

Meeting in the middle TVET programs' education-employment linkage in developing contexts

Authors:

Katherine Caves
Andrea Ghisletta
Johanna Kemper
Ursula Renold

Working Papers, No. 3, August 2019

Contact

ETH Zurich
KOF Swiss Economic Institute
Leonhardstrasse 21
8092 Zurich, Switzerland,
© KOF ETH Zurich

Financed by:



**Swiss Programme for Research
on Global Issues for Development**



FONDS NATIONAL SUISSE
SCHWEIZERISCHER NATIONALFONDS
FONDO NAZIONALE SVIZZERO
SWISS NATIONAL SCIENCE FOUNDATION



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

**Swiss Agency for Development
and Cooperation SDC**

Meeting in the middle
TVET programs' education-employment linkage in developing contexts

Katherine Caves**

Andrea Ghisletta*

Johanna Kemper*

Ursula Renold*

*KOF Swiss Economic Institute, ETH Zurich, Switzerland

+Corresponding author: caves@kof.ethz.ch

Abstract

Technical and vocational education and training (TVET) programs are most successful at supporting youth labor markets when they combine education and employment. Education-employment linkage theory describes this combination in terms of power-sharing between actors from the education system and their counterparts in the employment system over key processes in the curriculum value chain of curriculum design, curriculum application (program delivery), and curriculum updating. The KOF Education-Employment Linkage Index measures linkage at every function in a TVET program where actors from the two systems interact, aggregating those into processes and phases and eventually an index score. We apply that index to the largest upper-secondary TVET programs in Benin, Chile, Costa Rica, and Nepal. We find that Benin has relatively high education-employment linkage, while the other three countries score very low. Benin's situation is unique because its TVET program is moving from employer-led to linked, rather than the typical employer integration into an education-based program. Other countries with large informal economies, low formal education and training rates, and existing non-formal employer-led training may be able to implement similar approaches using functionally equivalent institutions. Furthermore, we summarize the results of discussions with policy-maker focus groups in the four case study countries.

Keywords: Vocational education and training, VET, TVET, education-employment linkage, KOF EELI, development economics

Funding: We thank the Swiss National Science Foundation and the Swiss Agency for Development and Cooperation for funding the research.

Acknowledgements: Thank you to the four R4D case study teams and, the TVET leaders from each country who attended the 2019 CEMETS summer institute.

Meeting in the middle

TVET programs' education-employment linkage in developing contexts

1. Introduction

Young people's successful transition onto the labor market is one of the main criteria for assessing the success of a technical and vocational education and training (TVET) programs (e.g. Ludwig-Mayerhofer et al., 2019; Rauner et al., 2010; Eichhorst et al., 2015). Successfully linking education and employment within TVET programs appears to contribute to better youth labor market outcomes (Bolli et al, 2018; Bolli, Egg, & Rageth, 2017). Common approaches to connecting education and employment include apprenticeship models (Wolter & Ryan, 2011), industry-school partnerships (Flynn, Pillay, & Watters, 2016) and more systemic public-private partnerships in developed (e.g. Pillay et al., 2017; Remington, 2018) and developing (e.g. Dundar et al., 2017; Kohli, Bandhopadhyay, & Kohli, 2015) contexts.

The variation in TVET institutions makes it difficult to compare their success at combining education and employment (Hadjivassiliou, 2017). However, Rageth and Renold (2019) use systems theory to formulate education-employment linkage, or power sharing between actors from the education and employment systems, measurable all points where actors from both systems come into contact. Linkage is highest when actors share decision power and low when actors from either side hold sway (Figure 1). This investigation takes a functional rather than institutional approach (Renold et al., 2019), making it applicable across contexts with different institutions carrying out equivalent functions. Bolli et al. (2018) demonstrate a measurement tool, called the KOF Education-Employment Linkage Index (KOF EELI), and show initial evidence that scores correlate to youth labor-market outcomes.

Existing studies on education-employment linkage focus on top performers among developed countries (Rageth & Renold, 2019; Bolli et al., 2018; Renold et al. 2016b). In this study, we apply the KOF EELI to four low- and middle-income developing countries: Benin, Chile, Costa Rica, and Nepal.¹ We investigate how these countries' largest upper-secondary TVET programs compare to international scores, and look for similarities and differences in the drivers of linkage. We expect that these countries' relatively weak TVET programs will have relatively low KOF EELI scores, and that the drivers of linkage may differ between low- and middle-income countries because of the differences in their education systems' development.

We find that Chile, Costa Rica, and Nepal have very low linkage, while Benin scores just above the international top-performers average. Benin's success appears to come from its strategy of bringing formal education into an existing employer-led program that exists in the informal labor market, while the other countries have to bring employers into education-led programs. Two patterns to increasing linkage emerge, Benin's education integration approach and the common employer integration approach. We discuss the institutional and economic conditions that may enable or require the different approaches.

Because TVET is a field of practice, this paper explicitly ties its results to their potential applications in ongoing TVET reforms in all four countries. Phipps et al. (2016) point out that knowledge is mobilized when researchers explicitly identify a pathway to impact in cooperation with practitioners. In their words, "research impact occurs when university researchers collaborate with non-academic partners who produce the products, policies, and services that have impacts on the lives of end beneficiaries" (Phipps et al., 2016, p.31). Therefore, we

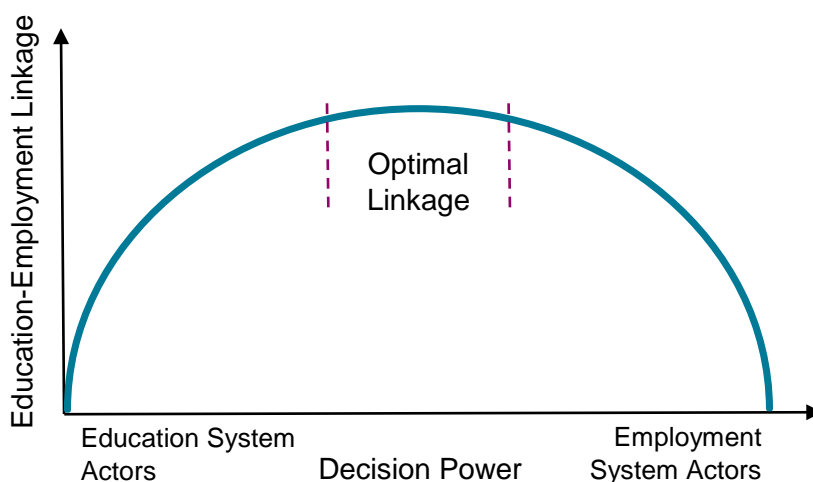
¹ In our selection of low- and middle-income countries, we followed the classification of a list provided by the OECD-DAC (http://www.oecd.org/dac/stats/documentupload/DAC_List_ODA_Recipients2014to2017_flows_En.pdf). Accordingly, Chile is classified as middle-income country, though other classifications may classify it as high-income country.

carried out focus groups with TVET experts and leaders in all four countries as part of an annual summer institute for disseminating research findings to practitioners. Those discussions focused on interpreting the results of this study in terms of existing reform efforts. Each country's reform leadership team revised its implementation plans to incorporate the findings of this study, creating a pathway to impact that should support better TVET and, consequently, better youth labor market outcomes.

2. Theoretical Foundations

We base this study on the theory of education-employment linkage (Rageth & Renold, 2019; Bolli et al., 2018). As summarized in Figure 1, linkage is highest when actors from the education and employment systems share power related to a given TVET program. Bolli et al., (2018) show that linkage is correlated with youth labor market outcomes, and Bolli, Egg, and Rageth (2017) show that TVET programs with at least 25% of students' time spent in workplace learning causally improve youth labor market outcomes, especially as relates to job quality, while those with less workplace learning do not.

Figure 1: Education-employment linkage as a function of power equilibrium



Source: Bolli et al., 2018

Rageth and Renold (2019) identify three ideal-type models for linkage in TVET programs. First, in high-linkage systems, power is generally shared. The other two models are low-linkage situations where one system has most or all of the power. When the education system has most of the power, employers have limited influence on curriculum content, program delivery, and curriculum updating. Programs like this are likely to be mismatched to labor market demand, expensive to operate, and outdated. In contrast, when the employment system has most of the power, educators have limited influence. Employer-dominated programs may lack general and transferable skills in the curriculum, may not include sufficient theoretical content along with the practical content, and may only be updated when one narrow job changes rather than to reflect changes on an occupational level (Renold et al., 2016).

