

Mediators for sustainable livelihoods

Promoting sustainable livelihoods in vocational and adult education through university curricula and programs

Mediators for sustainable livelihoods - Promoting sustainable livelihoods in vocational and adult education through university curricula and programs

Report from a preliminary study for GINTL pilot project

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Summary

Sustainable development has become a universal aim in national and supranational economic, social, and educational agencies and belongs to the repertoire of industries, businesses and civil society organisations. However, by breaking the concept into separate categories, such as the list of UN sustainable development goals, it remains vague, disordered and ambiguous. As authors of this report, we assume that social metabolism - the material and energy flows by social organisations of different scales - is potentially the foremost concept for sustainable development. The combat against unsustainable social metabolism happens in local and planetary organisation of work, industries, social and political life. For humans, sustainable social metabolism means livelihood in collectives or assemblies of humans and nonhumans. Although directly targeting this, vocational and adult education have remained marginal in policies and discourse of sustainable development.

Through our collaboration in research, teaching and interaction with practices and policies of vocational and adult education, we have ended up in questioning the role and responsibility of universities and higher education for sustainable social metabolism and livelihoods. While universities are prime institutions shaping agendas and expertise for political, economic and social development, we ask why they are ignoring vocational and adult education, despite their critical function for sustainable livelihoods. We hypothesise the impact of the established, taken-for-granted principles and practices in curriculum and program development and implementation, which overlook interaction and collaboration with non-university actors. Yet, from our experiences, we find this critical for analysing, understanding and shaping research-based expertise for sustainable livelihoods in vocational and adult education.

Our team of senior and junior researchers come from Finland, China, Tanzania, Kenya and Uganda, representing the diversity of local and global social metabolism, production and commodity chains and interdependencies. The ambition of our preliminary study is to clarify conceptual and methodological framework for future co-creative collaboration between key university and non-university actors, towards development and implementation strategies and practices of research-based curricula and programs, to shape expertise for sustainable livelihoods in vocational and adult education.

Based on our study we suggest that

- *New mediating expertise* is needed for combating environmental, social and political crises through vocational and adult education. We do not specify it as a certain profession, since it may emerge as a cross-disciplinary quality, integrated to various professional fields, or as a mutation of some existing professions. It requires integrated knowledge and understanding of conditions and transformation potential of local livelihoods and their global interdependencies.
- The expertise should be *contextualised and dynamic*, and address the *existing* environmental, economic, industrial and social *realities* in local context, in their global and planetary interdependencies. While being humble in learning from different actors, it should also be dynamic in *supporting transformative action* towards democratising work and social life among humans and between humans and non-humans.
- *Curriculum and program innovations* are required to achieve new expertise. They must recognize existing qualification frameworks, occupational structures, curriculum and program structures, and integrate knowledge of and competences for the world of vocational and adult education and their local, national and planetary interdependencies and governance. Universities are critical actors in *educating experts into leading positions in governance, in industrial, educational and civil society organisations*.
- *Co-creative and experimental strategies and practices* are needed in curriculum and program development and implementation. The *functioning of university curriculum and program development* is an under-researched and ignored topic in programs and agendas towards sustainable development. A co-creative and experimental process among actors from universities and higher education institutions and non-university actors should include co-research with self-critical analysis of the status quo.
- *Building bridges* as collaboration across Global North and Global South is necessary since sustainable livelihoods cannot build on global scaling of the exploitative solutions from the Global North. Partners of collaboration should identify cases of economic and social units and sectors of industry, which enable the analysis of their commodity chains and social metabolism, and connections to vocational and adult education.

The opening chapter introduces the background and aims of the study, the second chapter describes the design and the third one draws the implementation of the study. The fourth chapter reports and summarises findings from different contexts. The closing chapter draws conclusions and suggests recommendations for the future. Although the aim of the study is to support co-creative collaboration among the research team and their institutions, we believe that the exercise can be useful also for other actors, sharing the same interests and ambitions.

The preliminary study was accomplished during November 2021-March 2022, as part of “global innovation networks in teaching and learning (GINTL)”-initiative of the Finnish ministry of education and culture. (<https://gintl.org/>). However, the study aimed to support partners in their regular activities as well as projects with any relevant funding. The small

grant, transferred through Tampere University, funded one junior researcher in each partner university to work part-time for one to three months. Unfortunately, despite earlier promise by Tampere University, the team was not awarded applied additional funding. In Baoji University of Arts and Sciences (BUAS) and South China Normal University (SCNU) the team was supported by other students, presented in the Contributors-chapter. Yet, most of the work, especially of senior researchers, was carried out in addition to their regular duties. Without the commitment of the whole team, the study and this report would not be realised. We also warmly thank all the participants of the study for sharing their views, experiences and expectations with us. The participants were invited to attend the online dissemination event on 29 March 2022 to share the findings.

1. Introduction

1.1. Background

This study is based on concerns, which the participants share in their academic and work contexts about the responsibility of universities in addressing planetary crises. They believe this responsibility requires a holistic change in development and implementation of research-based university programs and curricula, especially related to adult and vocational education. Adult and vocational education promises one important way to mitigate planetary crises, brought about by unsustainable livelihoods. Redressing these crises implies cross-disciplinary interaction with non-university actors - communities, industries, educational institutions and policymakers - and collaboration across countries and contexts.

Further, the environmental and ecological crises have become a joint concern for all people and governments on the planet. Most governments, economic actors and educational institutions are committed to the UN sustainable development goals. To combat global warming and environmental degradation, the main challenge is whether humankind is capable of radical changes in ways of life and economic practices. This, however, is not possible without creating justice and equity across diverse contexts, where individuals, communities and countries are positioned politically, economically and socially. The response to planetary crises requires urgent response from citizens and communities, from industries, employers and workers; best supported by vocational and adult education programs. Ironically, it is precisely vocational and adult education that are marginalized in policies and programs for sustainability across the world, including the UN SDGs.

The contexts of the study, Tampere University in Finland, Mzumbe University in Tanzania, Kisii University in Kenya, Kyambogo University in Uganda, Baoji University of Arts and Science and South China Normal University in China differ in their political, economic, social and educational chances for change in curriculum and program development. The expressions and interpretations, especially translations to English vary. For example, the Finnish concept of vocational education is often translated as VET (vocational education and training, used in the European Union), the Chinese and East-African concepts translated as TVET (technical and vocational education and training, following conventions of supranational agencies). By making visible the diversity, the study aims at increasing knowledge and understanding for developing collaboration across the contexts, to support development of adult and vocational education for sustainability.

In general, vocational and adult education are marginal in current programs and curricula in partner countries. The emphasis is on programs for teachers and leaders in general secondary schools and primary schools. In all countries, collaboration with non-university actors (such as vocational and adult educator or teacher training institutions and administration, labour market partners) is not common when universities develop and plan their degrees and curricula. There is heavy bias in favour of producing workers for 'white collar' jobs from these institutions despite the identified need for graduates who have 'hands on' skills, are resilient and adaptable enough to attend to the crises in the planet. There is a diversity in profiles and location of programs and curricula, which focus on administration, management and governance of education among universities everywhere, also among this partnership.

Faculty of Education and Culture (EDU) in TAU



Picture 1.1. Students in front of Tampere University main building. Car mechanic students in Tampere vocational college (TREDU).

Tampere University (TAU) is in the Pirkanmaa region. While the university has a national and international mission, its local cooperation focuses on Tampere City, which very much dominates the region. Therefore, the needs of other communities tend to be absent in the strategies, in program and curriculum development practices of university and EDU. The faculty is dominated by teacher education (early childhood, primary and secondary education, university pedagogy), but in MA for lifelong learning- and Doctor in education and society-programs graduates enter planning, administrative and management positions in the public and private sector. The connections to non-university actors have weakened in recent years. The legacy of University Tampere as the main institute for adult and vocational education, and for local administration and democracy, has increasingly eroded during the fusion of University of Tampere and Tampere University of Technology in 2019. Though adult education is still a subject, there is no distinctive program in adult education. Vocational

teachers accomplish one year “teachers’ pedagogical certificate” in Vocational teacher training units of polytechnics (universities of applied sciences), integrating practice in vocational institutes to intensive/distant courses in teacher training. The links to practise in vocational schools or industry is limited to experiences that teacher trainees bring into their studies. In TAU, the Faculty of Management and Business provides programs with administration and management topics, but there is no collaboration with EDU in terms of educational planning, administration, and management.

According to the latest reform in secondary vocational education in 2018, there are no (formal) distinctions in qualifications and curricula for youth and adults. There are around 165 qualifications in most existing industries. (Finnish National Agency for Education 2022) The amount of work-based and self-directed learning was increased. Initial vocational education prepares skilled workers, but also provides further and specialist qualifications, theoretical studies in apprenticeship programs, and tailored continuing training for companies. Education is publicly funded and free of charge to students. Historically and in a wider perspective, vocational education refers beside vocational schools, also to polytechnics (universities of applied sciences), where graduates from vocational traditionally have been able to proceed to higher qualifications and positions in work life. Sustainable development is officially one of the priorities in VET, and Finland is active in participating in the EU’s Green Deal program. (European Commission 2019).

Popular adult education (free folk edification work) is an important educational sector, historically aiming at promoting participation of the population (citizens) in political and social activities. (MinEdu 2022) It takes place as

- Municipal workers’/people’s institutes providing general and hobby-related courses
- Folk high schools providing programs preparing youth for further studies, integration education for migrants, tailored occupational programs and short courses for shop stewards, religious and ideological activists
- Study associations, which support all kinds of civil society organizations in advancing their agendas
- Summer universities (of consortia of municipalities) providing university courses for adults, and sports institutes providing sport activities to individuals, families and organizations.

Sustainable development has been part of all education in Finland since the 1990s, however focusing on ecological or environmental sustainability. Since 2006 sustainable education has formally become a strategic aim of Finnish education policy at all areas and levels, including adult, vocational and higher education. (MinEdu 2020).

Currently, ecological, social and economic sustainability are explicitly included in all subjects of all vocational qualifications. If popular adult education organizations provide qualifying general or vocational programs, they should follow the same curricula as in the regular education system. Otherwise, they are free to decide the content of their education provision. However, both in vocational education and popular adult education, the concept of “eco-social” education has become prominent, and most providers have or aim at having an official certificate of sustainable development.

Universities are also free to decide on the aims and content of their programs, but TAU, as well as all other Finnish universities have announced sustainable development as their main strategic aim: “We develop solutions to tackle climate change, preserve the natural environment and improve the well-being and sustainability of societies.” (Tampere University 2020). Concerning collaboration with non-university actors, the legislation of universities includes as a third mission - beside research and education - societal interaction and impact. In TAU, there are some university level policies and groups, dedicated to promotion of societal interaction and partnerships. However, they have remained formal and abstract, thus it is very much up to faculties, research groups and individual staff, whether and how they interpret and implement the mission.

Furthermore, there is no clear integration of the third mission with the internationalization and global impact strategies. In EDU, the emphasis - if any - on partnerships and collaboration with practitioners and policymakers is on early childhood and teacher education, dominating the Faculty. The collaborations developed in adult and vocational education have eroded, and research and teaching are geared according to funding mechanisms, which rely on large-scale externally funded research projects. Some networks, based on Equality and planetary justice in vocational, adult and higher education-research group (EquJust), in popular adult education (SVV), in vocational and adult education, with their international networks, are still potentially available. However, the collaboration of previous years with non-university actors of adult and vocational education in teaching, thesis supervision and research, which also had an impact on curriculum planning and implementation, has vanished.

Although sustainable development, global and eco-social education are in principle overarching topics in all degrees and curricula of EDU, there are no systematic practices in integrating them into different programs, not to speak about involvement of non-university actors into the process. Though there are a couple of staff with focus on sustainability education, until now they primarily concentrate on their own separate courses, which are open to different programs in EDU. Also, there is no cross-disciplinary collaboration in

curriculum and program development with such subjects as public administration, environmental studies, work research or vocational teacher education.

Faculty of Education in Baoji University of Arts and Sciences (BUAS) and South China Normal University (SCNU)

The Faculty of Education (FOE) in Baoji University of Arts and Sciences (BUAS), is located in Baoji City, Shaanxi Province, the heart of China.



Picture 1.2. Baoji University of Arts and Sciences (Gaoxin campus).

While the university has a local, provincial and national mission, its local cooperation focuses on Baoji City. In Baoji, there are three public higher education institutions (HEIs), namely BUAS, Shaanxi Mechatronic Technology College (SMTC) as well as Baoji Vocational and Technical College (BVTC). BUAS can award bachelor and master's degrees while SMTC and BVTC can only award diplomas. Both BUAS and SMTC are administered by the Shaanxi Provincial Government, while BVTC is administered by the Baoji City Government. Teacher education and applied engineering are two core areas of BUAS. FOE is dominated by teacher education, such as BA in educational sciences, early childhood, education technology and applied psychology, MA in primary education, psychological health education, educational leadership, educational sciences, curriculum and pedagogy as well as history of education. The connections to schools are strong while to other sectors are weak. BUAS has no history or vision in developing vocational education. There is no subject, staff or students in vocational education either. However, it has the Institute of Further Education (IFE) which provides short-term in-service training for teachers and principals from local primary and secondary schools. FOE provides pedagogy and trainer support to IFE.

The other university participating in this study is **South China Normal University (SCNU)**, located in Guangdong Province in the southeast of China. In 2013, SCNU established the

School of Vocational and Technical Teacher Education (SVTTE), which mainly trains teachers for secondary vocational schools.



Picture 1.3. School of Vocational and Technical Education and Training, South China Normal University (Shanwei Campus). E-commerce Students in secondary vocational schools.

In the current bachelor's and master's degree curriculum in vocational education, the concept of sustainable development is absent. Some colleges related to environmentally sustainable development and technology, such as the School of Environment, the School of Life Sciences and the School of Geography provide many independent or subject-integrated courses. In addition to SCNU, some teachers from technical disciplines in which institutes? provide general sustainability courses for all students. However, there is no connection between these courses and vocational teacher training courses. Adult education is carried out by independent schools, providing mainly courses for the academic improvement of in-service personnel, while lacking courses in sustainability.

The development of vocational and adult education in China follows the policy guidelines of the central government and considers local differences. For vocational education, overall planning by the government, hierarchical management, dependence on local resources, industries' guidance, cooperation between schools and enterprises, and participation of the private sector shall be implemented (The State Council 2022). The Implementation Plan of National Vocational Education Reform 2019 aims at putting vocational education in a more prominent position in educational reform and innovation and economic and social development. It will be transformed from being mainly organized by the government to be governed by a pluralistic society, from the pursuing scale to pursuing quality, and from referring to the mode of general education to education with enterprise participation and distinctive professional characteristics. The Action Plan for Improving the Quality and Excellence of Vocational Education 2020-2023 (Ministry of Education 2020) emphasizes moral education, hierarchical structure, lifelong learning, integration of industry and education, enrolment system, ability of educational governance, teaching materials, informatization,

international cooperation and quality of vocational education. Provincial and municipal education departments formulate local development policies according to national policies. For example, in 2022 one work point of the Ministry of Education and Education Department of Shaanxi Provincial Government on vocational education, is to establish new bachelor-level higher vocational colleges (HVCs). By 2021, HVCs account for 54% of regular HEIs in China. Also, the Three-year Action Plan for Capacity Expansion, Quality Improvement and Service Strengthening of Vocational Education 2019-2021 (Guangdong 2019) is highly consistent with national policy.

Since the 1970s, importance to environmental protection, especially the treatment of wastewater, waste gas and waste residue has been emphasised. In 2012, the Communist Party of China National Congress launched the construction of ecological civilization and the concept of "green water and green mountains are golden mountains and silver mountains", to prevent and control of air, water and soil pollution. Several plans and guidelines have proposed that by 2020, green development will become a common requirement for the whole industry, and the promotion mechanism of industrial green development will be formed, and preliminary system for green manufacturing established on a significantly improved level. (The Ministry of Industry 2016). Opinions highlight ecological civilization, green development, protection of ecological environment, and building of a green silk road (Ministry of Environmental Protection 2017), formulate plans for implementation of carbon peaking and neutralization in the fields of energy, industry, transportation, urban and rural construction (The State Council 2021), and aim at biodiversity protection by improving policies and regulations, protecting space, monitoring system, safety management and public participation (CPC and the State Council 2021).

