of PPPs and might contribute to the expansion of innovated and contextualized models, especially in middle-income countries.



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ISSN N° 2421-9479

Dépôt légal N° 2015PE0055