The KOF EELI measures education-employment linkage in TVET programs. Renold et al. (2016) distinguish TVET pathways, programs, and curricula. The pathway is all TVET programs at all levels in an education and training system, for example an upper-secondary dual TVET program as well as multiple levels of postsecondary and tertiary professional education. A TVET program is part of the TVET pathway. Typically there is one program at each education level, though some jurisdictions have multiple TVET programs at a single level (Rageth & Renold, 2019). Within TVET programs are multiple curricula for the various

occupations available. The scope of occupational curricula varies greatly across countries—as an example, Finland’s largest upper-secondary TVET program offers 8 fields of study while Estonia’s offers 657 (Renold et al., 2016).

The KOF EELI does not measure everything about a given TVET program, only the aspects of the program that relate to education-employment linkage. These are formulated by searching along the curriculum value chain (Rageth & Renold, 2019) for every point at which actors from the two systems can come into contact or share power (Renold et al., 2016). The three phases of the curriculum value chain become the index’s three phases: curriculum design, curriculum application (program delivery), and curriculum updating. These form a cyclical process where updates feed back into the design phase.

In curriculum design, there are three main processes: designing the qualification standards, designing the format of examinations, and one called involvement quality that covers how actors from the employment system are able to access decision-making processes. In curriculum application, the processes are the learning place—classrooms or workplaces—regulations that govern workplace training if it exists, cost-sharing between the two systems, the provision of equipment, the provision of teachers, and the examination process itself. Provision of teachers, equipment, and financial resources are more important in programs that do not have workplace learning, because workplace learning substitutes for things like industry-experienced teachers and industry-standard equipment in classroom workshops (Bolli et al., 2018). Finally, in the curriculum updating phase, the two main processes are information gathering and update timing. Table 1 summarizes the main components of education-employment linkage as measured by the index.

Table 1: Components of education-employment linkage

Phases	Curriculum Design	Curriculum Application (Program Delivery)	Curriculum Updating
Processes	Qualification Standards	Learning Place	Information Gathering
		Workplace Training Regulation	
		Cost Sharing	
	Examination Design	Equipment Provision	Update Timing
		Teacher Provision	
	Involvement Quality	Examination	

Source: Bolli et al., 2018

The KOF EELI is made up of features that load into the processes, which themselves load into phases. As shown in Bolli et al. (2018), an empirically-derived weighting scheme is used to assign weights to each feature as it loads into a process, each process as it loads into a phase, and each phase as it loads into the total index score. All of the individual features are shown in Table 4 in the results section.

2.1 Developing Contexts

The KOF EELI was initially designed and tested in mostly developed countries (Renold et al., 2016). The index is functional rather than institutional, so in theory it is context-agnostic. However, one particular topic of importance in the developing context is the formality of both the TVET program and the labor market into which it feeds.

Formal, non-formal, and informal learning are differentiated by the method of learning, not by the level or type of knowledge acquired. However, definitions tend to be fluid and context-dependent (Carron & Carr-Hill, 1991; Eshach, 2007; DGIZ 2016). In general, formal education and training programs are part of the formal education system, guided by a curriculum, and recognized with a certification by the country's education authority. They have at least an enacted qualification standard and include mostly classroom learning, though they can simply be examinations. The certifications offered by formal education programs open up further education and training opportunities in the education and training system, making them attractive to students.

Non-formal education or training is a class or course, guided by a curriculum, but not part of the education system and not recognized by the education authority. Examples include language classes taken at the community center and many continuing education options. Finally, informal learning is also outside the education system but unplanned and unintentional—it is simply knowledge gained from experience. For example, someone who learns a language by talking to others is learning informally (DGIZ, 2016). Non-formal and informal education and training are still common and important means of acquiring knowledge and skills in developing contexts (Atchoarena & Delluc, 2002; Ahadzie, 2009; ILO, 2012). In this study, we focus on formal programs that are part of the education and training system, which we identify through case study research in each country.

Labor markets can also be formal and informal. The ILO (2002) defines the informal economy broadly, as “all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements” (p.25). According to the ILO (2017), “Informal economies... are typically characterized by a high incidence of poverty, inequality and vulnerability to decent work deficits.” At the same time, around 60% of the global workforce works in the informal sector (ILO, 2018). Moodie, Wheelahan, and Lavigne (2019) argue that there is a “substantial role of TVET in supporting workers in the informal economy to transition to formal employment” (p.6). In Chile and Costa Rica, the graduates of the formal programs we analyze typically go on to work in the formal labor market. In Benin and Nepal, however, graduates are likely to end up in the informal sector, mostly because 65-80% percent of the total workforce is in the informal sector in those countries (Medina, Jonelis, Cangul, 2016).

3. Method

We select the largest formal upper-secondary TVET program in three of the four target countries. These are Chile's *Enseñanza Media Técnica Profesional* (EMTP), Costa Rica's *Colegios Técnicos y Profesionales* (CTPs), and Nepal's Technical School Leaving Certificate (TSLC). In Benin, we chose the *Certificat de Qualification Professionnelle* (CQP), which is a dual TVET program. This program is not the largest upper-secondary TVET program—that is school-based TVET—but it is growing quickly. We selected CQP on the advice of our research partner in Benin to explore how it fares compared to benchmark countries as it grows.

We limit our selection to formal education programs, leaving out non-formal and informal models of training or apprenticeship. In Chile and Costa Rica, most actors from the employment system are formal. In Nepal, the actors from the employment system involved in TVET are also formal. In Benin, most of the employment-system actors involved in TVET are informal. Table 2 summarizes how the programs lie on the axes of education and employment formality.

Table 2: Selected programs by country and formality of education and employment partners

		Education		
		Informal	Non-Formal	Formal
Employment	Informal			Benin: CQP (Certificat de Qualification Professionnelle)
	Formal			Chile: EMTP (Enseñanza Media Técnica Profesional) Costa Rica: CTP (Colegios Técnicos y Profesionales) Nepal: TSLC (Technical School Leaving Certificate)

We collected data on two main aspects of the four TVET programs. First, we collected case studies of each program so we can describe them and frame the results in concrete practices. As part of an ongoing long-term research project², we partnered with in-country researchers in all four countries to carry out intensive literature reviews and, asset mapping of each country’s TVET pathway (Bankole et al., 2019; Camancho Calvo, Kemper & Maldonado-Mariscal, 2019; Peralta Rojas et al., 2019; Baral, Kemper, & Maldonado-Mariscal, 2019). We also performed statistical reviews on the education systems and specific TVET programs under investigation in this study. Country-specific partner researchers reviewed the summaries of each program as written.

Second, we sent an online survey measuring the KOF EELI to TVET experts from the education, employment, and research sectors in each country. This particular survey is long and complex, so we focused on respondent quality rather than quantity. We worked with in-country experts to select the right respondents, and used offline surveys and in-person interview-style surveys to reach experts without internet access. Table 3 summarizes response numbers and rates by country and group. The overall response rate is 62%, or 71% for government/education respondents, 60% for industry/employment respondents, and 50% for research respondents. Costa Rica has the highest response rate at 80%, followed by Benin (76%, many in-person surveys required), Nepal (55%), and Chile (38%). In terms of absolute numbers, responses range from 27-55 individuals.

Table 3: Response rates by country and respondent type

Country	Response Rate (N Respond / N Sample)		Respondent Type (%)		
			Government (Education)	Industry (Employment)	Research
Benin	76%	39 / 51	85%	67%	57%
Chile	38%	26 / 69	56%	25%	34%
Costa Rica	80%	55 / 69	85%	79%	74%
Nepal	55%	27 / 49	57%	64%	43%
Total	62%	147 / 238	71%	60%	50%

For analysis, we follow Bolli et al. (2018) and use the same analysis procedure to ensure comparability across countries. We also use the weighting scheme established by Bolli et al. (2018) for KOF EELI features, processes, and phases. To include all countries that have been measured to date, we update averages to include the four new countries as well as the American state of Colorado (Renold et al., 2016b).