Sustainable development in vocational lags the green policies. While it is based on the close cooperation between vocational colleges and enterprises, it will be influenced by the needs to develop green skills among workers in industries. There are plans to formulate institution, policy and standard system of green schools that by 2022 more than 60% of schools, colleges and universities will meet. (Ministry of Education 2020.) Opinions (CPC and the State Council 2021) propose optimizing the connection of vocational education with industrial upgrading and technological change, prioritize emerging majors required by advanced manufacturing, new energy, new materials, modern agriculture, modern information technology, biotechnology, artificial intelligence and other industries. Traditional majors should be transformed and majors with excess supply, low employment rate and disappeared professions eliminated. These are positive signals to start green skill education in vocational and adult education. While new practitioners are needed to update relevant

skills, vocational and adult education need to comprehensively integrate the concept of sustainable development in the curriculum, carry out teacher training, and cultivate the labour force to meet the needs of sustainable development of enterprises. Basic and higher education are promoting the reform of related disciplines, but in vocational and adult education, leaders, teachers and students have insufficient awareness of ecological sustainable development. There is an urgent need to integrate the concept into the curriculum.

In this study, one focus will be e-commerce (electronic commerce), which is one major in secondary vocational education. *E-commerce* means *buying and selling goods and services, transmitting of funds or data* on an electronic network, primarily the internet. The business transactions occur either as business-to-business, business-to-consumer, consumer-to-consumer, or consumer-to-business. The e-commerce major cultivates experts with professional abilities in business web design and production, internet sales, business affairs information processing, internet customer service and management, and can engage in related operation skills.

With exceptions of technical tertiary education institutions, educational systems in **East-African countries** lack pathways from primary through secondary to higher and adult education with clear focus on vocational skills and qualifications. There is no smooth progression from primary education to vocational and up to higher education. This is because qualifications to join higher education requires a pass from academic secondary education and the upper second-class performance from tertiary technical institutions. The links between universities and providers and governors of vocational and adult education - including vocational and adult educators and administrators - are weak. The concept of adult or lifelong education is still dominated by deficiency approach and linked to literacy and formal academic qualifications. (Kalimasi 2015, Tusimee 2015.)

Faculty of Social Sciences in Mzumbe University (MU)

The partner faculty of **MU** is in the Morogoro region in Tanzania, where addressing youth employment is both a local and national challenge, in their global context.



Picture 1.4. Mzumbe University Main Campus Morogoro.

On one hand, the emphasis is much in programs for traditional subject teachers of primary and secondary schools and the design and delivery of vocational and adult education programs is still facing challenges emanated from lack of cooperation among key important stakeholders. On the other hand, some initiatives to enhance vocational and professional skills are carried out in silos. There is a weak link between vocational education institutions and higher education, where more research and collaboration could be done with reference to new innovations and ecological sustainable development. As explained, there are no clear and straight pathways from vocational and adult education institutions to higher education institutions or universities.

Vocational education teachers are trained in vocational education teacher training colleges, such as the Morogoro Vocational Teacher Training College (MVTTC).



Picture 1.5. Morogoro Vocational Teacher Training College. Students at construction site.

Some of the teachers for subjects such as English are trained in the non-technical higher education institutions. There is also a possibility to recruit some other teachers from the technical higher education institutions with skills and competences related to trades provided in the vocational and adult education institutions. VET and adult education are not integrated into higher education institutions though there is a cry that graduates are missing practical skills when they leave universities and join the labour market. Therefore, vocational

education, higher education and adult education are provided in silos. While higher education institutions are governed by the Tanzania Commission for Universities, vocational education institutions are governed by The National Council for Technical and Vocational Education and Training (www.nacte.go.tz). This council is responsible for development and review of all vocational and technical programs.

When universities are in the curriculum review cycle or design, they consult some stakeholders at various stages from the needs assessment to the stakeholders' workshops internal and external to the university, but the participation of those stakeholders is not effective. Universities are trying to develop some initiative to collaborate with industries through various projects. However, sustainability of such collaborations to regularly inform the curricula is still a challenge in terms of readiness of industries and financing of their participation. There are also national strategies to formalize skills and competences that youth acquire from non-formal education and apprenticeships systems.

In **MU**, the Faculty of Social Science and the School of Public Administration have management and administration courses within the program tailored to suit their discipline and other related courses e.g., education management and education policy studies that have been integrated into the curricula as a course. Staff for adult education are trained in the national Institute of Adult Education and some academic universities, depending on the nature of the courses, are teaching at the institutes of adult education within the country across different regional centres.

School of Education and HRD in Kisii University (Kisii)

Kisii University is located in South-Western Kenya. Educational management is one major subject in the School of Education and HRD, which also trains adult and vocational educators with specific course units. In addition to teachers for early childhood, primary and secondary school grades, the School also trains TVET lecturers. Yet it has not received commensurate capacity building necessary to equip lecturers with knowledge they need to train their students in TVETs to actualize Kenya Vision 2030.

In the Vision 2030, Kenya aims to transform into a newly industrialized, middle-income country. Such a country would provide a better quality of life for its citizenry in a clean and secure environment. Part of the strategies of actualizing this aim is to train technologists and technicians to man the industries and production line positions created with the increasing industrialization. The government injected a whopping 30 billion Kenya shillings (263,504,610 USD) to modernize and upgrade TVETs (Abuya, 2021) and polytechnics to

ensure the attainment of vision 2030. Although more funds have been allocated to TVETs, not much capacity building has been done in universities that train the TVET lecturers. The lack of capacity building causes a disconnect between what worker skills the country needs to drive vision 2030 and what they get based on the training of the TVET lecturers by universities that train graduates mostly with a focus on white-collar employment.

Additionally, the Kenyan educational system lacks pathways from primary through secondary to higher and adult education with a clear focus on vocational skills and qualifications. The links between universities and providers and governors of vocational and adult education - including vocational and adult educators and administrators - are weak. The concept of adult or lifelong education is still dominated by a deficiency approach, linked to literacy and formal academic qualifications. In general, collaboration with non-university actors, such as vocational and adult educator- or teacher training institutions and administration, labour market partners, is not common when universities develop and plan their degrees and curricula. Yet such collaboration would be vital for manpower that will drive the vision of Kenya. Collaboration would also allow universities, such as Kisii, to capture in the curricula the changing needs of the community, such as the quest for sustainable livelihoods.



Picture 1.6. Kisii University Main gate. Tea Factory in Kisii.

Kyambogo University (KyU)

Kyambogo University is situated in Kampala region, on Kyambogo Hill. It was created with the aim of promoting and advancing knowledge and development of skills in Science, Technology and Education and such other fields having regards for quality, equity, progress and transformation of society.



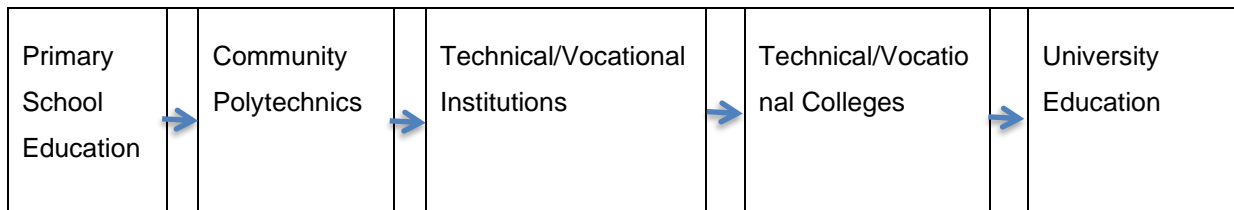
Picture 1.7. Technical and vocational teacher education block, Kyambogo University. Fisheries Training Institute (FTI) Classroom blocks.

Kyambogo University was formed in 2003 (Universities and Tertiary Institutions Act 2001) as a merger of the former Uganda Polytechnic Kyambogo (UPK), Institute of Teacher Education Kyambogo (ITEK), and Uganda National Institute of Special Education (UNISE). (Kyambogo 2022). The good collaboration has kept them working together for the development of Kyambogo and Uganda as a whole. Beside collaborations within administrative systems in KyU, there are many affiliate institutions to KyU, such as the Uganda technical teacher education institutions. The administrators of these institutions jointly sit with the management of KyU to plan curricula, co-curricular activities and examinations for these institutions.

In KyU, there are BA, MA and Dr programs in educational planning and management in the Faculty of Education, and they connect to the Faculty of Vocational Studies, which provides MA in Vocational Pedagogy for vocational teachers. KyU offers Bachelor of Environmental Science which addresses the issues of environmental sustainability through collaboration with National Environmental Management Authority (NEMA). KyU also collaborates with sister universities, other institutions, small scale and bigger industries, and Universities abroad or outside Uganda.

Technical, Vocational Education and Training (TVET) has been considered for long as the field of study for academic failures in Uganda. The trend was changed by an Educational Policy Review Commission report of 1992, whose recommendations were presented in the “The Government White paper” (Education, 1992). Despite the change in progress, pupils in primary schools lack guidance and sensitization. Pupils study for seven years in primary schools without knowledge about vocational or technical education pathways. They learn about technical or vocational schools while filling forms for joining post primary schools, where preferences are required: either general secondary school, or community polytechnics and former junior technical schools. Community Polytechnics is being the first stage of progress in vocational pathway after primary school (without joining secondary school). From

community polytechnic the students can proceed to TVET institute, from there to TVET College and further to university. The existing pathway of TVET, excluding the general education pathway in Uganda functions in following manner:



In an attempt to meet the SDGs and its vision of 2030 (Directorate 2022) and fight youth unemployment, the Ministry of education has embarked on adult and vocational education, by training youths who are not enrolled in the formal education system to a program Skilling Uganda (Monitor 2021). These youths are assessed and awarded certificates of competency by the directorate of industrial training. The aim is to provide the youths with skills for income generation through application of skills other than burning of charcoal from trees for survival.

1.2. Aims and focus of the study

Based on outcomes of previous collaboration and joint reflections, the research team was led to the conviction that progress towards sustainability in industries and communities, requires cross-disciplinary university programs, which enhance vocational and adult education. These should provide new expertise, which is needed 1) as educators with skills and qualifications to develop occupational and community life, which could be acquired before or during university studies, and 2) as administrators and leaders with capacity to develop vocational and adult education systems locally and nationally, in their global context. Therefore, the study aims at developing *research-based initiatives to transform the strategies and practices of curriculum and degree program development* - their aims, contents, implementation - in partner universities.

The new curricula, programs and expertise should not remain at the level of identifying contemporary needs in the labour markets. They should enable continuous interaction with relevant non-university actors, dialogue and negotiation between universities and its environment, for example community-based solutions in planning and implementation of courses, thesis studies and research. The transformation of curriculum and program strategies and practices is also an issue of university ethos and democracy. The new strategies should be built collectively by recognizing the experiences, challenges - such as lack of resources and power - and ambitions of staff at the grassroots, who finally are responsible for designing and implementing curricula and programs.

There are a variety of actors or stakeholders in vocational and adult education and in universities at local, national and global level. They include industrial actors in public and private work-organisations and companies, employers and employees and their unions, education providers, staff in vocational and adult education institutions, governing bodies and agencies, families and students, civil society organisations and local communities. The study aims at identifying the most critical actors or stakeholders for potential collaboration in each context of the partnership, such as governing bodies, educational institutions and their staff and students, trainers of vocational and adult educators, staff and graduates and students in partner universities etc. These would be engaged in the co-creative project in the future.

For the future co-creative experiments, the focus must be narrowed. Through the study, each partner aims at identifying a few issues, and industrial and occupational sectors, which are critical for sustainable development locally, nationally and globally, across the partnership. Furthermore, each partner should identify a community - a case - for deeper and closer understanding of local traditions, interpretations, ways of coping in work, and the challenges and opportunities. This would enable research-based experiments, which analyse vocational and adult education provision for the sector (policies, curricula, actors), the governance and policies of the sector of vocational and adult education.

The issues and sectors should also be exemplary to allow mutual learning and comparative analyses of cases as part of global industrial and occupational chains and in the context of global/supranational education policies and of governance in the chosen sector. The study aims at advising partners to pick up some commodity and production chains, which link their contexts, in order to follow the process in local industry and community, and to see how it is addressed by vocational and adult education. The study should also make visible the main gaps in current vocational and adult education provision, from the perspective of sustainable development locally, nationally and across localities and nations.

Consequently, the future experiment could apply a multi-level, multi-actor approach, integrating community-based, national and global analyses into co-creative transformation of degree and program development strategies and practices. Through this study, each partner aims to map the key actors and stakeholders for the co-creative project in their context, and what their main motivation to and way of engagement would be in the process. Based on findings, each partner should discuss what kind of cross-disciplinary teams, for example from educational sciences, administrative and environmental sciences, should be created in universities for developing the pilot concept further. The study should help the future project to go deeper in seeking traditional ways of coping with work and managing life, in

finding out philosophies, which the students in vocational and adult education and in universities are exposed to and building on during their studies.

2. Design of the Study

2.1. Conceptual framework

The latest IPCC report acknowledges mitigation, adaptation and resilience as responses to the accelerating planetary environmental crises. It calls for assessing solutions to environmental hazards in intersection with socio-economic development, considering their inherent link to vulnerability, poverty, livelihoods and inequality, as part of wider climate/environmental justice. (IPCC 2022) In this preparatory study, the core concept is “sustainable development”, tentatively understood as *caring for **means of livelihood of communities, in their human and nonhuman socio-metabolic relations, in changing geo-social settings and geo-economic interdependencies.*** The concept of social metabolism refers to flows of materials and energy between “nature” and “society” (non-human nature), inside and between societies.¹ (e.g., Haas et al 2017, Clark et al 2016). This is assumed to be visible in organization of (human and nonhuman) work, production and consumption (“economy”), and in institutionalization of social interaction (“civil society/communities”). (e.g., Moore 2017).

We consider vocational and adult education most critical for shaping means of livelihood and for tackling environmental crises, and universities as responsible for creating expertise to shape vocational and adult education. (Ruuska 2017, Heikkinen 2020, Heikkinen et al 2021) Therefore the focus is on their practices for curriculum and program development for experts in vocational and adult education. We explore the *meanings and interpretations* given to sustainable development, understood as caring for means of livelihood *across different actors and geo-economic and geo-ecological contexts* of the study. While this is assumed to require collaboration across diverse, increasingly interdependent contexts, we find it critical to understand the *contextual factors and their interrelations* in curriculum and program development in partner universities. Being preliminary, the study also attempts to explore

¹ Often the concept and approach of social or socio-metabolism is used in a wider framework of social ecology or political ecology. Since our study is very preliminary, it is the task of future research collaboration to develop a more sophisticated theoretical framework.

ways forward to *contextualised conceptual and methodological framing*, which would enable *co-creative, research-based collaboration* in tackling environmental crises *across contexts*.

Due to the attempt to co-creative and contextualised approach, the concrete definitions of vocational and adult education, as well as governance are not fixed, but kept open to their diversity in different contexts. Because the research team is in charge of the study, they are expected to be more explicit to locate the status and function of universities and higher education institutions.

Vocational and adult education are understood as *activities and practices* contributing to prevailing forms of social metabolism, mediated by human and non-human labour. They are formally or informally delegated to institutions and practitioners in public and private sectors of societies. They happen in interaction with students and learners with their own ambitions and intentions. A loose pre-understanding among the team is that vocational education aims at enabling student-learners to participate in work-life. When including adults, it may be called (vocational) adult education, but typically adult education is understood to aim at enabling student-learners to social and political participation and to proceed in their educational pathways.

Governance of vocational and adult education is considered as their *guidance by policies, practices and institutions*, executed by formally or informally authorized policymakers, administrators, leaders and planners (designers) in public and private sectors of society. Governance is assumed to materialise in interaction between the governors and governed.

Universities and higher education institutions are understood as *formally authorized, but autonomous institutions*, responsible for research-based knowledge-creation and education of professionals and experts, with societal interaction and impact. The universities occupy a prominent position in society. They train the people who drive production and consumption in society. Their missions materialize in strategies and practices in development/design of degree programs and curricula - aims, contents and implementation -, in engagement of different categories of staff, students and non-university actors in both public and private sectors.

The research design shows the framework with tentatively generic concepts of the study.

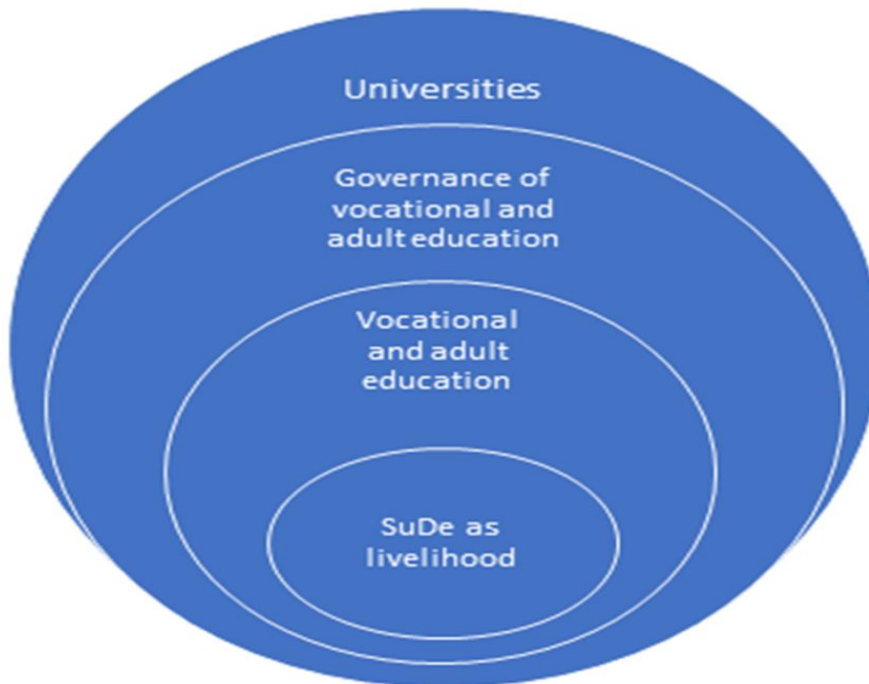


Figure 1. Research design of the study.

In this study, the focus is on *universities and their impact on sustainable development*, which can happen directly and indirectly as interaction with industries and communities, with educational institutions and governance, and as education of experts and professionals for governance and educational positions.

2.2. Research questions

While the pilot study aimed at mapping and describing the situation in different contexts, it was framed by a preliminary research problem, to be elaborated further in the next phase of research-based collaboration. The study asks

- What meanings and interpretations are given to sustainable development across different actors and geo-economic and geo-ecological contexts of the study? What contextual factors and their interrelations may affect curriculum and program development in partner universities?
- What kind of conceptual and methodological framing is required for co-creative, research-based collaboration, to develop curricula and programs for expertise that promotes vocational and adult education for sustainable livelihood (in local) industries and communities?

To reach the aims of the study, the partnership developed following heuristic research questions, which were adjusted to different contexts and target groups.

RQ1. What is the state of art in collaborative creation and implementation of programs and curricula for experts promoting sustainable development in local communities and industries, considered by key actors, such as university, educational institutions, administration, community and industry?

RQ2. What expectations are there of new expertise promoting sustainable production and consumption in adult and vocational education?

RQ3. What is expected of new practices of collaborative creation and implementation of university curricula for sustainable production and consumption?

RQ4. Which issues and industrial sectors are considered most important for sustainable production and consumption?

RQ5. What interest and readiness to participate is there for innovative co-creation and implementation of programs and curricula (including relevant pilot projects) for sustainable production and consumption?

2.3. Methods and collection of data

The research team agreed that due to the scarce resources and diversity of contexts and target groups, a list of joint topics is derived to respond to research questions, and to support formulation of aims, objectives, problems and methods for future research-based collaboration. Preliminary plan first to implement a joint survey through e-questionnaires to a wider group of potential stakeholders, then accomplish a few interviews with representatives of most vital ones, from the perspective of future research. While the questionnaire topics should be rather simple for respondents, they were supposed to be deepened in discussions with the interviewees. Interviews were expected to provide material for answering the research question. (Outlines for surveys and interviews are attached in the appendix 1).

Surveys: QUESTIONNAIRE TOPICS

1. Introduction and Instruction (in the message sent to the respondents).
2. Position and institutional status of respondent, relation of respondent to adult and vocational education.

3. Opinions about relevance of current programs and curricula for experts/professionals in adult and vocational education (items should also mention environmental and social sustainability).
4. Opinions about current interaction and collaboration between actors (to be formulated in each context) in developing programs and curricula (alternatives and open items).
- 5a. Critical issues in supporting the local community towards sustainable development?
- 5b. Critical issues in supporting local industries towards sustainable development?
6. What kind of experts/professionals are needed to promote adult and vocational education for sustainable development in local communities and industry?
7. Who should be involved in creation and implementation of programs for experts to promote adult and vocational education for social and environmental sustainability in local communities and industries?
8. Relevance of starting a project among different stakeholders to experiment with new practices in creation and implementation of new programs and curricula for new kinds of experts?
9. Any other issues, questions, comments to researchers etc.

Interviews with key informants: INTERVIEW THEMES

1. Introduction and instructions
2. Position and status of informant; relation to adult and vocational education.
3. The relevance of current programs and curricula for developing adult and vocational education for sustainable development in community and industries?
4. State of interaction and collaboration between actors/stakeholders in developing and implementing programs and curricula? Reasons?
5. Need for new expertise in developing adult and vocational education? Critical issues and sectors of industry? Reasons?
6. Need and visions for new collaborative practices in developing and implementing programs and curricula for new experts? Who should be involved and how? Reasons?
7. Relevance of starting a pilot project for experimenting new collaborative practice in creating programs and curricula of experts for adult and vocational education promoting social and environmental sustainability of local communities and industries?
8. Any other issues, questions, comments to researchers.

Target groups of study

The target groups for surveys and questionnaires were actors who partners identified to be potentially central in their contexts for the future research-based collaboration. The research team outlined the key actors and stakeholders as follows:

- Those involved in planning and strategies of program and curricula in universities, considering the new programs and curricula for new experts, such as deans and developers – leaders - of graduate and postgraduate studies in educational and administrative sciences, teachers and students in existing programs.
- Heads (leaders) of program and curriculum designers in vocational and adult education institutions and in institutions providing training for adult and vocational educators and teachers; staff and students of existing programs.
- Officers (leaders) in national and regional administration responsible for adult and vocational education policy and administration, including training of educators and leaders.
- *Representatives of industries and associations of vocational and adult education.

Due to the brief time for implementation, each partner had to compromise and select the respondents for surveys and informants for interviews according to their willingness and accessibility. Since the research team itself in many ways represents the intended target groups, their experiences, interpretations and knowledge on research questions were also considered.

3. Implementation of the study

Each partner adjusted the items of the joint questionnaire and the themes of the joint interview guide into their own context. In TAU they were translated into Finnish, in BUAS and SCNU into Chinese. In MU, Kisii and KyU, surveys and interviews were implemented in English, but respondents and informants were assisted by translations into local languages. The survey and interview results were translated back into English. To address the research questions, outcomes from questionnaires - closed and open items - and interviews were compared and analysed together.

The team of junior researchers in BUAS and SCNU collaborated in gathering data, in summarizing and reporting results. Coordination of surveys and interviews was also planned between MU, Kisii and KyU, but due to shortness of time and challenges of communication, finally they were all implemented separately.

3.1. Implementation of surveys

It was not possible to implement the survey through a joint e-questionnaire, due to technical and linguistic problems. The partners modified the outlines to suit their own contexts as follows.

In TAU, questionnaires were disseminated to individuals, who were considered representative of key stakeholders in collaboration of programs and curricula for (new kind of) experts in universities and higher education institutes. These included

- * University staff in Faculty of education and culture (EDU) and in Faculty of business and administrative sciences.

- * Staff responsible for vocational teacher education in Tampere University of Applied Sciences (TAMK).

- * Most important vocational and adult education institutes in Pirkanmaa Region: Tampere Vocational College (TREDU), Tampere (Vocational) Adult Education Institute (TAKK), Vocational institute STEP, Ahjola Adult Education Centre, Sivis Study Centre.

- * Staff responsible for vocational education affairs in Tampere Region office of Central Organization of Finnish Trade Unions (SAK), in Tampere Region office of Chamber of Commerce (CC), and in Tampere Region office of Suomen Yrittäjät (Finnish business owners), Specia – Akava special branches.

- * Staff responsible for governance of secondary education in Tampere City (including Pirkanmaa Region).

The responses could be given anonymously. Thus, from the 11 responses received, four were not identified, the rest came from EDU, TAMK, vocational and adult education institutes, SAK and CC.

In BUAS, experiences and expectations about (potential) collaboration of curricula and programs were in first place gathered in Faculty of Education (FoE) since it is quite independently developing curricula in the framework on national higher education system and policies. The questionnaire was disseminated to teachers and students in the FoE. 27 master students and 3 teachers responded to the questionnaire.

In SCNU, the challenge of sustainable development was interpreted specially to concern the rapidly increasing e-commerce industry. The questionnaires were disseminated to

- * Bachelor and master students of Vocational Teacher Training Program (e-commerce) at School of Vocational and Technical Teacher Education (SVTTE), SCNU.

* Teacher and leader of Vocational Teacher Training Program (e-commerce) at SVTTE, SCNU.

* Teachers majoring in e-commerce in secondary vocational schools in Guangdong Province.

The respondents comprised of 54 students from SVTTE e-commerce program (48 bachelor and 6 master students) and 2 teachers at SVTTE, and 24 teachers of e-commerce in secondary vocational schools.

The survey in **MU** focused on Morogoro Vocational Teacher Training College (MVTTC), which is mainly responsible for training teachers and staff for vocational education institutes, and for development of VET system and curricula nationally. The experiences and expectations about vocational skills and qualifications, and about expertise and collaboration required, were expected to become visible in industry. Thus, questionnaires were disseminated to students in MVTTC, and to workers in the main local industrial actor, the 21st Century Textile Factory in Morogoro. Responses were received from 8 students from MVTTC and 12 industrial workers from the factory.

In **Kisii** also, most relevant was considered experiences and expectations in industry and in Technical and Vocational Education and Training institutes (TVETs), as well as providers of education degrees and programs in university. Questionnaires were disseminated to managers and workers of the local Tea Factory, to teachers and students in local TVETs, and to teachers and students of education in Kisii University. Responses were received from one manager and 7 workers in the Tea Factory, 4 teachers and 5 students in TVETs, 5 teachers and 8 students of education in KISII, one teacher in secondary school.

Since **KyU** is a major provider of programs for teachers and staff in vocational education, questionnaires were disseminated among teachers and graduate school students of KyU. The relevance of VET provision and needs for collaboration were also surveyed among staff in vocational institutes serving local industries - Nakawa Vocational College and Fisheries Training Institute. Questionnaires were also sent to National Curriculum Development Centre (NCDC), which is the main actor in curriculum development in vocational and adult education. Responses were received from one head of department, 4 lecturers and 8 graduate school students in KyU; deputy principal in Nakawa Vocational College; deputy principal and principal Fisheries Training Institute, 4 heads of departments, 2 lecturers and 2 assistant lecturers in FTI; and 2 field staff in NCDC.

Table 3.1. Implementation of surveys

TAU	BUAS	SCNU	Mzumbe	KISII	Kyambogo
1 teacher in TAU	27 students in FoE	54 students of e-commerce in SVTTE	8 students in MVTTC	1 manager in Tea Factory	8 students in KyU
1 staff in TAKK, 1 in TREDU, 1 in TAMK, 1 in VET school	3 teachers in FoE	24 teachers of e-commerce in VET school	12 workers in 21 st textile factory	7 workers in Tea factory	5 lecturers in KyU
1 in CC		2 teachers in SVTTE		4 teachers in TVETs	10 staff in Fisheries Training Institute
1 in SAK				5 students in TVETs	2 staff in NCDC
4 anonymous				5 educ. staff in KISII	1 staff in Nakawa Vocational college
				8 educ. students in KISII	
				1 teacher in sec. school	

Acronyms:

TAU = Tampere University; TAKK = Tampere (vocational) adult education institute; TREDU = Tampere vocational college; TAMK = Tampere University of Applied Sciences; CC = Chamber of Commerce; SAK = Central Organisation of Finnish Trade Unions

FoE = Faculty of Education; SVTTE = School of Vocational and Technical Teacher Education

FTI = Fisheries Training Institute

MVTTC = Morogoro Vocational Teacher Training College

TVETs = Technical and Vocational Education and Training institutes

NCDC = National Curriculum Development Centre

3.2. Implementation of interviews

Junior researchers also accomplished the interviews according to the accessibility and availability of key informants, preferably based on the previously implemented survey. In Kisii, the interviews were made in connection to surveys. Since Kyambogo didn't have resources for interviews, the responses to open items of questionnaires were included in analysing the data.

In **TAU**, interviews were mainly targeted to the same stakeholders as the survey. They included

- Regional actors: a professor of adult education in EDU, a designer of VET teacher education in TAMK, the principal (and rapporteur in regional VET administration) of TREDU, an executive experienced in development of regional VET in CC.
- The head of administration of secondary education, in charge of development of VET system, in Ministry of Education and Culture (OKM).
- The chair of Finnish Association for Development of Vocational education (AMKE ry, gathering all vocational education providers, including vocational adult education institute).
- The chair of Finnish Association for Education of Adults (VST ry, umbrella for national popular adult education organizations).

In **BUAS**, interviews were targeted to people, who were assumed to be knowledgeable about program and curriculum development in university and in vocational institutions. These included

- the dean and the vice dean in the Faculty of Education
- one master student majoring in educational leadership in the Faculty of Education
- the director in the Vocational and Adult Education Division of Baoji Education Bureau.

In **SCNU**, survey findings from SVTTE were deepened through interviews. These were

- One dean and one teacher in the Vocational Teacher Training Program (E-commerce), experienced in curriculum and program development and implementation.
- As potential co-operator in program development, an expert from the School of Environment in SCNU.
- One e-worker from an E-commerce enterprise, to provide views from experiences and needs in industry and whether the concept of sustainable development was applied to work after graduation.

In **MU**, interviews were targeted to

- One MVTTC administrator, who is responsible for designing curriculum for vocational teachers.
- Two teachers, who participate in curriculum development and implementation.

- One administrator from Vocational Education and Training Authority (VETA), since VETA governs development of vocational education system and curricula nationally.

In **Kisii**, interviews were carried out in connection to surveys.

The open-ended items from the **KyU** survey also provided qualitative information from respondents.

Table 3.2. Implementation of interviews

TAU	BUAS	SCNU	MU	KISII
1 professor in TAU	2 deans in FoE	1 dean in SVTTE	1 admin in MVTTC	1 manager in Tea factory
1 planner in voc. teacher ed in TAMK	1 master student in FoE	2 teachers in SVTTE	2 teachers in MVTTC	7 workers in Tea Factory
1 head of general and vocation ed. in MinEd	1 director in voc. edu section, BEB	1 expert in SoEnv	1 supervisor in 21st Textile Factory	4 teachers in TVETs
1 chair of AMKE		1 worker in E-commerce	1 administer in VETA	5 students in TVETs
1 chair of VST				5 educ. staff in Kisii
1 head of TREDU				8 educ. students in Kisii
1 executive in CC				1 teacher in sec. school

Acronyms:

TAU = Tampere University; TAMK = Tampere University of Applied Sciences (teacher education); MinEd = Ministry of Education and Culture; AMKE = Finnish Association for the Development of Vocational Education and Training; VST = Finnish Association for Education of Adults; TREDU = Tampere vocational college; CC = Chamber of Commerce

FoE = Faculty of Education; BEB = Baoji Education Bureau; SVTTE = School of Vocational and Technical Teacher Education; SoEnv = School of Environment

MVTTC = Morogoro Vocational Teacher Training College; VETA = Vocational Education and Training Authority

TVETs = Technical and Vocational Education and Training institutes

4. Analysis and findings from the study

The period for implementing surveys and interviews, for making analyses and interpretations was short, only four months. The research team used a joint Moodle Digma-platform both for documentation of all meetings and discussions related to the study, for generation of research questions, questionnaires and interview themes, for sharing data, for analysis and interpretations and for developing the final report. Zoom-meetings among the whole team were organised to make joint decisions, analyses and interpretations, additionally junior researchers had zoom-meetings about data-collection and documentation. The zoom-collaboration was challenged by repeated technical problems - internet connections and electric blackouts, but also by difficulty to find dates to suit all participants. To test preliminary interpretations, the research team organised a workshop, where respondents and informants and staff and students from partner universities were invited to join.