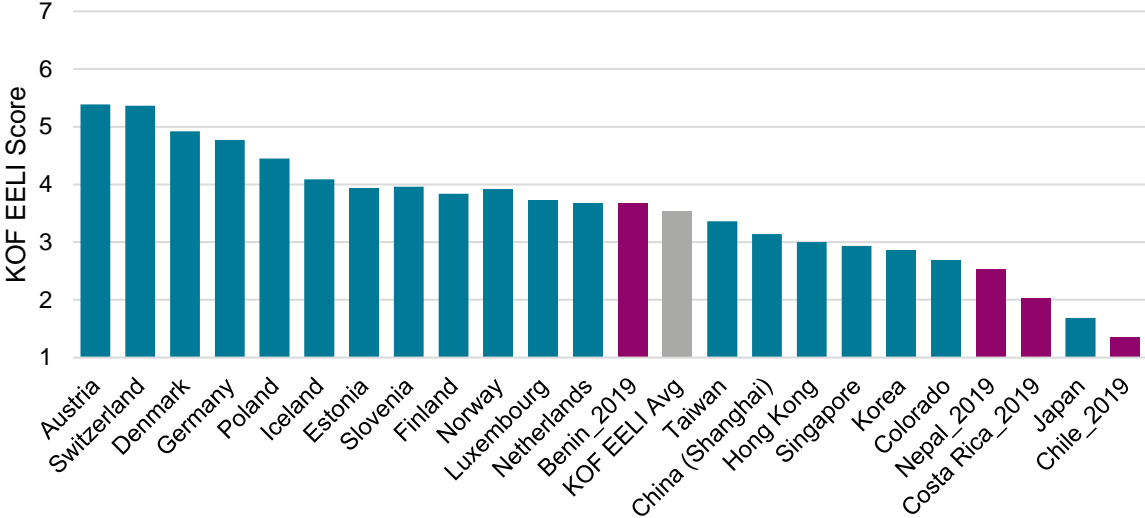
² This project is part of an ongoing SNSF-funded *Research for Development* project. See <https://r4d.tvet4income.ethz.ch/> for more information

Focus groups complement our data and validate the results. The focus groups are part of an annual summer institute for TVET reform leaders³, to which all four participating countries have sent representatives since 2017. Reform leaders are government, industry, and research leaders focused on the TVET field. Benin’s team of three included on leading TVET researcher, one representative from the Ministry of Secondary Education, Technology, and Vocational Training, and one representative from the umbrella association for all formal employers. Chile’s 2019 team included a member of the country’s TVET Council, two leading international employers, and a representative from the country’s main industry association. From Costa Rica, one representative from the Ministry of Public Education and one from the main employer’s association. Finally, Nepal’s delegation was representatives from three major employers’ associations and from the apex body governing TVET.

4. Results

Figure 2 shows the overall index scores for the four countries we study in comparison to all countries studied using KOF EELI thus far (Renold et al., 2016; Renold et al., 2018). All items, and the total index, are scored on the same one-to-seven-point scale. The KOF EELI measures how much power education-system actors give over to employment-system actors in a formal education program, so a score of one out of seven represents total power for the education system, and a seven is somewhere between equal power and more power for employers. Higher scores do not indicate total employer control, rather they indicate balanced power between education-system actors and employment-system actors, possibly with more employer power in the very highest scores.

Figure 2: Results in international context



Source: Own depiction.

Chile and Costa Rica, the middle-income countries, score low relative to the field at 1.4 and 2.0, respectively, on a one-to-seven-point scale. Nepal scores slightly higher at 2.5, and Benin scores the highest of these countries and the only one above the overall average, at 3.7.

Before delving into the details of the scores’ components, we briefly summarize each selected program for context. For space reasons and because it is not the main focus of this paper, we do not share the full detailed description of each program here. However, in order to facilitate discussion and understanding, we provide a brief summary of each program in this section.

³ The CEMETS summer institute, more information here: www.cemets.ethz.ch.

Program summaries are based on the case studies collected with in-country researchers for Benin (Bankole et al., 2019), Chile (Peralta Rojas et al., 2019), Costa Rica (Camancho Calvo, Kemper & Maldonado-Mariscal, 2019) and Nepal (Baral, Kemper, & Maldonado-Mariscal, 2019). We also rely on KOF Education Systems Factbooks⁴ and data from international organizations like the World Bank and OECD. These summaries include a very short context overview, a description of the education system in general, and the general framework of the selected program in particular. We also discuss the governance and funding of the selected program.

4.1 Benin: CQP Program

Benin is a West African country of 11.5 million people, with 114,763 square kilometers divided into 12 Departments. Agriculture is the country's main source of employment (32.2%), and the country is generally young with youth ages 10-24 years accounting for 32% of the total population. The informal sector is the main source of employment, accounting for 65% of total employment (Medina, Jonelis, Cangul, 2016). Vulnerable employment is also a key issue at 87.7% of employment.

The education system in Benin is subdivided into pre-primary education from age 2.5 to 5 years and primary education from 6-12 years. After primary education, students can pursue general secondary schooling from ages 12-18. Formal secondary education includes general and technical programs, with the general route comprising a four-year lower secondary program then three-year upper secondary program, and the technical route comprising two three-year programs for lower and upper secondary education. After either secondary education route, students are eligible for university (KOF, 2017).

Benin adopted a new Education Act in 2003 (modified 2005), which sets two main priorities. First, every child in Benin should complete primary education. Second, the majority pathway should be TVET. Education attainment is currently low, with 85% of boys and 81% of girls starting primary, and 69% and 57% finishing primary education. Many students do not enter secondary education, with 62% of boys and 49% of girls starting, then 39% of boys and 23% of girls finish secondary education. Only 15% of boys and 6% of girls attain tertiary education.

Alongside the formal education system, primary school completers can attend a three-year dual apprenticeship (CQP program). Primary non-completers can access the CQP through a remedial apprenticeship of three to five years. The CQP is a new program established as part of recent reform efforts with the mission of adding an education component to traditional apprenticeships. Approximately 3,500 students are enrolled in CQP (KOF, 2017), compared to a total secondary-level cohort of 896,800, of which 29,300 are enrolled in TVET. Informal-sector training accounts for about 200,000 individuals annually. Therefore, although small, CQP is already approximately 9% of total TVET enrollment.

CQP is available in 13 artisan occupations, and lasts for 3 years. Students spend one day a week in the classroom, and four or five in their workplaces. Students must have apprenticeship contracts with their master artisans. CQP entrants must have an apprenticeship contract, be at least 14 years old, complete at least the fifth year of primary school, pass an entry test, and be literate in French. The program is regularly oversubscribed, with more applicants than places. Currently, there is no formal education or training progression route for CQP graduates.

⁴ https://kof.ethz.ch/en/publications/Factbooks_Edu_Sys.html

The main actors involved in the CQP program are the government, private sector, training providers, and donors. The government's main actors are the Ministry of Secondary School and TVET (MESTFP) and Ministry of Labor, plus sector-specific ministries when relevant. Representation from the private sector in the form of the National Union of Chambers (UCIMB), and Benin National Confederation of Artisans (CNAB). Training providers include public and private vocational training centers, as well as artisans in informal-sector workshops. Finally, foreign donors are involved in funding, supporting, and developing the program.

Financing for CQP comes from three main sources: the government, donors, and trainees (5-10% of total costs). The Fund for the Development of Continuing Vocational Training and Learning (FODEFCA) provides scholarships to students.

4.2 Chile: EMTP Program

Chile is an emerging market located in South America with a population of 17.6 million people and a total land area of 756,096 square kilometers. Its largest employment sector is the service sector, which accounts for 69.2% of total employment. The country has begun to prioritize TVET, with a 2018 National TVET Strategy⁵ at the forefront. The strategy brings TVET back into the national public policy discussion, recognizes the demand for TVET from students and the private sector, and calls for the development of a TVET system in Chile.

The Chilean education system begins with up to five years of non-compulsory pre-primary education, then compulsory primary from ages six to 13, divided into four-year cycles. Secondary education is also compulsory, running from ages 14-18 in two two-year cycles. In the second cycle, students can choose between a general curriculum leading to tertiary education, or vocational education (EMTP), which can also lead to university. Postsecondary education is carried out by universities, professional institutes, or technical training centers.