In the following chapters, the outcomes of analyses are presented in the order of the research questions. In each chapter, findings are first described from each context, followed by interpretative and comparative summaries, also as tables. Due to the shortage of funding and time, there was no possibility to specify them according to the survey and interview data.

4.1. Relevance of current curricula

In this section, we present how relevant respondents find current university and vocational education curricula. Since the context in each country is different, it is considered in our analysis.

While in Finland sustainability is acknowledged as a megatrend, which affects society and industry in many ways, it must be adapted throughout all education. The inevitability of implementing sustainable development was univocal among participants of **TAU** study. Most respondents expressed that they do not know university curricula related to vocational and adult education that well. Since most had Master or even Doctoral degrees in social or educational sciences, they seemed to evade the topic of universities' responsibility in promoting sustainability through vocational and adult education. Rather they spoke about curricula in general and their current state of the art regarding sustainable development.

Only few respondents made a difference between vocational and adult education, since after the latest vocational education reform, there is no legal separation between youth and adults. Both in surveys and interviews, they acknowledged that sustainable development has already been implemented in vocational education and its curricula. However, there was a wide understanding that there are many further steps to be taken. Many respondents found it positive that concrete work towards sustainable development has become day-to-day activity

in vocational education. This can mean using recycled material, intensifying energy use, making effective use of digitalization and making sustainability part of the education in general. More negatively, there were many voices about the current situation of sustainability being shallow. Sustainable development is often seen as something extra and *not implemented into the structures of education*. This was described as “greenwashing”, meaning that sustainable development does not seriously tackle environmental threats.

An essential part of the latest vocational education reform was transferring larger parts of curriculum to be learnt at the workplace and increasing self-directed learning. Some respondents found this problematic concerning promotion of all the pillars - ecological, economic and social - of sustainable development. The TAMK representative was suspicious whether the curriculum is properly implemented at workplaces. The opportunities of schools and teachers to support wider and deeper learning have narrowed, which may be harmful especially for young and vulnerable students. The mission of vocational education to promote employment and employability has made it formally and statistically more socially sustainable, enhancing inclusion of all kinds of students into the labour market. However, many participants, especially from the ministry of education and culture (OKM) and Tampere Vocational College (TREDU), were concerned about the growing learning gaps between student groups, which is a more *negative indicator about social sustainability*. There are students who come from comprehensive schools with good grades, and do not have a problem adapting to vocational studies, but also a growing number of students who do not have as good learning skills or attitudes. This is a challenge that should be addressed both in education and in university research. There was also concern about student’s mental health by the AMKE representative, and especially during the pandemic about student well-being in general.

Concerning university curricula and their function for vocational and adult education, some participants saw universities as separate institutions and instances which do not help them with “practical” issues, also concerning sustainable development. The most negative voice in the survey expressed that university curricula are not relevant at all for development of vocational education, due to their non-practical nature. However, while not concretising the content, most respondents found university collaboration and research highly relevant for vocational and adult education. They recognised a clear need for university trained experts and university research for deeper implementation of sustainable development into vocational and adult education.

In surveys and interviews from **BUAS and SCNU**, the need for relevant university curricula and for strengthening the programs in vocational and adult education was emphasised.

There was a large portion of students in the survey, who requested for better connection to enterprises and practical know-how. It was also acknowledged that practical skills were useful for students entering in the labour market. Most respondents found ecological sustainability necessary, but the interviews with teachers and students showed that their understanding of the *concept of ecological sustainable development was vague*.

In BUAS, ecological sustainable development for classroom teaching is integrated into general courses or subject courses of education. The vice dean of FoE mentioned an undergraduate educational ecology course, but he did not know whether it is related to ecological sustainability. He assumed that if teachers would learn about the relation of the content to ecological sustainable development in current affairs and politics, they will permeate it into teaching. For master education, it may be discussed in basic education or public education courses, in classroom seminars and some paper writing, but the concept itself may not be explicitly discussed. A student representative of the FoE said: "The current curriculum is not relevant to the program (for ecological sustainability). Because the goal of the school is to shape students' professional ability. However, how to combine the sustainability course with the project is still a question worth considering. So I don't think the current courses are relevant to the project."

The faculty representative of the SVTTE in SCNU noted that there are no courses directly related to eco-sustainability. However, there are some general courses and elective courses: Biodiversity and Sustainability and Marine and Human sustainability, offered by School of Life Sciences; Global Change and Community of Human Future, offered by School of Geography; Environmental Sustainability, offered by School of the Environment. Since environmental protection and ecological literacy are mostly implemented in the form of a hidden curriculum without systematic and specialised design, offering courses on ecological sustainable development is difficult.

The vice dean of SVTTE emphasizes that in some *science and engineering majors*, ecological sustainable development is reflected in the curriculum syllabus and talent training programs and offered as courses. In the *humanities*, the teacher's guidance to the *students' ideological understanding* is paid more attention. Although ecological sustainability is not specifically emphasised in the SVTTE curriculum, relevant concepts are integrated in some courses. In some professional courses and comparative vocational education, the concept of global citizens is included, and in some units, ecological concepts are integrated into the curriculum. In the future, elective courses may also be offered, but mainly as informal courses or general education courses. SVTTE will open relevant ecological seminars, but

there is still a long way to go for specialisation courses including ecological sustainable development.

The respondents believe that ecological sustainable development courses that are offered in vocational education and adult education in university are necessary and will become a trend. They also have difficulties, since there is no corresponding ecological sustainable development curriculum system, no clear course positioning towards the nature of ecological sustainable development, as well as lacking corresponding teachers and teaching materials.

The study was not targeted to universities in **Mzumbe University**, since there are hardly any courses or programs dealing with vocational and adult education, nor with emphasis on sustainability. Results from surveys and interviews showed that VET administrators were requested to explain current curriculum relevance to current needs and sustainable development considerations. Compared to responses to other items, slightly astonishing was that the administrators considered in interviews that the current VET curriculum is relevant and working very well since its development process is participative and reflects community needs. Also, it includes environmental sustainability issues as a subject and topic. However, *the implementation of curricula lacks modern teaching facilities and efficient practical training* which make the trainees not having necessary required skills in the job environment as per current technological changes and demands.

In the results of surveys and interviews in **Kisii**, there was an understanding that the current curriculum in vocational education institutions is relevant for the needs of the country in many ways, but besides that, there was also a concern about the practicality of VET. The curricula should narrow down gaps in unemployment by emphasising practical rather than theoretical knowledge, to build skills needed by students in the job market, accommodating its constant changes and need for flexibility among workers. *The new curricula should integrate the views of stakeholders*, and especially employers, relating to what are important skills needed in the society. There is a need for developing a close link between current education curricula and the social and environmental sustainability institutions such as National Environment Management Authority (NEMA), National Construction Authority (NCA) and other consumer bodies in Kenya, to address climate change challenges. Curricula in the school system should be very well linked and relevant for stakeholders, such as industries and organizations who are the key consumers of education products, which is not clear currently. Respondents expect *curricula to link universities and local industry's* various fields, so that university graduates would not see themselves as aliens in the society and job market.

From the results of the questionnaire in **Kyambogo**, 92% supported the relevance of the current programs and curricula. In Kyambogo University, one respondent (lecturer) disagreed with the relevance of the current curricula and programs. NCDC and Nakawa vocational college respondents supported the relevance of the current curricula and programs. And in Fisheries Training Institute, one respondent (lecturer) did not support the relevance of the current curricula and programs. Those who supported the relevance of the current curricula and programs said the curricula and programs cover natural resource conservation, environmental sustainability, entrepreneurship and safe water transport. The curricula offer competence-based teachings that provide a chance for acquisition of skills by the learners, they provide education for self-reliance and equip learners with practical skills which reduce the burden of job seeking.

However, the 8% in opposition say that the curricula do not provide for practical skills development to the learners. They find a skills-mismatch among TVET graduates since the few tools and equipment in practice are already out-dated. There is absence of modern equipment and limited practical resources in classrooms. Learning is theoretically based, and the curricula fail to address issues of pollution of the environment in cities, poor waste management, food insecurity in the communities, poverty and the needs of the industries.

Table 4.1. Relevance of current curricula and program in universities/HEIs

TAU	BUAS&SCNU	MU	Kisii	KyU
<ul style="list-style-type: none"> -In VET, inclusion of ecological and economic SD is average or good in practical solutions -Not yet implemented to deep structures of VET -Universities detached from VET/work life -SD seen as a megatrend -Social sustainability progressing, but social gap between students growing. 	<ul style="list-style-type: none"> -Climate change and SD are affecting VET, but no clear definition of SD in VET curricula -No conditions to develop curricula/program for SD in VET: lack of supporting curriculum system, clear curriculum positioning, appropriate teachers and textbooks -The concept of SD internalized in some general courses. 	<ul style="list-style-type: none"> -Curriculum (VET teachers) is relevant and works well since its development is participative and reflects community needs -Environmental sustainability included -Lack of modern facilities and efficient practical training: trainees don't have required skills for job according to technological changes and demands. 	<ul style="list-style-type: none"> -Curricula should focus on practical skills driven by technologists and technicians to become an industrialized nation -Curriculum in TVETs/HEIs does not produce people capable of independent thought -Environmental conservation and natural disaster-preparedness not comprehensively included in HEs/TVET curricula. 	<ul style="list-style-type: none"> -Curricula offer natural resource conservation, environmental sustainability -Challenge of climate change, pollution, food insecurity, poverty, burning trees into charcoals -Social sustainability not provided: TVET graduates fail to perform in industries and communities -TVET curricula not providing adequate practical skills.

Concerning the quality of new expertise to enhance sustainability through vocational and adult education, our study questioned *interpretations of sustainable development* in university programs and curricula. The findings indicate their *vagueness in relation to vocational and adult education*. There were hardly concrete notions about certain disciplines, curricula and programs, which would be from their perspective. The lack of clarity of the concept was explicitly stated by respondents in BUAS and SCNU, but the ambiguous use of the concept was visible also in TAU, MU, Kisii and KyU contexts. Only in KyU, being vocationally oriented and in charge for curriculum development in vocational institutions, the current curricula were considered relevant to sustainability in vocational and adult education. Typically, sustainability was more explicitly integrated into programs in technical universities and higher education institutions. While the connotation of vocational education is primarily technical (TVET) in China and East-Africa, these institutions were also taken as most important for promoting sustainability in vocational education. Despite the different context, respondents from BUAS, SCNU and TAU emphasised *ideological, political or ethical education and enlightenment* as core of curricula for sustainability in vocational and adult education.

Many stakeholders in all contexts seem to be positive about the current *trajectory of vocational education at least* heading towards sustainability. Still, much needs to be done in implementing *sustainability into the structures of education*. In TAU, BUAS and SCNU contexts, most respondents worried that sustainability in vocational and adult education tends to remain external and shallow. Since it is still a future trend, there is not yet a clear vision of what it should concretely mean. Due to the stronger emphasis on governmental policy guidelines and the composition of respondents, views seemed more explicit in Chinese than in other contexts. In East-Africa, the relevance and current state was seen most optimistically. According to KyU data, VET institutions are rather relevant in aiming at preserving natural reserves and enhancing job markets and entrepreneurship. In KiSii the curricula were depicted as an instrument for learning new skills to enhance the economy and to reduce unemployment. MU findings indicated ambition towards industrial development, though current facilities of VET are not up to needed standards. While MU, Kisii and KyU responses about relevance seem to contradict responses in other themes, this may rather indicate a social desirability bias or a hoped-for situation than reality.

In all contexts, respondents highlighted the *practical relevance of curricula and programs* as a prerequisite for promotion of sustainable development, whether in universities or in vocational and adult education. However, when emphasising competences and skills which satisfy the current needs of industry and promote economic growth and employability, they

did not problematise how compatible they are with sustainable development. Both in TAU and BUAS and SCNU contexts, respondents connected the protection of national livelihood with the promotion of globally competitive “green industries”. The lack of understanding of links between environmental degradation, economic growth, production and local livelihoods among most stakeholders indicates that current vocational and adult education needs to be widened and deepened to make the links visible.

Respondents interpreted sustainability mainly as ecological. The notions of *social and economic sustainability remained detached from ecological aspects*. In TAU findings on vocational education, emphasis was on learning gaps between students, problems of life management among students and polarisation between successful and failing students. These were attributed to failures in the latest vocational education reform, where the unrealistic pedagogical goal of self-directedness is combined with lacking resources. Due to pandemic, mental health problems have become more visible. In BUAS and SCNU findings, social and economic sustainability was brought up in relation to work life and student’s future status in job markets. In East-Africa, social and economic sustainability was coupled with reducing unemployment through relevant skills and competences and entrepreneurship for work life.

Although some respondents made notions about sustainable development - primarily ecological, such as climate change - as a global issue, the *framework of most comments was the nation state* and education as a servant to its competitiveness in global markets. Hardly any reflected interdependencies between local, national and global sustainability. The lack of references to (inequal) division of environmental degradation, industries, work and wellbeing seems alarming concerning the aims of our collaboration. The preliminary study was supposed to support research-based collaboration to promote place-based and planetary perspective in vocational and adult education, which would enhance sustainable industries and communities. The findings show that universities should not just react to the political and economic quest for solutions to “practical” problems of sustainability in industry and society. More holistic awareness of ecological, economic, industrial and social interlinkages across local industries and communities requires theoretical understanding, which is connected to contextual practices. This suggests a need for research-based curricula and programs to develop vocational and adult education for sustainable livelihoods.

4.2 Current Collaboration

In this section, we introduce the results from surveys and interviews first from each context and then make a comparative summary with comments. We focus on key stakeholders identified in each context and on positive notions and suggestions for improvement.

Based on the results from the survey in **TAU context**, current collaboration between stakeholders - primarily in vocational and adult education, only few in universities - was seen as neutral and good. Research team had identified universities, secondary vocational institutions, ministries, municipal agencies, representatives of work-life, such as employer- and trade unions to be the key stakeholders. Participants were mainly describing collaboration from the perspective of vocational and adult education in general, not from the perspective of universities. According to findings, *ministries, municipalities, educational institutions* and *work life representatives* were identified as most important stakeholders.

The collaboration between VET institutions and work life was seen generally as getting better in recent years. The closer cooperation seems to mean that practical needs of industry have been considered and there is interaction especially between individual actors. This is no surprise since the latest reform has strengthened work life-orientation in vocational education (Kontio et al. 2019). However, the reform has been criticised, because it narrows learning and pedagogy to the workplace, emphasising acquisition of job-related competences instead of edification (ibid.). The TREDU representative noted that major collaboration happens between individuals, not organisations. According to the AMKE representative, despite general weakness of collaboration, there is improvement in connection between work life and VET institutions. While they are following the needs of work life, improvement towards sustainability has happened. However, he *did not see that vocational education has brought sustainability to work life*.

Most respondents found collaboration in all education *fragmented*. Each institution focuses on its own sector and projects, thus not paying attention to fruitful collaboration. As a remedy, on many occasions, was the *expectation to have professional “bridge builders”*. One important notion about the imbalance in collaboration with industry came from the Chamber of Commerce. The structure of collaboration in Finnish education is well suited for bigger companies, who have more resources for using educational services, than for smaller enterprises, who have their hands full on daily work. This is due to the *prioritisation of big companies* in the history of mainstream vocational education (Heikkinen 2012), and a crucial point for attempts to promote local industries into educational collaboration towards sustainable development.

Besides fragmentation, a major mentioned problem is financing, which creates tensions between stakeholders. The structure of *financing tends to support short term projects* at the expense of more long-term collaboration. According to AMKE and university representatives, development by projects-policies prevents implementation of sustainable development in a deeper sense. The VST representative stated that the current fragmentation reproduces “tunnel vision”, which means that each sector or program specialises in its own agenda, which leaves the dialogue between them shallow. Many respondents saw universities as isolated institutions, even as creating fragmentation and isolation in educational collaboration. Although a few respondents questioned the importance of university collaboration because they are not practical, most considered universities and research highly important as such, but still detached from the practical world and work life.

According to **BUAS and SCNU** data, the stakeholders of curriculum development in universities involve people from every field, mainly including government personnel, universities, enterprises, curriculum development experts, secondary vocational experts, teachers and students. The survey confirmed that in the current vocational and adult education programs, the overall cooperation of the stakeholders is good. The questionnaire data show that nearly 50% of the respondents believe that the current stakeholders cooperate well and are satisfied with the collaboration in vocational education curriculum development. However, more than a half are neutral about this and point out that there is a lot to be improved.

The vice dean of the FoE in BUAS mentioned that the establishment of an ecological sustainable development curriculum requires many efforts. First, the government can incorporate the ecological sustainable development curriculum into the national regulation of curricula, in terms of higher education, mainly as a professional oriented curriculum. Second, there is no suitable way to intervene into industries and enterprises. Lectures, social practice or cooperation with enterprises are all ways which can be tried in the future. Meanwhile, course development can be guaranteed by finances, making it possible to purchase equipment needed by the course and build laboratories. Therefore, support in all aspects is highly necessary.

The teachers of SVTTE in SCNU are satisfied with the current cooperation in curriculum development and point out that the *cooperation between universities and secondary vocational colleges should be strengthened*. On the one hand, students will have more opportunities to get training in the real teaching environment, thus they will strengthen the understanding of secondary vocational teachers, improve professional skills and teaching skills and gain professional identity. On the other hand, *course designers need to*

understand the real job demand and development trend so that the university curriculum design is no longer disconnected from reality.

The relevant support for curriculum development includes both national policy support, financial and human resources and other support. At present, the curriculum development of ecological sustainable development has insufficient support, which affects its effect and process. One interviewed secondary vocational teacher believes that due to the *shortage of school funds and human resources*, the development process of vocational education curriculum is relatively slow. Some student representatives also believe that government departments could provide the support needed and help curriculum development through financial support and professional talents.

In addition, respondents consider communication in the curriculum development cooperation between all parties not good, and each party has quite different understandings about the collaborative development of courses. Most respondents believe that *people have different understandings of the course development, and different groups will have different demands, and different opinions in the process of course formulation*, making it challenge to carry out the curriculum development. One SCNU teacher mentioned that all parties should pay attention to the equal participation in the process of curriculum development and cooperation and pay attention to the consistency of information among all parties in communication.

In curriculum development and cooperation, imperfect and inapplicable teaching materials, as well as disconnection between curriculum and enterprise development cause problems. *The two key actors* involved in the curriculum are mainly *teachers and students*. Therefore, curriculum development should take their opinions and suggestions into account.

Meanwhile, curriculum development should involve needs of different stakeholders, such as society, vocational schools and enterprises. As society and people are changing every day, the courses including teaching materials must keep pace with the times. As one student of SVTTE said: "Due to the quick update of industry information, curriculum development should take the future applicability of the course into account, so the course must also keep pace with the times. This requires teachers to keep up with the changes of the market combined with the actual situation and textbook knowledge so that talents (graduates and experts) can better adapt to the society and make contributions to the society."

In the **Mzumbe University** study, various stakeholders for curriculum development were identified and data revealed that the collaboration among those stakeholders varies. Data shows strong collaboration between *VET institutions and the associated authority*, in this case VETA which is responsible for governing the institutions for all curricula and

extracurricular activities. Recently this authority on program development is bestowed to National Council for Technical and Vocational Education and Training (NACTE-VET). It is corporate body that coordinate provision of vocational and technical education and training to ensure that graduates from vocational and technical institutions are of high quality and respond to changing needs as well as technological innovations in the world. It is responsible for development and review of all vocational and technical programs. Collaboration was also evidenced between VET institutions and the external stakeholders on curriculum development. The challenge is that it mainly includes more people in higher positions in industries like *employers and engineers*. Little emphasis is given to workers in lower positions, such as *artisans and technicians*. Yet they are working at the technical or operational tasks which makes them more informed about the needed skills, competences and attitudes to be reflected in the curriculum.

Despite its research-based nature, the data indicated that *collaboration between VET institutions and universities during curriculum development is marginal*. Interviews with teachers and administrators in VET indicated that due to the nature of education provided by universities, they are not given priority. Education in universities is considered to be academic oriented and not practically based, which is insisted in VET. This implies that evidence-based curriculum among VET institutions is missing and that, among other factors, lack of collaboration with universities is still a problem. Therefore, respondents find that improvement is needed to enhance collaborations among all important stakeholders for a more informed and technologically up to date curriculum.

In **Kisii** surveys, 46% from the respondents of the questionnaire believe that the current collaboration between different stakeholders, such as universities, local industries, and organisations works well, but 36% were neutral on this item and intimated that the impact of collaboration is not felt. For most respondents, issues of *employability and needs of industries dominate their views on sustainability*. The neutral response was amplified during the interview with one of the factory managers who indicated that their expectations are not entirely met by the current university curricula. The Tea Factory manager said: "I think more could be done to include more voices and as such more information in the university curricula. This will help address the commonly cited problem of unemployability of young graduates and university courses that are not market ready. ...ask the market who they need. What do we need here? People who are resilient, adaptable and relevantly skilled." The HR-staff from Tea Factory added: "Would it not be best if we were asked to contribute to developing university curricula. As of now there is not much collaboration in this area of [developing university curricula for the workers they employ in tea factories] curricula."

According to the findings of the survey in **Kyambogo**, 89% of the respondents rate the current collaborations between KyU and different stakeholders as being useful and 11% rate it as not good. Due to the history of KyU, it has close connections to general, vocational and special education institutions and administration. The management of KyU plans together with affiliated technical teacher education institutions their curricula, co-curricular activities and examinations. Beside other universities in Uganda and abroad, KyU *collaborates with small and big scale industries* in Uganda. Findings from Nakawa and Fisheries Training Institute show that also vocational and technical institutes have good collaboration with their industrial stakeholders and examination body. These participate in curriculum development, marking examinations, and acceptance of trainees during industrial training periods. Collaboration feeds into sustainability of industries, for example by guarding against harvesting of immature fish by training on how to make proper size nets, maintaining quality during fish processing and avoiding pollution of the lakes.

Table 4.2. Current collaboration

TAU	BUAS&SCNU	MU	Kisii	KyU
<ul style="list-style-type: none"> -In VET and VET teacher training, cooperation with work life getting better with ongoing and stable networks between actors -In universities, collaboration with work life and civil society actors eroded -Frequent problems lack of dialogue, fragmented educational field -Uneven resources within industries: bigger companies use educational services better -Problem with financial support in project-oriented cooperation 	<ul style="list-style-type: none"> -Many stakeholders involved in the education system, industries and government -Cooperation between universities and enterprises not close enough, enthusiasm for cooperation not high -Improvement: strengthen school-enterprise cooperation and industry-education integration, consider needs of different actors 	<ul style="list-style-type: none"> -Collaboration (VET teacher education) well practiced though challenged by employer participation and financial resources -Collaboration involves higher positions (employers, engineers), little emphasis to workers (artisans and technicians) -Collaboration involves VET institutions, CBO and VETA - Universities not involved due to their (assumed) nature as theoretical knowledge providers 	<ul style="list-style-type: none"> -Mixed reactions: current collaboration is limited, disconnection between universities' training and needs of labor market and life in communities -No clear lines of collaboration for stakeholders to contribute ideas to curricula -Need for more streamlined collaboration in developing curricula most noted 	<ul style="list-style-type: none"> -Collaboration between universities, TVET institutions and policy makers good -Some policy implementers at district/county and parish level seem to encourage burning of trees into charcoal -Tree planting and forest maintenance should be included in curricula for all levels of TVET institutions

Most participants in all contexts referred to collaboration between different stakeholders in general, not just curriculum development, while they claimed not being familiar with

university curricula and programs or they did not want to comment on them. They agreed that collaboration between educational, work life and political actors is necessary for promoting sustainable development through vocational and adult education. However, assessment of collaboration primarily focused on to *what extent it responded to the needs of industries and labour markets*. These remained largely unspecified, but most respondents vaguely referred to companies, employers and the national economy. From the livelihood focus of our study, perceptions seem dominated by mainstream institutional actors. Critical stakeholders, such as students of educational institutions, workers and employees, trade unions and civil society organisations and local communities, are ignored - also as actors in industries and labour markets. This is understandable due to the focus of vocational and adult education policies on the demand of companies and employer organisations than workers and employee organisations.

Assumptions about *collaboration between vocational education and work life* becoming better is no surprise. Relevance of education for improving productivity and competitiveness of industries and quality and employability of workers is high on the agenda of national and supranational policies. Furthermore, beside policymakers, (big) industries are represented in national and local bodies of vocational education, being able to monitor the direct usefulness of curricula and programs. Still, in MU, Kisii and KyU contexts, this does not seem to be enough for increasing entrepreneurship and employability. Notions about adult education were lacking in the data. In Finland this is partly because vocational education covers both youth and adults, but in other contexts, public interest is still heavily in younger generations.

While respondents were not specific about curricula and programs, they generally considered universities to be isolated and not enhancing concrete skills and competences for work life, which is understood as the main target of vocational education. Courses and programs were seen distant from vocational education institutions and work life. This was seen a problem also for university graduates, specially to their functional employment. KyU – which resembles rather universities of applied sciences/polytechnics than research universities – was an exception. Due to its history, it educates graduates to different industrial sectors, but also trains vocational teachers and administrators and is responsible for developing curricula for vocational institutions.

It may seem contradictory that despite complaints about isolation and practical irrelevance, most respondents found the *lack of research and research-based new knowledge* in vocational and adult education as a threat to enhancement of sustainable development. Some respondents complained weak institutional connections between universities, vocational and adult education institutes. Others considered that promotion of sustainable

development suffers if RDI (research, development and innovation) activities are not organised across diverse levels of education. In MU and Kisii context, respondents complained that representatives from industries are not included in curriculum and program development. Yet it remained unclear, if representatives would also refer to workers, self-employed and communities. The blame for weak or lacking collaboration was primarily targeted to academic contempt towards vocational and practical life. However, collaboration is typically weak also inside universities, which are multidisciplinary institutions where disciplines are distinctive and internally competitive. In addition, comments were also made about industrial and work life actors asking services and immediate benefits from universities.

To summarize, *gaps between actors* - institutional and financial fragmentation and isolation, traditional and ideological differences, communication and knowledge controversies - were considered the biggest collective problem. Most respondents accused “structures” and “rigidities” of education system and policies for institutional fragmentation, which makes rational collaboration too difficult. However, some found it rather to depend on personal and direct interaction between actors, and to self-directed initiatives in their regular practices. Rigid attitudinal blocks and detached vocabularies seem also to play a role, though respondents did not elaborate this more.

A critical factor increasing gaps and fragmentation are the *funding systems*. Competition on finances is severe between and inside different educational institutions, but also among industrial actors and policymakers. The short-term, project-based funding policies causes friction between actors. Current support for promoting sustainable development in vocational and adult education, also in collaboration with universities, is found inadequate. When collaboration primarily builds on competitive project funding, the required long-term, strategic interaction becomes impossible.

From the perspective of our study, the responsibility and ability of universities to tackle the gaps and fragmentation hindering collaboration in curriculum and program development for sustainable development is crucial. Joint reflection is required among actors about their distinctiveness and function towards sustainable livelihoods in industries and communities. Instead of losing their identity and mission, universities should find their compensatory roles. More open and reciprocal relations between actors are required in future collaboration. The distinctiveness of universities could be their analytical and theoretical capacity to support actors in critical analysis of their missions and collaboration practices – including the diverse disciplines and university-intrinsic practices -, which is required for building bridges between

educational institutions, industries and communities, and for creating new expertise to build the bridges.

4.3. Expectations towards new expertise

Based on the results of surveys and interviews, this chapter focuses on experiences and expectations about change, especially related to practicality and pedagogical and cultural change.

In **TAU data**, respondents are talking both about university trained experts and experts in vocational and adult education in general. However, all notions are valuable for considering the focus of developing programs and degrees for expertise in universities. While *change is the most recurring*, the university representative assumes that vocational and adult education need “leaders of change”. With an emphasis on leadership, this means that university experts should be in frontline, leading and not following the changes. From other respondents, for example from TREDU, vocational education was acknowledged to need university research in which to build on. Work life is also changing, and future experts should stay in touch with it. Change is going to be comprehensive and must be acknowledged in both universities and work life. The Chamber of Commerce (CC) representative pointed out that the ongoing change is contingent on many factors, and no one is not sure about outcomes. Ministry of education and culture (OKM) respondent spoke about a paradigm change, which implies a substantial change in both practical and intellectual level, i.e., in vocational day-to-day practices and in scientific activities.

Many respondents were highlighting *practical knowledge, or “work life-driven” expertise*. The need to continuously address changes in work-life and society was emphasised in the role of universities in producing experts as “leaders of change” for vocational and adult education. The CC representative mentions the lack of teachers and trainers in VET, who can follow and influence changes in industry and technology from the perspectives of environmental sustainability - such as carbon emissions - and process-effectiveness. The need for experts with knowledge of industrial innovations was also raised by OKM and AMKE representatives, who were proposing creation of a national RDI (research, development, innovation) system, to keep educational and industrial sectors UpToDate. Vocational students or schools need not do research by themselves, but there should be a joint RDI platform between vocational education, work-life and research and higher education.

According to the OKM representative, sustainable development requires a wide paradigm change in the whole society. The new expertise in vocational and adult education should

include a *holistic understanding of society, work-life and education, and ability to promote paradigm change* in different points of these systems. Beside practical knowledge from different sectors, collaboration in RDI requires *wider understanding about environmental issues and sustainability*. To illustrate the need for a holistic approach, he gave an example from the medical sector in India with highly developed and sophisticated medical research, but schools without teachers with medical education. All respondents emphasised that the view of sustainability *should integrate social inclusion into the RDI system*, to keep all people on board in work-life, society and education.

The VST representative emphasised the need for *pedagogical change*, aiming at deeper edification and at cultural rather than practical and technical changes. For sustainable development (environmental, economic, social), expertise would require cross-disciplinary programs, instead of current specialisation. The potential of *experiential expertise*, emerging from the practice of popular adult education, should be recognised beside research-based expertise. It could provide knowledge that is different from that provided by university research or VET practice. It could function as a mediator in disseminating awareness of environmental and social sustainability. Survey respondents also highlighted that besides technical and practical know-how, new pedagogies should include artistic, cultural and ethical components. In a similar vein, the TREDU respondent endorsed a wider understanding of sustainable development. As for education for future expertise, for example in universities, she suggested portfolio work going through the studies, where *sustainable development is present all the way through*. The views of both respondents indicate that implementation of sustainable development must go deeper in structures of education and learning, and that future experts should have wide and holistic view of sustainability.

In **BUAS and SCNU** data, respondents' ideas about the ecological sustainability curriculum in vocational and adult education have changed. They no longer equate this with environmental education but focus more on the sustainable development of the environment, industry and people. In addition, the interviewees gave some feasible suggestions according to the situation of socialist country, and their expectations towards new expertise comprehensively as follows.

The first is the talent in education communication. The dean of FoE in BUAS considered university teachers' own ecological concept and sustainable development concept particularly important. Teachers can integrate their own ideas into the classroom teaching, a better way to integrate ecological sustainable development concepts. Such talent is what we need. In addition, one teacher at SVTTE in SCNU believes that we need talents in education communication in today's society. Such talents should understand the basic

ecological concept and have professional knowledge. Second, they should have an effective way to pass on the knowledge to others. As for the current situation, there is no way to equip the current schools with such talent, and it is difficult for everyone to have such an ability. This is also an important direction for talent training in the future.