Among all upper-secondary students, 40-45% choose EMTP. It is school-based, with curricula for 15 sectors and 35 specialties. The program lasts two years, students spend roughly 10% of their time in the workplace, and approximately half of program content is occupation-specific. EMTP students must have completed primary school, and are usually 16-18 years old with some older students due to repetition. EMTP graduates can progress throughout the education and training system post-graduation (KOF, 2015).

EMTP is state-funded, with municipal and voucher schools receiving per-capita subsidies with adjustments for certain specialties and student characteristics.

4.3 Costa Rica: CTPs

Costa Rica is a Central American emerging market, with a population of 4.8 million and 51,100 square kilometers of land area. The service sector is its major employer, accounting for 66.9% of employment (KOF, 2015b). However, youth unemployment is relatively high at 21% (World Bank, 2018).

The Costa Rican education system consists of pre-primary education (age 5-6), primary education (6-12), lower secondary education (12-15), diversified education (15-18), then postsecondary or higher education. Pre-primary, primary, and lower secondary education are

⁵ <http://www.tvetchile.org/wp-content/uploads/2018/03/Estrategia-Nacional-de-Formaci%C3%B3n-T%C3%A9cnico-Profesional-febrero-2018.pdf>

compulsory. Diversified education lasts 2-3 years and consists of three branches: academic, technical, and artistic.

The technical branch, accounts for 19% of all upper-secondary enrollment and is Costa Rica's main formal TVET program. It comprises 56 specialties and lasts 3 years. It is fully school-based, taking place mainly in technical colleges, the CTPs. Students have a required practice period before graduation, accounting for 11% of the total program duration. In addition, some colleges or specializations require internships, but those are usually very limited. The program is entirely occupation-specific. Every CTP has its own entry requirements, including completion of basic education and ninth grade. From the CTPs, students can pursue postsecondary TVET or attend non-formal TVET programs at various levels through the National Institute for Apprenticeships.

CTPs are governed and financed primarily by the Ministry of Public Education. Under the Ministry, the Directorate of Technical Education and Entrepreneurial Skills is responsible for professional technical education and diversified technical education. Higher education institutions consult on curriculum and standards, as do advisory bodies that represent the education, trade union, and employment sectors.

4.4 Nepal: TSLC Program

Nepal promulgated a new constitution in 2015 that affects its fundamental governance structure, adding a province level between local and central governments and reallocating power to form a federalized rather than centralized government. The education system, like every other system, is undergoing a dramatic change (Renold & Caves, 2017). The Asian country of nearly 29 million people and 147,181 square kilometers has a large informal employment sector, comparable to Benin.

Nepal's education system is expected to undergo dramatic change with the passage of a new Education Act in 2020 that will implement a new National Qualifications Framework. At present, the system includes preprimary education starting at age three or four, then primary education from five to nine years of age. Lower secondary education lasts from ages 10-12, followed by upper secondary at ages 13-14 (KOF, 2015c).

At the end of upper secondary, students choose between the general School Leaving Certificate (SLC) pathway or the Technical School Leaving Certificate (TSLC), a 2-year TVET program. Those with the SLC can go on to pre-tertiary education, then potentially tertiary education. The level of compulsory schools is in flux, having transitioned very quickly from none to third, fifth, and possibly even eighth grades. The new Education Act should clarify that issue.

The TSLC usually lasts two years and leads to a technical diploma, but specific programs vary greatly. For example, another way to earn the TSLC is to complete the SLC and then a short-cycle version of the TSLC. TSLC represents about 25% of total upper secondary enrollment, and offers 24 occupational qualifications. Curricula are about 80% occupation-specific. The program is generally school-based, with some workplace learning near the end of the program for a total of 15-20% workplace time. After the program, graduates can go on to three-year diploma courses in certain professional fields like agriculture, engineering, healthcare, and tourism.

The Council for Technical Education and Vocational Training (CTEVT) is the government's apex body for all TVET programs. CTEVT controls program design, implementation, and

quality. However, 14 ministries are involved in TVET, including the Ministries of Education, Labor, Agriculture, and others. CTEVT has some employer advisors in its administration. Technical schools and on-the-job training providers also play a role in the system.

Financing for TSLC comes mainly from the state, but also from pupils' tuition fees and industry itself. Public technical institutions and public schools offering TVET are funded through the government budget, but private training providers typically rely on student fees. TSLC programs can have considerably different training costs across institutions, both in terms of gross costs and costs to the student.

4.5 Cross-Country Comparison

Table 4 shows all four countries' scores for each feature, process, and phase of education-employment linkage, as well as the weights for each and the overall average. Benin has the highest score, with most of that strength coming from the application phase (4.2) and design phase (3.6), followed by the updating phase (3.0). Benin's score in the design phase matches the KOF EELI average and its design-phase score is higher, making it the only country studied here to have any score at or above that benchmark. Benin's high score in the application phase is mainly driven by its high score in the learning place process (5.3),

Chile's lowest-scoring phase is design at 1.0, followed by updating at 1.3 and application at 1.8. All of these scores indicate that employers have almost no power over VET, and the score in the design phase indicates that curriculum development is completely an education-system action with no decision power for employers at all. The design phase has the greatest weight of all three phases at 41.9%, so this is particularly important.

Costa Rica's lowest score comes from the updating phase at 1.6, followed by design at 2.0 and application at 2.4. Although employers have some small role in curriculum design, there is almost no role for them in updating the VET curriculum. This makes it unlikely that the program will stay up to date, jeopardizing graduates' transitions to the labor market.

In Nepal, the lowest phase score is curriculum updating at 1.5 followed by design at 2.6 and application at 3.1. Employers have a stronger role in Nepal than the two middle-income countries, but are still relatively weak.

Figure 3 shows the process level. Benin is the highest in all design-phase processes, and Chile is the lowest. The most important process in the design phase is setting qualification standards (15.8% of total weight). There, Chile scores a no-linkage 1.0 because curricula are completely determined by education-system actors. Although the qualification-standards-setting process is controlled by the ministry of education in Costa Rica and Nepal, both score slightly better because both leading TVET governance organizations have employer advisors. Benin's qualification standards are set more collaboratively because the CQP is a formalization of existing traditional apprenticeships. As the program scales up, changes may be interesting.

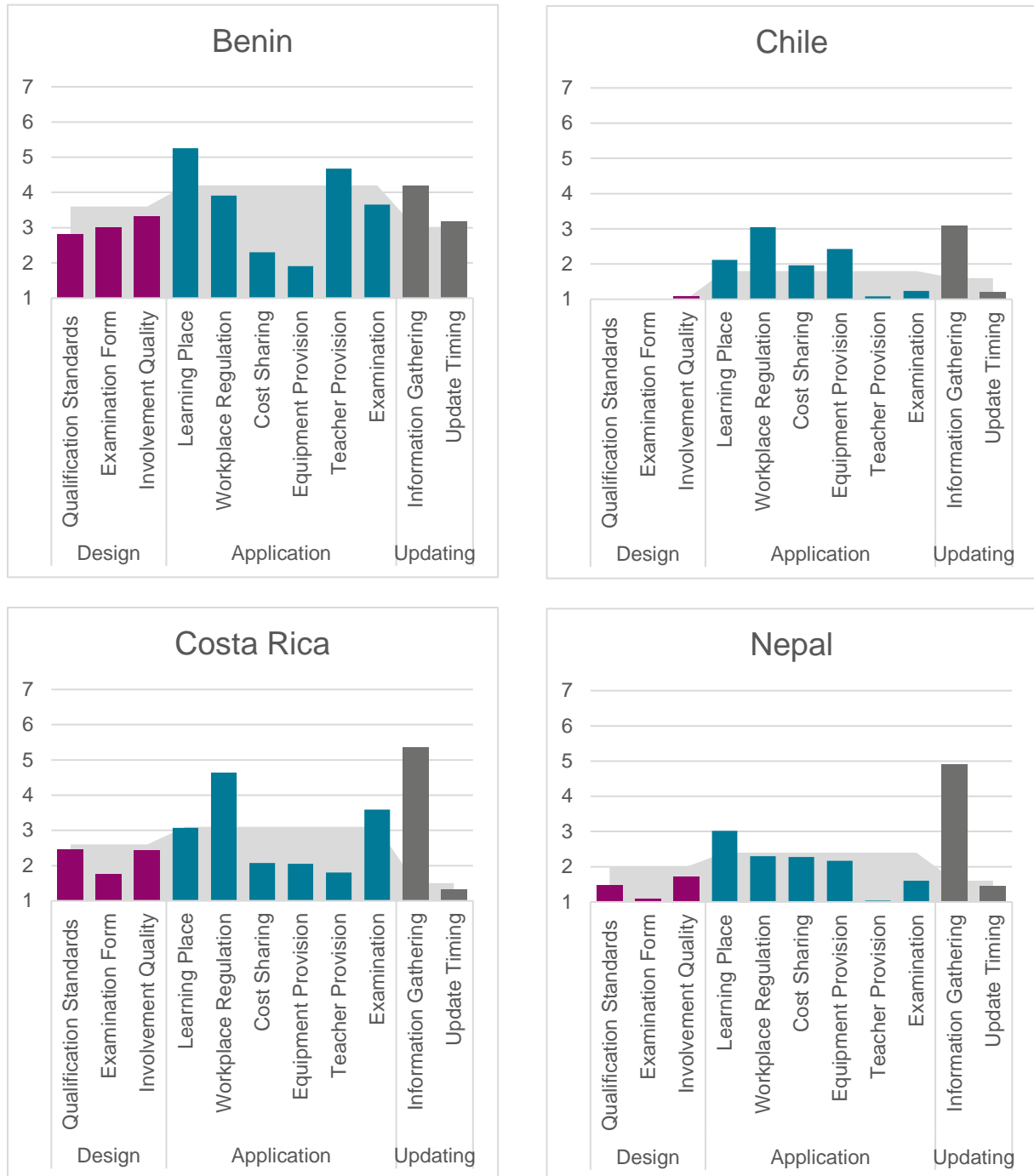
In the curriculum application phase, the most important process is the learning place (13.2%). Chile, Nepal, and Costa Rica all score near 3.0 because all programs are school-based with some minor practical-experience requirements. Benin scores very high (5.3) because its program is dual work and school-based. When TVET programs are school-based, workplace regulations are less important while cost-sharing, equipment provision, and teacher provision are more important. However, workplace regulations are strong in Costa Rica and Chile's highest scores, and both school-based programs score low in the other processes. With very limited workplace training, regulations only reduce already-low linkage even further.