The second is the *talent with innovative spirit and innovative ability*. The competition of comprehensive national strength in the world is the competition of talents, and the key to talent competition lies in the innovative spirit and ability. One e-commerce practitioner said, " In the future, experts should have an innovative spirit, dare to think and do it, and be able to develop or create more practical and applicable products or systems.

The third is *technically skilled talent*. Technically skilled talents master specialized knowledge and technology in the fields of production and service, have certain operational skills, and can use their own technology and ability for practical operation in work. This suggestion is in line with the government action plan for upgrading vocational skills from 2019. The student representatives of the FoE in BUAS believe that technical talents are needed in today's enterprises. They should be excellent in professional technology, understand the basic laws of ecological development, have a high sense of social responsibility, and be committed to improving technology to promote sustainable development.

The fourth expectation towards expertise is *all-round talent*, especially among the education administrative departments. Their views follow the training objectives, set by the government and communist party, which aim at training all-round talented socialist builders and successors to build education that makes the country strong and satisfies the people. For example, the leaders of the Education Bureau in charge of vocational education in Baoji believe that all-round talents should not only have correct thinking with a high level of political consciousness, but also have strong *management and construction ability*. At the same time, talents should also strengthen the *cooperation with enterprises and industries* to jointly help the sustainable development of China.

The questionnaire data show that some respondents believe that talents should be trained to become lecturers of ecological environment protection, green product developers, technical talents in the Internet industry, enterprise experts, resource managers; experts in the industry, garden-management talents, urban-planning talents, etc. To sum up, the programs in sustainable development should undertake the important task of cultivating new experts, who should be *diverse, distribute in different fields, and have comprehensive skills*.

In **MU**, based on the interviews done both in the selected industry and MVTTC, respondents have shown the interest of producing more *artisans as a way of encouraging self-employment and promoting industrialization*. It was also realised that industrial workers are the most required group in society. The need for more artisans is influenced by the Tanzanian industrialization policy that requires artisans, technicians and professionals to be engaged in various fields including construction and ICT to mention some (URT 2021). New programs were also suggested to be developed by some interviewees, such as a specialized *vocational education program to VET administrators*. Many respondents supported the introduction of this new program in the education system. As Cedefop (2010) highlights, outcome-oriented curricula have primarily been introduced to strengthen the link between the curriculum and work requirements. The role of artisan (VET skills practitioners) is considered vital for analysing work requirements and developing the curriculum based on these requirements. Concerning employers, they are important in providing their personal experience and knowledge of a sector or an occupation, they provide inputs into the development process or give feedback on the results.

As far as expertise is concerned, data revealed that for *all groups of experts*, they should be technically and practically trained to a level of competence that he/she can *cope with current working environment and technological changes* rather than being only theoretically trained. The lack of competence to cope with the working environment has been one of the major weaknesses of TVET institutions in Tanzania caused by *low capacity to analyse labour market information* among other factors and *low adoption of ICT* (URT 2013). In addition, the growth of TVET in Tanzania does not match with the *ever-growing demands of technical personnel* in appropriate levels for all sectors of the economy (ibid).

The survey and interviews in **Kisii** revealed expectations from both industry and educational stakeholders concerning the expertise needed in the community. The employers and industry were asked to evaluate the skills, knowledge and attitudes of employees necessary in achieving expectations of the industry. Findings show a gap between what skills employees have and the expectations of the industry. There was thus a need for more *collaboration in curricula development between industries, TVET, and Universities*. HR-manager from the Tea Factory stated: "I don't know what can be done for sure...since there is kind of independence among the different stakeholders...but if there will be kind of collaboration between these stakeholders from the point of curricula development to the point delivery ...like us as industry to be included at development stage and even at delivery/teaching I think we can easily close the gap that is there. Mine is to ask all involved

to consider improving this collaboration to *make university and TVET curricula practical-based rather than theory.*"

Employees also revealed the need for refresher courses to be updated on evolving skills and new technologies available in the market. On the part of academics, Deans, lecturers, tutors and TVET instructors suggested the need for more future collaborations to *create a link that is currently missing* between them. This is most important because universities are the ones that train tutors or TVET instructors. The Dean from University stated: "We need to work more with the people who employ our graduates. We will then know what skills they want and even what details of the skills to stress on... such as environment regeneration, adaptability and resilience in the market due to unpredictable changes... pandemics, environmental disasters..."

The Dean of the University stated: "Kenya has the Vision 2030 focus which is planned for the country to be a newly industrialising, middle-income country providing a high quality of life to all its citizens by 2030. People with hands-on skills to drive this vision are needed. Universities should train such graduates and TVET tutors who are able to, in turn, train such graduates." Overall, many aspects of data in Kisii study resonate with Kenya's Vision 2030. The aim for the future is very linked to *practical skills which benefit both the individual and society*, interpreted in the vision as industry.

From **KyU** data, the quality of the new expertise of future change agents is considered highly important in Uganda, because it could be from this new expertise that the negative mind set of the communities toward sustainability will change. The results obtained from the survey, 73% of the respondents said the kind of experts required for the development of adult and continuing education and social sustainability should come from educational institutions and universities. The respondents suggested that the training of new experts should change. The trainees should be given much *more time on practical work* - hands-on - and the duration of time taken at the universities should be *increased by one year* on the existing number of years depending on the course being pursued. There should be strong *connection between the universities and industries or communities during training* time so that the tools and equipment used for training are the same ones as used in the industries or world of work. Trainees should spend time working in the industries (industrial training) so that they are able to *relate technology and attitudes of training to that of the world of work*.

The new expertise is also expected to come out of the universities with some advanced skills, on how to *manage industrial wastes*, such as smoke, since smoke from all motor engines provide pollution to the environment, especially in cities and towns.

Table 4.3. Expectations towards new expertise.

TAU	BUAS&SCNU	MU	Kisii	KyU
<ul style="list-style-type: none"> -Leaders of change with knowledge of sustainability, society, societal change and new pedagogy needed -Practical knowledge of materials, production -Deeper understanding: synthesis of practical and theoretical knowledge, ethical awareness - Mediators between different institutions 	<ul style="list-style-type: none"> -In education: experts who understand ecological concepts and spread the concept and knowledge -In administration: experts with high political awareness, strong management and creative capabilities -In enterprises and industries: people who can develop practical and applicable products or systems with social responsibility 	<ul style="list-style-type: none"> -Artisans most required for encouraging self-employment and producing employees -Training for VET administrators important for VET management specialization -Training for both administrators and artisans must integrate practical competences with understanding of work environment 	<ul style="list-style-type: none"> -Universities should provide practical skills in addition to theory, needed in community, such as technicians and technologists -People who are resilient, critical thinkers and flexible to change, able to decide promptly, and understand importance of sustaining the environment 	<ul style="list-style-type: none"> -Educators should be real change agents with new pedagogical and practical skills to drive communities towards sustainable development -Experts should be products of institutions and universities -Time for training experts should be extended to provide practical skills mastery.

Our study should support the identification and experimentation of new expertise to promote vocational and adult education for sustainable development. The ambition was to have an open and wide view about what it might mean. In all contexts, some respondents criticized current expertise – though it was not specified – produced by universities. They mentioned that university knowledge is currently irrelevant to the needs of vocational education if it does not recognise or contribute to practicalities in work life. The graduates seem not functional for developing vocational and adult education or they are expected to adapt to rather than change the work life. As one respondent in the TAU study said: “There are too many experts and developers, not enough people who do things.” The expectation of work life-driven and practical expertise is an age-old question about the identity of universities. Current funding policies have encouraged them and higher education institutions to show more directly practical and relevant for work-life. However, increased prioritisation of practical innovations may lead to decrease in the quality of theoretical research and education. Furthermore, it may challenge the autonomy of universities as well as other educational institutions in comparison to industrial organisations.

Yet, the need for new expertise and viewpoints to enhance sustainable development in vocational and adult education was recognised in all contexts. The common nominator was the *mediating role of new expertise*, bridging gaps and communicating across diverse, fragmented actors and sectors in education, policies, industry, and communities. The

deepest gap to tackle was identified between *educational and work life actors*, visible in expectations to enhancement of industries and employees. The curricula and programs for new expertise should help to improve of current structures, contents and practices in vocational and adult education. The challenge is the unclear concept of sustainability, the contingent future of education and societies, and the diverse ways to adapt to changes in work life.

A *dualism* between expectations to expertise was visible between promotion of *technical and practical skills and wider educational and edificational aims* in all contexts, but especially in TAU, BUAS and SCNU data. On the one hand, many respondents reminded about universities' role at the forefront of change towards sustainable future, which requires holistic curricula and education. As mediators between actors and institutions, university educated experts should be familiar with the needs of industries and communities, but also understand the structural causes of environmental, economic and social unsustainability. On the other hand, respondents emphasised wider educational framework for developing talents for different sectors of society and industry, as well as personal internalisation and propagation of sustainability by teachers. The emphasis was on dynamic and well-rounded professionals, who can move between practical, educational and ideological dimensions. In MU, Kisii and KyU data, the emphasis was more on practical and technical improvement towards sustainable means of production, and enhancement of self-employment and entrepreneurship.

Our study emphasises expertise for *sustainable local livelihoods as well as more democratic approaches* to education. This need was most explicit in Kisii and MU, to some extent in KyU data. First, it highlighted that large groups of industry and local communities are not recognised in and missing from educational collaboration and curriculum development. The new expertise should recognise the gap and mediate between education and community. In addition, it should engage industrial actors and focus on issues, which are most vital for sustainable livelihoods, such as artisans, food and leather industries, technicians and ICT.

Concerning *democracy and autonomy of educational institutions*, in TAU context the making of new expertise was figured as an outcome of personal commitment and negotiations among actors. In MU, Kisii and KyU contexts, respondents emphasised the role of government policies, but in BUAS and SCNU contexts, the emergence of new expertise was expected to be most state-driven, despite the space available for individual university staff as part of their teaching.

4.4 Expectations towards collaboration in curriculum and program development

This section provides information for planning future collaboration in developing university programs and curricula to enhance vocational and adult education for sustainable development.

Most of the respondents from the **TAU** study were advocating collaboration between *work life and educational institutions*. This was also the area in which collaboration is already working well in vocational education. Other stakeholders mentioned most often were both *national and municipal governance* and policymakers. Employees and students were not mentioned often, which indicates that respondents emphasise employer and politically driven collaboration.

The CC representative recognized national political agencies as allocators of money, resources and strategies - also in sustainable development - to the educational field. He suggested that education in general should keep *customer interfaces open* so that communication would function, and the needs of work life actors are heard. From the perspective of local collaboration, *regional council and municipal governments* would be important both in allocating and financing projects, but also in coordinating activities and in providing open interfaces between different actors. The TAMK representative also advocated connection between work life, vocational schools and Universities of Applied Sciences. She found it especially important for *VET teacher training to have cooperation with universities*.

The TREDU representative mentions national and municipal political organisations, *industrial and employer organisations*, *ARENE* (association of rectors of the universities of applied sciences/polytechnics), *AMKE* and the *ministry* of education and culture, as key stakeholders, which have most update knowledge about the current state of vocational education. Besides these, *universities and researchers* are vital partners in collaboration, even if she is aware that research on vocational and adult education has been declining in universities. Due to the ever-changing work life and environment, university research and collaboration with universities would be seriously needed.

The representative from AMKE emphasised the quality of collaboration, which should be more long term rather than just short projects which are forgotten as soon as they are finished. He introduces a *tripartite concept for collaboration*, where the centre is *work life*, entrepreneurship and support for industries. Another party would be *VET institutions*,

engaging their teachers, staff and students. The third-party would-be *universities and higher education institutions*, where teachers, researchers and students should be involved in collaboration. It should be a *holistic and bottom-up activity*, instead of being organised top-down. He also hopes it would not depend on external financial support, but happen *directly and continuously* between actors, building on a stable communicative platform between the three parties.

The VST representative was not specific on the institutions which should be involved since he finds collaboration difficult in the fragmented educational system. In his vision, popular adult education could be *complementing fragmentation*. His view is compatible with notions of paradigm change by other interviewees, who emphasise a change in worldviews and ways of life, beside technical and practical innovations. He considered popular adult education as a “joker” - free and unobtrusive player - in the educational system. The role of *popular adult education* in collaboration could especially be to *develop pedagogies* - such as eco-social or deep ecological - for sustainability education. The VST representative also thought that popular adult education could mediate interaction of various kinds of organisations.

The university interviewee emphasised that although it is important to expand collaboration, each stakeholder must also have its *own field and expertise*. She also finds it particularly important that university researchers are in contact with *ministries and political agencies*. Still, it is vital that actors bring their own expertise and knowledge to the educational field in general.

The representative of OKM sees current stakeholders - *ministries, work life actors and interest organisations* - as critical for collaboration. While other respondents addressed their complaints about the siloing of strategies, funding and development in vocational and adult education to policymakers and administration, he is calling for increasing dialogue between different sectors and actors. However, he emphasises the diversity of industrial sectors and educational actors. As an example, he uses the car industry, where companies have realised that in the future, being a car mechanic means completely different from what it used to be in the past. Therefore, it is especially important for educational institutions to be in close touch with the changes in their industrial sectors. This should be kept in mind in training of new expertise, teachers included. Like the VST representative, he also emphasises pedagogical expertise. Concerning the role of universities in collaboration, he is positive that they have become more aware of the contribution of research and education of experts for work life than they were 20-30 years ago, “when the word work life was unknown in universities.”

Respondents and interviewees in **BUAS and SCNU** study believe that the development of ecologically sustainable courses in vocational education requires the *joint efforts of the government, enterprises, universities and society*. The most mentioned stakeholders are *curriculum designers or leaders of vocational and adult education*, whereas employees and students are not mentioned much.

The dean of FoE in BUAS agreed that the establishment of ecologically sustainable development courses requires a multi-effort. First, at the national level, the country can put forward some *policy guidance* and integrate the courses of ecological sustainable development into the national curriculum. Second, at the university level, the university should have an overall goal of talent training and *combine ecological sustainability with specialty* setting.

As *teachers* are the main body of curriculum implementation, their own concept and consciousness of ecological sustainability are crucial. The student representative from BUAS said, "In order to develop an ecologically sustainable development curriculum, the *local government* should first give universities the appropriate rights, and the *community* should also give universities some resources to promote vocational education. Second, universities should measure their own development and students' long-term development, to make overall arrangements for the implementation of ecologically sustainable development vocational education courses." It is necessary to strengthen the training of teachers and improve their awareness and ability of sustainable development.

The teacher representative proposed two paths to integrate ecological sustainability into vocational education. "The first path is top-down. Academic research and seminars are useful to curriculum reform and have the potential to *influence policy makers*. Due to the top-down education governance system in China is, the influence of policies is exceptionally large and can radiate to more universities to promote reform. The second path is bottom-up. For example, the action research carried out by a professor in aiming to promote the transmission of ecological sustainable experience. in higher vocational education institutions in Hong Kong inspires us to *carry out pilot courses* in the mainland. For example, Jiao Cheng I can carry out piloted research in her course to promote ecological sustainability.

The dean and a teacher representative from SVTTE also put forward, "In order to develop courses on ecological sustainability, teachers are required to have international understanding and theoretical knowledge of this aspect." The expert from School of the Environment believes that the integration of ecological and vocational courses can start with every teacher. Just like ideological and political education, the concept of ecological

sustainable development should have been written into the teaching program, requiring *teachers to cultivate students' concept of sustainable development* when teaching. The state first carries out *top-level design*, and then concrete to the *implementation level*, *teachers can promote the theory of national design into all the courses*. Regular training can also be carried out within the university, or in regions and counties, and some environmental experts could carry out teacher training. The environmental protection laws and regulations should be integrated into the teaching design.

Finally, there is *society*, for which there is currently no suitable way to intervene. Listening to lectures, taking students to social practice, personally experiencing or cooperating with enterprises are all possible ways to try in the future. The development of sustainable courses in vocational education in general requires the cooperation of universities, society and industry. In addition, teachers, as an important part of the future curriculum development, need to be trained.