Table 4: Results for index, dimension, process, and feature including weighting scheme

Index	Weight*			KOF EELI scores**				
	Phase	Process	Feature	Benin	Chile	Costa Rica	Nepal	EELI Average
Overall Index				3.7	1.4	2.0	2.5	3.5
Design	41.9			3.6	1.0	2.0	2.6	3.6
Qualification Standards		15.8		2.8	1.0	1.5	2.5	3.1
Standards: Involvement			15.8	3.1	1.0	1.7	2.4	3.3
Standards: Decision Power			0	2.5	1.0	1.3	2.5	2.9
Examination Design		11.8		3.0	1.0	1.1	1.8	2.8
Examination: Involvement			11.8	3.2	1.0	1.1	1.9	3.0
Examination: Decision Power			0	2.9	1.0	1.1	1.7	2.7
Involvement Quality		14.3		3.3	1.1	1.7	2.4	4.4
Career vs Occupation vs Job			0	1.0	1.2	1.0	1.0	4.7
Firms vs Employer Associations			4	4.4		5.8	5.1	5.0
Represented Firm Share			0.1	3.7	1.0	1.8	2.8	4.5
Legal Def. of Involvement			10.2	4.4	1.0	1.9	2.8	4.2
Application	34.4			4.2	1.8	2.4	3.1	3.4
Learning Place		13.2		5.3	2.1	3.0	3.1	3.5
Classroom vs Workplace Share			13.2	5.0	1.8	2.6	3.1	3.2
Legal Def. of Share			0	5.8	4.3	3.8	3.8	4.2
Site Visits				1.5	1.8	2.3	1.8	1.8
Counselling				1.5	1.4	1.8	1.5	1.7
Workplace Training Regulation		8.6		3.9	3.3	2.3	4.6	4.5
Work Contract			1.7	4.1	3.6	2.5	5.0	5.3
Curriculum: Existence			0	3.2	4.4	2.8	6.3	5.8
Curriculum: Implementation			6.9	3.5	2.9	4.0	4.4	5.0
Trainer: Existence			0	4.2	2.7	1.3	5.2	4.7
Trainer: Number			0	4.6	7.0	1.0	5.4	3.8
Trainer: Training			0	6.1	7.0	7.0	4.5	5.3
Trainer: Continuous Training			0	6.1	1.0	7.0	3.5	3.4
Cost Sharing		1.5		2.3	1.9	2.3	2.1	2.6
Classroom Education Costs			1.5	1.9	1.4	1.2	1.7	1.4
Workplace Training Costs			0	2.7	4.0	3.7	2.5	4.2
Equipment Provision		0		1.9	2.4	2.2	2.1	3.0
Equipment Provision			0	1.8	1.9	1.8	1.9	2.3
Equipment Quality			0	4.7	4.3	4.6	4.2	5.5
Teacher Provision		3.2		4.7	1.1	1.0	1.8	2.0
Teacher Provision			3.2	2.8	1.1	1.1	1.6	1.6
Teacher Training			0	7.0		1.0	3.6	3.5
Continuous Training			0	6.8		1.0	3.6	3.2
Examination		8		3.7	1.2	1.6	3.6	3.2
Practical Share of Examination			0	5.2	1.6	2.0	4.1	3.9
Examination: Location			0.3	1.9	1.0	1.8	3.6	2.4
Examination: External Supervision			0			0.0	7.0	5.9
Examination: Employer Expert			7.7	4.0	1.0	1.3	2.4	3.5
Updating	23.7			3.0	1.3	1.6	1.5	3.5
Information Gathering		1.2		4.2	3.2	4.9	5.4	5.7
Employer Surveys			0.7	4.6	3.2	5.3	5.4	5.5
Labor Force Surveys			0.5	3.9	3.2	4.7	5.1	5.8
Update Timing		22.5		3.2	1.2	1.4	1.3	3.0
Update Involvement			15.7	2.6	1.2	1.4	1.3	2.7
Legal Def. Update Involvement			6.7	3.7	1.1	1.4	1.3	3.1

Notes: *Features weights are shown as percentages. **KOF EELI scores are shown on a 1-to-7-point scale.

Figure 3: Process-level results by country



Notes: Higher scores represent more employer power. Shaded grey fields represent phase-level averages. Columns in pink represent design-phase processes, in teal the application phase, and updating in dark grey.

Finally, the most important process of the updating phase is that employers have a say in update timing (22.5%). In Chile, Costa Rica, and Nepal, this score is very low. In Benin, update timing scores 3.2, meaning employers do have some formal say in when curricula need to be updated. Although information gathering is not very important (1.2%), all four countries have high or relatively high scores for that process. In fact, information gathering is the highest-scoring process in Chile, Costa Rica, and Nepal. Only in Benin is it not the highest score, sitting behind learning place and teacher provision in the application phase.

4.6 Focus Group Discussions

The KOF EELI can be very useful for reform leaders as well as interesting for researchers. It creates a scoreboard of countries, which always stimulates some reaction among stakeholders. More importantly, it gives a detailed analysis of how specific characteristics of a TVET program relate to each other, the index, and benchmark countries. Finally, because the index has empirically derived weights for each feature, process, and dimensions (Bolli et al., 2018), it can be used to prioritize the more heavily weighted items over those with little or no importance. Overall, the information contained in KOF EELI results can help practitioners develop strategic roadmaps for improving TVET programs' education-employment linkage. Because linkage is tied to youth labor market outcomes (Bolli et al., 2018), these roadmaps have substantive importance.

The summer institute is a reform laboratory that combines TVET theory, existing research, practical input, and country-specific results like the ones presented here to support countries as they improve their education systems. During the institute, we held focus group discussions with all four countries' teams to discuss the results and apply them to each team's existing reform strategies and implementation plans. We follow Phipps et al.'s (2016) knowledge mobilization logic model, which rejects the traditional activity>output>outcome>impact model, instead following the path of research>dissemination>uptake>implementation>impact. The focus groups' purpose is to address the dissemination, uptake, and implementation phases of that model.

Benin's reform team took note of the CQP's KOF EELI results, which are slightly above the other partner countries. Their overall goal is to expand the program to more occupations and larger enrollment so that it becomes the mainstream TVET program. However, this is only possible if the master artisans who provide the training in informal workshops can earn similar certificates to their apprentices. For Benin, recognition of prior learning procedures that strengthen the position of employer trainers are a pre-condition for program expansion.

Chile's reform team 2019 had strong industry leadership with representatives from the Confederation of Production and Commerce (CPC) and from Nestlé Chile. The KOF EELI results reinforced their convictions that employers' role in TVET is not sufficient for strong linkage. The Chile leadership team developed a strategy to strengthen employers' role in TVET by bringing existing initiatives together instead of allowing them to operate alone, calling for greater employer power in the form of workplace learning, qualification standards design, and legal decision power over standards and updating.

Costa Rica's 2019 team was also unsurprised by the low KOF EELI score earned by CTPs. They decided that, without stronger commitment of the industry, there is no way for the Ministry of Public Education to improve outcomes alone. Their implementation focuses on aligning all of the main TVET partners under one strategy, and de-prioritizing efforts to improve TVET that do not include employers.

Nepal's reform team 2019 were mainly representative from industry. Their aim is to develop an industry strategy for TVET that allows them to speak with one voice and gain influence throughout the curriculum value chain. The leadership team had already developed a list of employers' offers and demands related to TVET, and used the KOF EELI results to prioritize the most important aspects of increasing linkage and program quality.

5. Discussion

Two clear patterns emerge in these results. Benin, with its dual TVET program, has relatively high scores, especially in important processes. In Chile, Costa Rica, and Nepal, the TVET programs are school-based and the more important processes have low scores while higher scores come from less-important processes like information gathering and workplace training regulation—especially unimportant given the dearth of workplace training. As a result, Benin has high education-employment linkage while the other three countries have very low linkage.

To understand the origin of all four countries' KOF EELI scores and to explore linkage in the four programs, this section examines respondents' subjective assessments on linkage and discusses the possible institutional differences that may lead to the differences in programs' linkage levels.

5.1 Subjective Assessment of Linkage

One limitation of the KOF EELI is that, because it measures linkage in formal TVET programs, it assumes education power and increases linkage as it observes power given to employers. Therefore, it mostly measures the left half of the arch that describes linkage theory—the half where educators have more power. In addition, the point of optimum linkage is theoretically near the point of equal power sharing between education- and employment-system actors, but the optimum itself is unknown. Therefore, the maximum index score is likely to be past the midpoint, lying somewhere on the downslope of the linkage curve toward employment. As a result, it is difficult to tell whether higher index scores pull towards education-system actors or—at the same vertical level but on the opposite side of the curve—toward employment-system actors.

To address the possibility that Benin's CQP program is employer-dominated rather than education-dominated, we can examine an additional data point. In addition to collecting data on the features of linkage that are aggregated into the KOF EELI's processes and dimensions, the KOF EELI survey asks subjectively how much power the education and employment systems have over each phase of curriculum design, application, and updating. We can construct a subjective index score by computing a weighted average of these dimension scores. Table 5 compares the KOF EELI to subjective dimension and overall index scores.

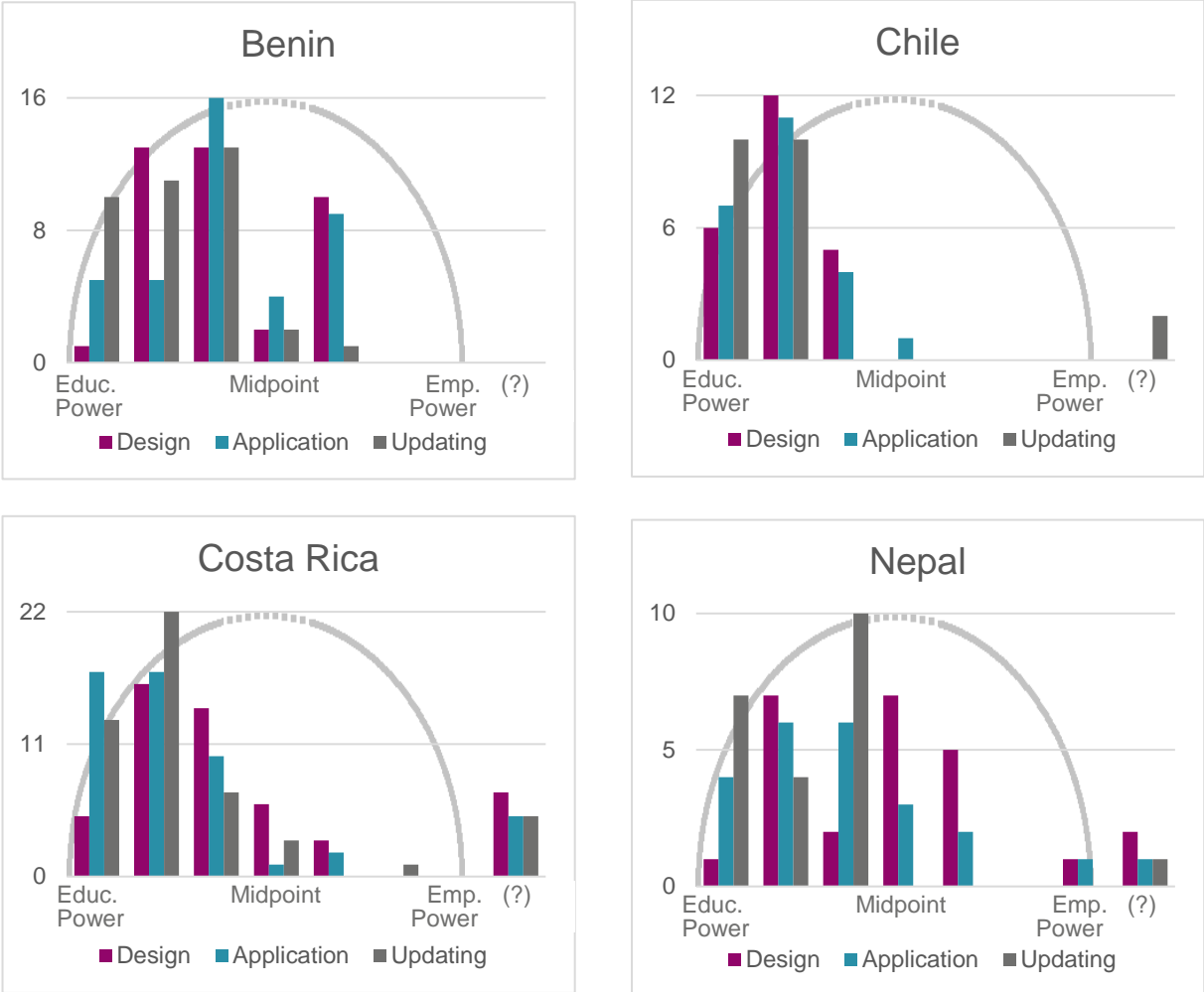
Table 5: KOF EELI dimensions and scores compared to subjective dimensions and scores

Country	KOF EELI				Subjective Scores			
	Index	Design	Application	Updating	Overall	Design	Application	Updating
Benin	3.7	3.6	4.2	3	3.0	3.2	3.2	2.3
Chile	1.4	1	1.8	1.3	1.8	2.0	2.0	1.5
Costa Rica	2	2	2.4	1.6	2.3	2.7	2.0	2.1
Nepal	2.5	2.6	3.1	1.5	3.0	3.5	2.9	2.1

For the subjective scores, a score of seven indicates the far right of the linkage curve—full power for employment-system actors. A score of four is the midpoint, where respondents claim that education- and employment-system actors have equal power. In both subjective and standard KOF EELI scores, a score of one indicates complete power for education-system actors. The subjective and standard scores are quite close, all within one point and usually much closer. This reinforces both scores, indicating that they are both measuring some signal despite the noise of measurement error in both.

To examine the subjective responses more closely, Figure 4 shows histograms of phase-level subjective responses by country. As usual, education power is on the left, employer power is on the right, and shared power is in the middle. The bars show the distribution of responses. As demonstrated by the figure, none of the programs evaluated here are employer-dominated. Like other formal TVET programs, the power balance of these programs skews toward education-system actors to varying degrees.