According to the survey and interviews findings in **Kisii context**, it was evidently noted that collaboration between *universities, trainers of adult and vocational educators, administration and leaders of adult and vocational education, and representatives of local community and industry* is crucial for the whole development of a country and the successful implementation of the school system curricula. Universities should have collaboration with non-university actors, such as vocational and adult educator/teacher training institutions and administration, labour market partners. This is currently not common as universities develop and plan their degrees and curricula in Kenya. The manager of tea factory said: “This is technical skills since most youth want white collar jobs but now, they are facing high rate of unemployment, this makes me wish *university could develop courses* that will encourage self-employment and job creation ...these are sectors like Jua kali, Manufacturing Sector Technical subjects, Entrepreneurship, Research and Innovation, Masonry and Carpentry, Art and Craft, Life skills and local industries, like building and construction. I mean skills that one can apply directly and maybe that is why the *government* is championing the new Competency Based Curriculum (CBC).”

In the findings of **MU**, comments primarily referred to curriculum development in vocational education. The collaboration from a range of different stakeholders was evidenced to be important for several reasons and aspects of the VET curricula. Findings from industry, VET administrators and teachers revealed that expectation on the changing and improvement of the VET sector will be attained by *including* lower-level industrial employees like *artisans and technicians* in development and implementation. This is because they have rich information on missing competence base on their daily activities as they are the ones who perform most

of the production activities in industries. This implies that while the labour market competences relevant for VET students are vested to these artisans, the VET institutions are not exploiting this potential to improve their curricula.

Among other stakeholders, VET colleges and related higher learning institutions which are technical based, such as Mbeya university of science and Technology, Dar Es Salaam Technical College were observed to be important stakeholders. This is mainly because of their nature of *conducting technical research*, on one hand, and their experience in *training VET experts* in different trades.

Politicians were perceived to be important, but it was suggested that they should be involved for policy advocacy issues only. Moreover, interviewees revealed that the emphasis should be on *national policy* of industrialization, entrepreneurship, self-employment and job creation as well as environmental protection. It was observed that to enable the curriculum to meet the current need of the community and industries for individual and national development, *enough funds* should be allocated to the expected collaboration for its proper operations toward good results.

In the **KyU** study, 96% of respondents accepted that it is relevant to start a new project to experiment new practices and implement new programs and curricula for new kinds of expertise, and 73% of these showed willingness to participate in the new program. This information obtained from the respondents showed that Ugandans are ready to collaborate towards the new expertise. There is hope that the new collaboration will help *change the mindset of the communities* and they will embrace TVET and industries as necessary for personal development. If positively handled, sustainability will be realised both at social - economic levels - and as industrial progress.

In planning for the curricula and program development, the stakeholders such as policy makers (politicians) - ministry of education -, university administrators, lecturers and students, TVET institution/college/school administrators and students, both small-scale and large-scale industries, secondary schools, primary schools and community leaders or representatives should be involved in the collaboration. Thus, collective views are brought together for proper channelling during curricula development.

Table 4.4. Expectations towards collaboration in curriculum and program development

TAU	BUAS&SCNU	MU	Kisii	KyU
-Long term collaboration	-SD-courses are necessary and	-Improvement of SD in VET requires	-To develop curricula in line	-Most accepted relevance of

<p>with enhancing financial structure</p> <ul style="list-style-type: none"> -Tight networks between education, work-life and customers -Effective use of R&D&I resources, use of university research in general -Collaboration between theory and practice. 	<p>will become a trend in VET</p> <ul style="list-style-type: none"> -Multi-cooperation: SD-curriculum needs the efforts of the government, universities, teachers, enterprises and society -Demand-oriented: development of SD-curriculum should focus on needs of society and schools. 	<p>workers, VET colleges and HEIs training experts in VET</p> <ul style="list-style-type: none"> -Politicians involved for policy issues only: national policy of industrialization, entrepreneurship, self-employment and job creation as well as environmental protection -Allocation of funds for proper operations toward good results. 	<p>with the vision of the country should include diverse stakeholders: government, ministries, entrepreneurs, industry, local community members</p> <ul style="list-style-type: none"> -Universities should research who to draw in for curriculum development. 	<p>exploring new programs towards SD</p> <ul style="list-style-type: none"> -Ideas needed from multiple stakeholders: government, universities, TVET institutions, secondary schools, primary schools, small scale and large-scale industries, and community leaders.
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The hope for wide, cross-sectoral collaboration was common for data from all contexts. However, the views about who are the key actors, what is the role of each actor, and what is the substance of collaboration varied. Hardly any respondent specified, which university curricula and programs they meant, or how the expected curriculum or program development should concretely happen.

In all contexts participants agreed that promotion of sustainable development through vocational and adult education *requires long term and reciprocal collaboration* among identified stakeholders, which implies *long term funding and strategies*. One premise of our study was to find suggestions for (new) local and grassroots collaboration, but respondents usually started with current institutional stakeholders, and top-down coordination. This is understandable due to the power and potential of national governments and policies in the development of vocational and adult education, which in all contexts are dominated by the interests and needs of big companies and - especially export – industries. Yet several respondents in TAU, MU, Kisii and KyU also acknowledged this as a problem, because collaboration of educational institutions with the enormous number of small enterprises and the informal sector is limited. Primarily in TAU, representative collaboration, also horizontally, between political agencies, interest organisations, educational institutions and universities was emphasised. Respondents from BUAS and SCNU considered local, self-directed implementation vital, but they did not find it contradict with the centralised, top-down political, industrial and educational system

Still, the TAU, MU, Kisii and KyU respondents didn't find it fair that mostly the large companies benefit from educational collaboration: the key issue is *how to involve small*

companies and local businesses to be part of it. Since in East-Africa TVET refers mainly to technical occupations, respondents from MU, Kisii and KyU emphasised collaboration of VET and teacher education institutes with higher technological institutes and science universities. They also connected collaboration most closely to promotion of livelihoods of individuals and communities. These should promote acquisition and improvement of vocational skills and competences in educational institutes, work life and community. The involvement of politics and politicians should remain at policy advocacy of industrialisation, support for entrepreneurship and environmental protection and to allocation of funding. AMKE and OKM representatives in TAU data also emphasised the need for *sectoral collaboration* across levels of vocational and higher education, to integrate efforts for sustainable development of workers and employees at different occupational levels and across production chains.

While the research team and most of the respondents come from the fields of education, most explicit expectations for collaboration in curriculum and program development were targeted towards *educational actors*. The focus was on wider and deeper *pedagogical* – or ideological in Chinese vocabulary - *impact* through horizontal or mediating collaboration between fragmented educational institutions, and with work life and communities. In all contexts, but especially in BUAS and SCNU, mediation between differences in goals, opinions and resources between actors was considered vital. Leaders, teachers and students in universities, higher and secondary education institutes are key actors in initiating collaboration for curriculum and program development and implementation, but also in disseminating scientific knowledge, changing paradigms and worldviews to society at large. Kisii respondents and the VST representative in TAU considered especially universities and civil society and popular adult education organisations have the potential to provide holistic perspective into collaboration, to move beyond or to integrate sectoral and institutional interpretations of sustainable development.

One of the premises our study, global or planetary perspective to collaboration, was mostly missing from our data. The notions about global competition and production chains were translated into needs for collaboration and competitiveness within nation-states. Hardly anyone recognised the linkage of sustainable livelihoods with global interdependencies, global division between industries, work and occupations. Yet respondents from BUAS and SCNU reminded that the ideological (pedagogical) conception of sustainability includes international collaboration. The dominance of big industries and companies, fragmentation between industrial and educational sectors and actors, as well as tensions between their goals, worldviews and paradigms, function across and beyond national contexts. Local and

national solutions may not be promoted through vocational and adult education without collaborative promotion of awareness of and action towards global power relations in economy, industry and education.

4.5 Most important sectors and issues for expertise and collaboration

The contextual diversity was expected to become visible in the issues and sectors, considered most important in surveys and interviews. In the following, results from each context are described and summarised, to provide ideas for more concrete and focused collaboration among partners in the future.

In **TAU**, the most common notion among respondents was that *every sector* is important, and sustainability needs to be implemented in *all areas of education*. However, some sectors were used as an example on how sustainability has already been implemented in practical work. The AMKE representative highlighted *construction* as an example of a sector, where collaboration and sustainability has already been taken seriously. In his view sustainability cannot be achieved without structural change in all sectors towards collaboration across production chains and between occupational levels. This requires structural renewal of the VET system, which should be supported by new expertise. He criticises current educational ideologies and reform policies for adoption of too individualistic continuous learning approach instead of collective perspective to industrial, occupational and education systems. The CC representative considered important *logistics and construction*, where environmental aspects like carbon emissions are already considered. He believes that the growing requirements of customers drive the industry to take environmental reductions seriously. The TREDU representative highlighted *forestry* as exemplary for VET, since they are advanced in efficient use of digitalization and new technology to reduce pollution and emissions. For example, teachers and students can manage through computers the functioning of forest machinery, controlling fuel and power etc. Such practical solutions could be transferred also to other sectors in industry and VET.

Most respondents found the implementation of sustainable development as the key issue also in vocational and adult education, since climate change and environmental crisis affect all areas of education, society and industrial sectors. The representatives from AMKE, OKM and university emphasised that the *structural changes* needed in the whole education system require long term collaboration between all stakeholders. New experts and professionals with a comprehensive view on economy, industry and culture are needed to support adoption of sustainable practices, worldviews and ways of life.

In **BUAS and SCNU** data, sustainability is closely seen to relate to *all sectors*. Since the focus in surveys and interviews was on ecological/environmental sustainability, it was understandable that the professor of the SoEnv in SCNU emphasises that *agriculture, construction, and manufacturing* sectors are most closely linked to sustainability, while the government has issued important regulations and policies to promote cleaner production in these sectors. Both the dean and the representative of SVTTE in SCNU highlight that the concept of eco-sustainability is better integrated in science and technology colleges or universities and relatively less integrated in liberal arts schools. The *prioritisation of technological solutions* in sustainability policies echoes in the comments of the SVTTE representative: "The concept of eco-sustainability is generally better integrated in science and engineering universities."

Most respondents believe that *policy support, Internet technology and the R&D sector* are the most crucial factors in promoting sustainability. The representative from the SVTTE in SCNU expresses that state policies can be quickly and strongly promoted and implemented nationwide in China. The director of the SoEnv in SCNU further explained, "China's education governance system is top-down so *national policies* have a profound impact on university education and can effectively contribute to university reform." A faculty representative from BUAS mentions, "In China, the talent training program for schools requires coordinated design by the central government, local government and administration. After that, universities and local schools implement the plan accordingly." The majority of respondents believe that the *Internet* plays a vital role in the 21st century because it *provides a significant platform* for publicising and promoting sustainability concepts. In addition, the *R&D sector* can develop and update *key technologies* to promote cleaner production effectively.

Based on the survey conducted in **MU**, the leather sector was observed to be the most required sector for the attainment of sustainable development in the country. The findings indicate that 45% of the total population of the study opted for the leather sector. This was followed by the food sector by 15%, textile sector 10%, ICT 10%, transport 10%, tourism 10% and nothing opted for the medical sector. Conclusively, *food and leather industrial sectors* were considered to be important for expertise development and collaboration for easy self-employment. Collaboration should insist on integration of ICT, financial and entrepreneurship skills in training of experts.

From the survey in **Kisii**, the following sectors were found to be the most important: manufacturing sector, technical subjects, entrepreneurship, research and innovation, agribusiness and masonry and carpentry, art and craft and life skills (Jua kali sector and

local industries). Others were education on financial literacy, practical skills for handling various engineering and technical tools and equipment, living curriculum that changes as required with a focus on employment, special needs (disability needs) training, and ICT.

Quick observation is that Kenya's most *important sectors* are those that will lead one to acquire *self-employment skills*, this may be because of the high rate of unemployment in the country. Respondents found most important are sectors, which are critical to achieve the *Kenya Vision 2030*, which aims at transforming Kenya into a newly industrialising, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment. As the Dean of University stated, “people with hands-on-skills are needed, and universities should train such graduates and TVET tutors who are able to, in turn, train such graduates.”

The most critical issue at hand in the data from **KyU**, is that to promote sustainable development, *trainers* must have enough *practical skills* in the vocational or technical field of their professions. Furthermore, training institutions should have adequate *modern tools, equipment and materials* required for training. New *positions* for employment should be created for *trainers* into the community so that they become *mind set change- agents*. Issues of sustainable development should be integrated in the curricula so that all trainees come out with the skills needed for sustainable development. From the conducted study, the *food industry* was identified as the most important industrial sector with 73%, followed by the *machinery and chemical industry* with 15% of responses.

Table 4.5. Most important issues and sectors for expertise and collaboration

TAU	BUAS&SCNU	MU	Kisii	KyU
<ul style="list-style-type: none"> -Technical, financial, pedagogical and cultural changes -All sectors important in implementation of SD -Construction, forest industry, logistics are exemplary for SD. 	<ul style="list-style-type: none"> -Policy Support: national policies are the key: once a national policy is issued, it will be quickly promoted and implemented nation-widely -R&D Department: should master key technologies to make production more environmental-friendly and practicable. 	<ul style="list-style-type: none"> -Leather sector, food sector, textile&ICT&transport - Emphasis on development of expertise and self-employment -Collaboration in training experts should integrate ICT, financial and entrepreneurship skills. 	<ul style="list-style-type: none"> -Manufacturing sector is the future of the country -Technologists and technicians seen as important drivers of the vision -Graduates need survival skills in unexpected situations -Theoretical subjects important but practical subjects needed. 	<ul style="list-style-type: none"> -Food industry most important -Trainers must have adequate practical skills in VET field of their professions -Training institutions should have adequate equipment and materials required for training.

As expected, most respondents in all contexts emphasised the need for practical and technical skills in promotion of sustainable development through vocational and adult education. Hardly any mentioned unequal roles and power of actors in industry, society and communities, to participate and influence sustainable development.

In TaU, BUAS and SCNU findings, *all industrial sectors* were considered important for sustainable futures, but both suggested some sectors. In TAU context, construction, forestry and logistics were mentioned as *exemplary* for efficient processes and circular use of raw materials and end-products, but also advanced collaboration across industrial and educational actors. Following their example would strengthen current economic, social and education structures. In BUAS and SCNU contexts, construction, agriculture and technology were emphasised because of their *central place in government policies*. The respondents in MU, Kisii and KyU mentioned specific sectors, which were vital for *modernisation of industry, for entrepreneurship and self-employment*, such as leather and food industry, construction, craft and tourism. Emphasis was also on digitalisation and financing, which are less “developed” than in Finland and China.

On the other hand, most respondents also found *pedagogical and cultural change and education of educators* as crucial issues and sectors for future collaboration. The bottom-line is education of teachers and trainers to enhance skills and competences for promoting sustainable development in different occupational and industrial sectors, but critical for future is developing holistic and comprehensive understanding and competences to build bridges between educational and industrial sectors and society. This requires new larger and cross-disciplinary theoretical frameworks and complex arrangements in education and between social actors. However, as emphasised by TAU respondents, the need for change in industry, ways of life and worldviews when combatting and adjusting to environmental crises, is huge but unclear to most actors. The new expertise should *react to this uncertainty and unpredictability* in all sectors of vocational and adult education. Although the state is main platform for change, the content and concrete implementation of change is decided in enhanced within industries, education and communities, depending on their autonomy and the level of democracy.

According to our data, the key stakeholders are willing to participate in future collaboration. However, the concept of sustainability varies and may have different, contradictory meanings to different actors. This becomes visible in emphasis that is given to required change as more industry-driven with technical innovation and economic drivers or as an ethical or educational issue. Differences resonate with the burning global research and policy discussion, questioning whether the “green transformation” is possible through

technological innovations and green capitalism or whether the organisation of economy, work and education should go under metamorphosis. However, truly sustainable livelihoods require new strategies which involve practically everyone, thus differences and oppositions should be recognised and negotiated.