Figure 4: Subjective linkage by phase and country



Notes: Figures are histograms of subjective linkage by phase. Responses range from “They [employers] have no power” on the left to “They [educators and employers] share power equally” at the midpoint and “They [employers] have all power” on the right, with the (?) showing “I don’t know” responses. The curve behind each histogram represents linkage theory, with higher linkage at the midpoint, or power sharing. The top of the curve is a dotted line because it is not clear where the optimum lies.

Chile and Costa Rica show the same pattern for their school-based TVET programs, such that most—but not quite all—of the decision-making power over these two programs lies with education-system actors. These are both established school-based programs, which accounts for both the education-heavy power balance and general agreement among respondents. Benin and Nepal show wider distributions of power-balance assessments, with Benin’s mostly concentrated just to the education side of the midpoint and Nepal’s more diffused.

Nepal’s TSLC program is well established, but its duration, delivery method, and actor engagement varies across industries and occupations. Nepal is the only country where respondents report employers having all power in any phase, but in both cases it is an employment-system actor reporting that employers have all power in either design or

application, but no power in the other two phases. These reports of employers' power in one area and powerlessness in the others may reflect within-program differences, political considerations, or frustration with low linkage in some areas.

It is somewhat surprising to see Benin's CQP program reported to have mainly education-system actors holding power. The program grows out of traditional apprenticeships, where employers have complete control, and is not very old. Further research should investigate how new occupations' linkage changes as they transition from traditional apprenticeship to CQP, and whether there is an oscillation-then-stabilization effect, a rapid switch from employer- to educator power, or some other phenomenon. However, Benin's CQP has the highest linkage overall and the most subjective responses indicating employer power, regardless of being more education-driven than expected.

One key question is how Benin came to have the highest linkage, despite an earlier development stage than Chile and Costa Rica and a small formal employment sector, and why Nepal is not more similar with its similar development and economic status.

5.2 Factors leading to higher linkage

Benin's CQP program is a case of moving from the employer-power side of education-employment linkage toward power-sharing, instead of the usual case of an education program moving toward linkage by bringing employers into the program. This creates a novel situation in education-employment linkage research where the development of the program has relied on education integration rather than employer integration. When it is possible, education integration into existing employer-driven programs may be a faster path to high-linkage TVET programs than employer integration into education-driven programs because employers' demand for training makes them more willing to change than educators, from whom training is being demanded.

Benin's large informal economy and low rate of formal education and training may be a factor in its ability to convert an employer-driven program into a high-linkage program. Because they have smaller informal economies, Chile and Costa Rica do not have as much traditional or non-formal apprenticeship and may have more demand for formal education and training from formal-sector employers. With more students enrolled in formal education and training, the middle-income countries also have less demand from students and employers for non-formal training, especially at the upper-secondary level. However, Nepal and Benin share the general characteristic of large informal economies and relatively low formal education and training rates, but have different linkage levels in their TVET programs. There must be more factors at play.

Nepal's formal TVET sector has a long history, especially compared to Benin's relatively newer focus on that sector. TVET in Nepal began with donor programs in the 1980s⁶, and has undergone various reforms, expansions, and reformulations since that time. However, despite increases in the rates of formal primary and secondary education attainment, there are diminishing increases in wage employment (Bolli, Parajuli, & Renold, 2019). This suggests that workers in the informal economy have education and training credentials from formal programs. The combination of a longstanding—if somewhat weak—TVET sector and demand for formal education and training by the informal economy indicates that there may be less demand from employers to develop formal training programs. In that case, the opportunity for converting employer-led programs to high-linkage programs may not be present.

⁶ <http://ctevt.org.np/page.php?pagecat=7>

Benin's education integration approach may be possible when a country has a large informal economy, low formal education and training rate and—unlike Nepal—high demand from employers for increased or improved formal education and training. With those three ingredients—informal economy, low formal education and training rate, and demand from employers—the most expedient approach to high-linkage TVET programs appears to be education integration, rather than the supply-driven and more institutionally delicate introduction of employer power into education-controlled spaces. However, this is not to say that the process of formalizing CQP in Benin has been easy or problem-free. The process is still underway, has already dealt with major challenges, and will likely face more before CQP is an established mainstream TVET program.

6. Conclusions

These results confirm our hypothesis that education-employment linkage is weaker overall in our sample of developing countries than it is in the sample of top performers. However, the lower scores are not driven by income level. The middle-income countries have the weakest linkage, with the low-income countries faring better. Benin especially scores well, above the overall average.

One possible explanation Benin's success lies in the development of its CQP program from traditional employer-led apprenticeships into a high-linkage formal TVET program. This is the reverse of the education-to-employment trajectory that we typically observe and that the other programs follow. This seems to be possible in contexts with larger informal labor markets, low enrollment in formal education and training at the upper secondary level, and high demand for more training from employers. Nepal has a relatively low enrollment rate in education and training and a large informal economy, its long history of formal, school-based TVET may reduce employer demand for new and improved education and training. For Chile and Costa Rica, more formal economies and high enrollment in formal education and training mean that those countries, like Nepal, need to integrate employers into their existing school-based education programs to achieve linkage.

Education-employment linkage in TVET programs appears to be linked to better youth labor market outcomes and school-to-work transitions. In most countries where education-employment linkage has been measured, the education system has most of the power and moving towards optimal linkage means giving employers more power. However, these results demonstrate an alternative where move instead goes from employment-system power towards including education-system actors to meet the demand for quality education and training.

Developing countries that do not have strong TVET systems but do have strong demand for training from employers may be able to “skip ahead” by formalizing traditional non-formal apprenticeships into TVET programs. Those with established education systems may have to work harder to re-establish links to the employment system in TVET because young people are already enrolled in formal programs and employers expect education to provide skills they consume through the labor market. When possible, the education-integration approach to increasing linkage by targeting employer-led programs is a major opportunity for low-income countries with large informal economies, low formal education and training rates, and demand for education and training among employers.

6.1 Limitations and Outlook

This study examines one TVET program in each country, not their education and training systems as a whole. We summarize the context and the system in each case, but do so very

briefly. We also do not go into detail on the specific actors and institutions involved in each program. Doing so in depth and fully exploring the origins of the linkage scores reported here is an important task for future case-based research.

Our sample is carefully targeted, selected with in-country experts, and has exceptionally high response rates thanks to embedded advocates and in-person survey methods when necessary. However, the sample of KOF EELI studies is always necessarily small, because there are not many TVET experts in any country that understand the system and the program well enough to respond to the survey. Therefore, results may be biased due to expert selection, non-response among the small fraction that did not answer the survey, and expert-level rather than ground-level perspectives.

Although the KOF EELI allows us to closely examine the functions, processes, and dimensions of linkage, it does not assess the specific institutions involved in TVET. One crucial actor that may explain Benin's success at turning demand for training into a successful program is the industry association. Benin's existing informal apprenticeships already had an ecosystem that included informal industry associations for each occupation, ensuring some degree of consistency and quality in training regardless of formality. Without those associations, or when government institutions crowd out industry institutions by attempting to carry out their functions, it may be much more difficult to build a high-linkage TVET program. This institutional point of view may explain linkage differences across countries, but institutions are much more difficult to assess than equivalent functions. Future research is necessary to understand the institutions of TVET across contexts (Renold et.al, 2019).

The KOF EELI is a snapshot and describes the state of cooperation at the time of measurement. Therefore, it serves only as a diagnostic tool for reform leaders in order to obtain more effective clues as to which measures can be initiated in an evidence-based and targeted manner. Because any good reform plan is only effective if it succeeds in permanently installing social institutions, more research is necessary.

For the development of all four countries' TVET sectors, each already has TVET reforms underway with specific goals for improving TVET. In Benin, the team is working on ensuring equal opportunity in the CQP program, especially through recognition of prior learning mechanisms for master trainers in informal workshops. Without these, the program may be unable to continue growing due to political opposition. Chile's TVET sector is beginning to align strongly on a strategy of industry alignment, led by its main industry association and strong employer leaders. Costa Rica is in the process of developing a TVET strategy that creates a role for industry and a way for industry to commit and speak with one voice. Finally, Nepal's industry-heavy team developed an industry strategy for TVET to influence upcoming major legislation and create a role for employers in the TVET sector.

These improvements to linkage should improve the programs' effectiveness at promoting good youth labor market outcomes. Future research is needed to monitor and continually support knowledge mobilization through uptake and utilization to implementation and impact.

References

- Ahadzie, W. (2009). The traditional informal apprenticeship system of West Africa as preparation for work. In *International Handbook of Education for the Changing World of Work* (pp. 261-275). Springer Netherlands.
- Atchoarena, D., & Delluc, A. (2002). *Revisiting Technical and Vocational Education in SubSaharan Africa: An Update on Trends, Innovations and Challenges. New Trends in Technical and Vocational Education*. UNESCO-IIEP, Paris, France.
- Bankole, R., Gandonou, E., Kemper, J., Maldonado-Mariscal, K. And Nouatin, G. (2019). Case Study: Technical Vocational Education System (TVET) Programs Benin. *LELAM-TVET4Income Working Paper*, forthcoming.
- Bolli, T., Caves, K. M., Renold, U., & Buergi, J. (2018). Beyond employer engagement: measuring education-employment linkage in vocational education and training programmes. *Journal of Vocational Education & Training*, 70(4), 524-563.
- Bolli, T., Egg, M. E., & Rageth, L. (2017). Meet the need: The role of vocational education and training for the youth labour market (No. 429). *KOF Working Papers*.
- Bolli, T., Parajuli, M. N., & Renold, U. (2019). Has the relationship between formal education and the formal employment sector in Nepal changed between 1995 and 2014?. *KOF Working Papers*, 455.
- Camacho Calvo, S., Kemper, J., and Maldonado-Mariscal, K. (2019). Case Study: Technical Vocational Education System (TVET) Programs Costa Rica. *LELAM-TVET4Income Working Paper*, forthcoming.
- Carron, G., & Carr-Hill, R. A. (1991). *Non-formal education: information and planning issues*. Paris: International Institute for Educational Planning.
- DGIZ Deutsche Gesellschaft für Internationale Zusammenarbeit (2016). *Definitions of formal, informal and non-formal learning*. <https://www.giz.de/expertise/html/11954.html>.
- Dundar, H., Millot, B., Riboud, M., Shojo, M., Aturupane, H., Goyal, S., & Raju, D. (2017). Technical and Vocational Education and Training: The School-to-Work Transition.
- Eichhorst, W., Rodríguez-Planas, N., Schmidl, R., & Zimmermann, K.F. (2015). A Roadmap to Vocational Education and Training Around the World. *ILR Review* 68 (2):314-37. <https://doi.org/10.1177/0019793914564963>
- Eshach, H. (2007). Bridging in-school and out-of-school learning: Formal, non-formal, and informal education. *Journal of science education and technology*, 16(2), 171-190.
- Flynn, M. C., Pillay, H., & Watters, J. (2016). Industry–school partnerships: Boundary crossing to enable school to work transitions. *Journal of Education and Work*, 29(3), 309-331.
- Hadjivassiliou, K. (2017). Policy overview of school-to-work transitions. *Youth employment*, 84.
- ILO (2012). *Upgrading Informal Apprenticeships: A Resource Guide for Africa*. Available at http://www.ilo.org/wcmsp5/groups/public/---africa/---roaddis_ababa/documents/publication/wcms_171393.pdf.
- ILO (2017). *Formalization of the informal economy*, Governing Body 329th Session, Geneva, 9–24 March 2017 GB.329/POL/2

- ILO (2018). *Informality and non-standard forms of employment*. Prepared for the G20 Employment Working Group meeting 20-22 February 2018, Buenos Aires. Retrieved from https://ilo.userservices.exlibrisgroup.com/view/delivery/41ILO_INST/1255489780002676
- KOF (2015). *KOF education systems factbook: Chile*.
https://ethz.ch/content/dam/ethz/special-interest/dual/kof-dam/documents/KOF_Factbook/kof_factbook_education_system_chile.pdf
- KOF (2015b). *KOF education systems factbook: Costa Rica*.
https://ethz.ch/content/dam/ethz/special-interest/dual/kof-dam/documents/KOF_Factbook/kof_factbook_education_system_costa_rica.pdf
- KOF (2015c). *KOF education systems factbook: Nepal*.
https://ethz.ch/content/dam/ethz/special-interest/dual/kof-dam/documents/KOF_Factbook/kof_factbook_education_system_nepal.pdf
- KOF (2017). *KOF education systems factbook: Benin*.
https://ethz.ch/content/dam/ethz/special-interest/dual/kof-dam/documents/KOF_Factbook/FactbookBenin.pdf
- Kohli, S., Bandhopadhyay, R., & Kohli, K. (2015). Public private partnership in education an impactful means of promoting skill development and inclusive growth in India. *Scholedge International Journal of Multidisciplinary & Allied Studies*, 2(5), 21-35.
- Ludwig-Mayerhofer, W., Pollak, R., Solga, H., Menze, L., Leuze, K., Edelstein, R., Künster, R., Ebralidze, E., Fehring, G., & Kühn, S. (2019). Vocational Education and Training and Transitions into the Labor Market. In *Education as a Lifelong Process* (pp. 277-295). Springer VS, Wiesbaden.
- Medina, L., Jonelis, A. & Cangul, M. (2016), The Informal Economy in Sub-Saharan Africa: Size and Determinants. *International Monetary Fund Working Papers*, 17(156), 31p.
- Moodie, G., Wheelahan, L., & Lavigne, E. (2019). Technical and Vocational Education and Training as a Framework for Social Justice.
- Peralta Rojas, M., Bordón Tapia, P., Kemper, J., and Maldonado-Mariscal, K. (2019). Case Study: Technical Vocational Education System (TVET) Programs Chile. *LELAM-TVET4Income Working Paper*, forthcoming.
- Phipps, D., Pepler, D., Craig, W., Cummings, J., & Cardinal, S. (2016). The co-produced pathway to impact describes knowledge mobilization processes. *Journal of Community Engagement and Scholarship* 9(1), p. 31-40.
- Pillay, H., Watters, J. J., Flynn, M. C., & Hoff, L. (2017). Public-Private Partnership Principles Applied to Industry-School Partnership to Support Technical and Vocational Education. In *Adult Education and Vocational Training in the Digital Age* (pp. 18-36). IGI Global.
- Prasad Baral, D., Kemper, J., and Maldonado-Mariscal, K. (2019). Case Study: Technical Vocational Education System (TVET) Programs Nepal. *LELAM-TVET4Income Working Paper*, forthcoming.
- Rageth, L., & Renold, U. (2019). The linkage between the education and employment systems: ideal types of vocational education and training programs. *Journal of Education Policy*, 1-26.
- Rauner, F., Smith, E., Hauschildt, U., & Zelloth, H. (2010). Innovative apprenticeships. *Vocational Education and Training Series*.

- Remington, T. F. (2018). Public–private partnerships in TVET: adapting the dual system in the United States. *Journal of Vocational Education & Training*, 70(4), 497-523.
- Renold, U., & Caves, K. (2017). Constitutional reform and its impact on TVET governance in Nepal: A report in support of developing understanding and finding the way forward for federalizing the TVET sector in Nepal (No. 89). *KOF Studies*.
- Renold, U., Bolli, T., Caves, K., Bürgi, J., Egg, M. E., Kemper, J., & Rageth, L. (2016). *Feasibility Study for a Curriculum Comparison in Vocational Education and Training. Intermediary Report II: Education-Employment Linkage Index*(No. 80). KOF Studien.
- Renold, U., Bolli, T., Caves, K., Bürgi, J., Egg, M. E., Kemper, J., & Rageth, L. (2018). *Comparing International Vocational Education and Training Programs*. NCEE, Washington DC. <http://ncee.org/wp-content/uploads/2018/03/RenoldVETReport032018.pdf>
- Renold, U., Caves, K., Bolli, T., & Bürgi, J. (2016b). *From bright spots to a system: Measuring education-employment linkage in Colorado career and technical education* (No. 87). KOF Studien.
- Renold, U., Rageth, L. Caves, K. & Bürgi, J. (2019). Theoretical and Methodological Framework for Measuring the Robustness of Social Institutions in Education and Training. *KOF Working Papers*, No. 461.
- Wolter, S. C., & Ryan, P. (2011). Apprenticeship. In *Handbook of the Economics of Education* (Vol. 3, pp. 521-576). Elsevier.
- World Bank (2018). Unemployment, youth total (% of total labor force ages 15-4) (modeled ILO estimate). *The World Bank: Data*. <https://data.worldbank.org/indicator/SL.UEM.1524.ZS>