5. Conclusions and recommendations

The aim of this chapter is to summarise our findings for development of future collaboration. It also aims at tentative responses to the research problems of the study:

- concerning meanings and interpretations given to sustainable development across different actors and geo-economic and geo-ecological contexts and contextual factors and their interrelations affecting curriculum and program development in partner universities,
- concerning conceptual and methodological framing of co-creative, research-based collaboration, to develop curricula and programs for expertise that promotes vocational and adult education for sustainable livelihood (in local) industries and communities.

First, we suggest what is distinctive in findings from different contexts, also considering which sectors and actors our respondents and informants represent. Then we speculate which factors might underlie such distinctions. Third, we reflect on the role of universities and higher education visioned in our findings. After this, we draft a sketch of new expertise in vocational and adult education, supported by new curricula and programs and new principles for their planning and implementation. Finally, we provide a short methodological critique of our study, which may promote designing research-based collaboration in future.

5.1. What is distinctive in findings from different contexts

In the context of **TAU, Finland**, university and higher, vocational and adult education institutions have relatively high autonomy for local action, but still the respondents commented on all themes from the perspective of *national industry and education system*. They did not announce much experience or confidence in promoting sustainability in industry and communities through collaboration among local actors and with focus on local issues. Since most respondents represented a *certain stakeholder* - university, association of vocational institutes or popular adult education organisations, chamber of commerce, vocational institution, vocational teacher education -, they emphasised its *interests* and policies. Still, despite their distinct positions, respondents shared the concern that the current

structure of collaboration and content of curricula and programs are dominated by large companies and industrial sectors, critical for global competition and export industry. Although service and welfare sectors are prominent in Finnish economy and education, they didn't get attention among respondents. Though they did not provide concrete suggestions, they considered that the promotion of sustainable livelihood would require inclusion of *small companies and local perspectives* in strategies and policies of vocational and adult education. Especially representatives of educational institutions emphasised the importance of *sensitising, participatory and community-oriented pedagogy* in developing ethical and social capacity towards sustainable development, beside critical thinking, knowledge and technical skills.

The surveys and interviews in **BUAS and SCNU** emphasised ecological and environmental sustainability, which was also visible in responses about collaboration, new programs and expertise. Also, the target groups were almost exclusively from university, thus changes were mainly asked from university actors: *cross-disciplinary collaboration* in courses and programs, engagement of teachers, staff and students in development practices. The *role of central government* and smooth functioning between various levels of governance were considered vital for transforming programs and practices of curriculum development. Solutions are sought from *large-scale industrial and technological innovations*, not that much from local actors and practices. This points to the need to affect education of *leaders, managers and administrators* of vocational, adult and university education. However, at the same time *moral education of students and enlightenment of workers* and citizens were emphasised in promotion of ecological and environmental sustainability. An important example is rapidly expanding e-commerce, where consumption habits, patterns of production and logistics intersect with environmental problems. Otherwise, both vocational education for welfare work and adult education were hardly mentioned, showing that these sectors are quite marginal in economic and educational policies.

Despite differences in institutional settings and industrial sectors, there were several distinctive features among responses and summaries in **Kisii, MU and KyU**. Many responses seem to follow national (and supranational) development and education policies, emphasising rather abstractly that sustainability in industry and communities could be promoted through *self-employment and entrepreneurship*. Vocational and university education should prepare graduates by responding to the (current) needs of industry and labour markets. However, workers and teachers more concretely ask *workers, artisans and technicians at shopfloor, as well as local communities*, to be involved in developing industries and education. As expected, service and welfare (such as social and health care)

work or industries were hardly mentioned, since they are mainly carried out in the informal sector without formal qualifying education. Similarly, there are few notions on adult education, which has remained marginal in education systems. Yet, the experiences, competences and knowledge of adults and local communities are expected to be recognized in program and curriculum development and the programs and curricula to be relevant for them.

Table 5.1. Summary of findings to research questions (RQs).

RQ	TAU	BUAS	SCNU	Kisii	MU	KyU
Relevance of curricula/programs	ECEC and teacher training dominate. Detachment from VET&worklife realities.	Focus on teachers and education leaders, not vocational and adult education.	Educating VET teachers but not connected with concrete VET&worklife.	No direct connection to VET&adult education.	Isolation of universities from vocational and adult education. Lack of funding.	Programs for VET and industry. National role in developing VET&adult curricula. Lack of up-to-date facilities and programs.
Current collaboration	VET institutes with worklife (enterprises). VET teacher education with worklife, some extent. Universities isolated. Lack of cross-disciplinary/intra-university collaboration.	Minor collaboration with non-university actors.	Government, university, industry in planning. Lacking connection with industry and enterprises, between education and environment departments.	No collaboration with vocational, adult education or worklife actors.	VET teacher training with schools&worklife. Universities isolated: opposition of "academic" and "practical" knowledge.	Negotiation systems exist: policymakers, engineers, managers. Low input from worklife/enterprises.
Expectations on expertise	Understanding and knowledge of VET, adult education, worklife realities. Change/transformational agency.	Understanding worklife realities. Innovative professionals in education, administration and industry.	Understanding worklife realities. Innovative professionals in education, administration and industry.	Understanding and skills of VET, adult education and worklife realities.	Understanding and skills of VET, adult education and worklife realities.	Understanding and skills of VET and adult educators to worklife realities.
Expectations on collaboration	From projects to long term collaboration.		Government, universities, enterprises, "society".	Engaging workers/artisans, Universities, VET&adult education and Trainer institutes, community.	Engaging employees/workers. Funding for collaboration.	Engaging employees/workers. Funding for collaboration.

Most important issues/sectors	Holistic approach in all sectors. Exemplary sectors	Government policy.	Government policy. Agriculture, construction, manufacturing.	Self-employment, life skills. Manufacturing, art and craft.	Self-employment. Leather&food industry.	Self-employment. Fishing and food industry.
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In all contexts, most respondents were not familiar with or didn't want directly to comment on current curricula and programs in partner universities. This was the case also with current practices in collaboration for developing curricula and programs. Therefore, they mainly commented on curricula, programs, expertise and collaboration in vocational education, less in adult education, but thus indirectly referred to universities and higher education. Almost all respondents seem to consider *national and (indirectly) supranational economic, industrial and education policies to dominate* development of vocational, adult and university education, also concerning sustainability. Those, in turn, believe in *large-scale, high tech industrial solutions*. Hardly any considered the themes of the study from the perspective of the (partner) university and its collaboration with local work life, industry and community, or emphasised local wisdom, skills and technology as solutions. This indicates that the systems, traditions and practices to develop vocational and adult education from the *perspective of local industries and communities are widely absent* in all contexts. Therefore, the respondents considered that the need for new expertise, new curricula and programs and collaboration between stakeholders, was primarily the concern of actors at the national level.

Yet, respondents from all contexts emphasised the *quest for skills and awareness of practicalities and realities in industry, work life and communities*, across all stages and areas of education, to promote vocational and adult education for sustainability. They complained about the lack of relevance and support for local industry and the neglect of the needs of local communities at all levels of education. They criticised the dominance of national (and supranational) policies, considering them to prioritise big companies and cities, and their competitiveness in global markets. They emphasised the need to develop strategies, policies and practices to *concrete and practical solutions for sustainable local livelihoods*. If the diverse skills and competences for sustainability in different industrial sectors are not recognized in vocational and adult education institutions, this leads to waste of time and resources, and graduates depend on learning from mistakes and experiences. Suggestions on collaboration in curriculum and program development between universities, local communities, enterprises and educational institutions remained abstract, but most respondents in all contexts found it necessary and expressed willingness to participate in future co-creative experiments.

5.2. What is at stake concerning characteristics?

The concerns of respondents about the relevance of curricula, functioning of collaboration, and their expectations towards new expertise in vocational and adult education, *focus on the gap* between the curricula and programs (aims, contents, implementation) of mainstream educational systems and the realities of industry, work and life in communities. The gap is unanimously addressed to the *siloining* of policies, strategies and funding across sectors, actors and institutions. Yet the quality of the gap and silos differs according to their distinctive economic, political and ecological characteristics and geo-economic and geo-ecological interdependencies.

In findings from **TAU**, the emphasis on the *high-tech export industry, vital for global competitiveness* also in vocational education for sustainable development, was to be expected among respondents and informants, even if many found it problematic. Finnish economy is traditionally open and highly dependent on foreign trade and export industry and concentrates on intermediate products, with many SMEs being subcontractors to multinational companies. (Haaparanta et al 2017; Ali-Yrkkö et al 2016.) Forest or wood-processing, chemical, metal and electronics industries are the largest sectors from this perspective.

The expectations of most respondents towards policymakers and educational institutions are understandable, since Finland has become a Nordic welfare state and part of Global North with a universal public social, health, education and infrastructure services sector. Industries, labour markets and civil society are *highly formalised, monetarised and regulated*, including comprehensive taxation. Beside civil society organizations and autonomy of local governance, popular adult education institutions have been historically important for civic engagement and democracy. Since Finland is a member of the European Union and euro-zone, the solutions in promoting sustainable development are integrated to EU economic, social and education policies.



Picture 5.1. Forest machine in action. Restoration of factory area into “smart green city” in Tampere.

From an ecological perspective, Finland is mainly a sub-arctic, boreal area, where forests cover almost 80 % of land-area. Mining sector also provides some critical materials for renewable energy production and electronics. Farming provides partial food self-sufficiency and products for export. The dominant economic and innovation policy figures Finland as a globally competitive "high green-tech" industry and society, also as part of EU green deal and digitalization policies, which impact the whole education system.

The lack of comments on local solutions, grassroots collaboration between actors, indicates that despite relative autonomy of educational institutions and staff, the national economic and innovation, research and education policies, as well as funding systems are *not encouraging* solutions for sustainability through *local innovations and local communities*.

In **BUAS and SCNU**, respondents and interviewees consider problems in promoting sustainable development in universities, due to their lacking connections to VET institutes and industries and enterprises, as well as *lack of cross-disciplinarity* in programs and curricula and *autonomy* in program and curriculum development. This is understandable in a huge and diverse country with extensive natural resources, which is steered comprehensively through a centralized governance system.

From an ecological perspective, China has rich and diverse natural resources, but because of rapid industrialisation and growth in production and consumption since the opening-up policy in 1978, it is also one of the *largest polluters and greenhouse emitters*. Solutions in China have a major impact to the sustainability of global economic and commodity chains. Despite evolvement from agricultural to world's largest manufacturing country, there is a historical *unbalance between economic development of the eastern, central and western regions*. Many parts of the country are highly vulnerable to climate change and loss of biodiversity. The differences in economic, cultural and social ideas also affect the effectiveness of implementation of national reforms.



Picture 5.2. A vocational teacher graduated from SCNU leading students win the provincial e-commerce skills competition. Logistics robot system solution.

The government has ambitious policies to address climate change and promote sustainable industries through reforms in *large-scale industrial and technological solutions*. For example, the State Leading Group Office for Carbon Neutrality and Emission Peak has co-edited a training book *Cadre Textbook Carbon Neutrality and Emission Peak (2022)*. In universities, the research focus has shifted to energy, materials, and waste treatment. Under the influence of COVID-19, people's dependence on e-commerce increased, and the promotion of community waste classification slowed down. However, progress has taken place through Regulation of Classification and Management of Urban Domestic Waste, for example in Baoji City (Baoji Government 2022).



Picture 5.3. Baoji Culture and Art Centre. Renovation of factory area into “City Library and Youth Activity Centre” in Baoji.

In **MU, Kisii and KyU**, the emphasis of responses was on self-employment, skills and competences required to enhance local industries and communities. This indicates their current neo-colonial position in global production and commodity chains with their industrial and occupational hierarchies. Their economies build heavily on *primary production* and are

dependent and most vulnerable directly on natural resources. (ICPP 2022). Consequently, the majority (around 90 %) of the working population are working in the *informal economy* and in informal employment, primarily in agriculture and petty trading. (NACTE 2020, Kiaga and Leung 2020).



Picture 5.4. Textile factory in Morogoro. Tea plantation and natural forests surrounding a factory in Kisii.



Picture 5.5. Learning fishpond construction and boat building in Fisheries Training Institute.

From an ecological perspective, East Africa is a tropical area with diverse flora and fauna, favourable for agriculture, fishing and tourism. The *ways of life* in Tanzania, Kenya and Uganda are still *ecologically intact*, and could provide alternative pathways to exploitative economic development in the Global North. Yet, because of (neo-)extractivist tendencies in industries, conditioned by transnational companies and finances, both the natural environment, and the health and livelihood of communities are endangered by climate change, erosion and loss of biodiversity. At the same time, the rapid population growth

encourages people and governments to adopt unsustainable solutions to fast create employment and economic growth. (Kiaga et al 2020, Pereira and Tsikata 2021). However, while the national policies focus on industrialisation, technological advancement, growth of incomes and formal economy, respondents seem to assess promotion of sustainability in education based on contribution to these aims.

Politically and economically Tanzania, Kenya and Uganda carry the *colonialist legacy* of the Global South. They are still dependent on supranational donors and agencies and their industrial, social and education development policies and funding. The centralized and corrupted governance are a challenge to civic participation and local industrial or social initiatives. The staff in universities or vocational and adult education institutions don't have much autonomy and power. Thus, unless there is external funding by international donors, they hardly can deviate from national policies and priorities. (Kalimasi 2015, Pereira and Tsikata 2021).

The transnationally and nationally *dominating eco-modernist policies and discourses* of vocational and adult education and sustainable development are visible in the responses from **all contexts**, despite their political, economic and social diversity. The aims of continuing economic growth and competition by developing large-scale high-technological solutions in production, distribution and consumption, were commonly taken-for-granted or problematised only indirectly. Accordingly, many respondents seem to follow dominant discourses, where vocational and adult education would promote the global transformation to “green economy” by providing green skills and competences. These would allow continuation of economic growth (production and consumption) through new technologies, urban densification and rationalisation of rural industries. (see OECD 2021, Strietska-Illina 2019, European Commission 2021, An Ecomodernist...2015, MinEdu 2020, Abyu 2021, URT 2021, Ministry of Industry...2016, Directorate... 2022).

Yet, based on responses and discussions among the research team, the universalism of eco-modernist solutions is confronted by the diversity of political, economic and social traditions and geo-ecological realities. The *dominant solutions are developed in individualist, highly regulated and monetised, and high socio-metabolic countries* of Global North, such as Finland. While it has a long tradition of civil society organisations (CSOs), including trade unions, rather autonomous educational institutions and professionals, sustainability policies remain nationalist and Euro-centric. Despite differences, the Global South countries Kenya, Tanzania and Uganda are all dominated by low-tech primary production and informal economy, benefiting production and consumption in the Global North. Initiatives for local change are difficult due to centralised political and educational systems and lack of civic

participation and role of CSOs. On the other hand, they have potential for alternatives to eco-modernist solutions, due to their low socio-metabolism and collectivist concepts and practices in work and community life. Political, economic and educational systems are most centralised in China, but there is a huge geo-ecological, industrial and social diversity - and thus in social metabolism - between various parts of the country. It is one of the biggest economic and industrial actors in the world, but the weakness of civil society and the marginal role of CSOs hinders creating local alternatives to dominant eco-modernist policies. However, due to the exceptionally significant role in the global economy, in production and commodity chains, *solutions towards sustainability in China are most influential* to all other contexts of the study.

An important topic, which was marginally considered in our preliminary study, is the *position of workers and quality of industrial relations* in different contexts, though it has a critical impact on the capacity of working people - whether in formal or informal economy, employees or entrepreneurs - to promote sustainable livelihood critical. In Finland, workers have social and legal potential to influence, but the mobilisation and rights of workers in China, Kenya, Tanzania and Uganda are radically worse. (ILO 2022, ITUC 2022). Furthermore, international organisations, such the International Trade Union Confederation (ITUC), are dominated by the Global North. Yet, even in Finland, the issues of industrial relations, workers' rights or democracy in work-life and economy are poorly addressed in vocational and adult education or in related programs in universities. Consequently, awareness and support to workers' capacity in influencing the future of work and industry locally and across localities, is vital in the search for new expertise. This also confirms the need to build bridges also between vocational and adult education.

Although mainly indirectly, the findings also indicated possible alternatives to eco-modernist sustainability policies. They remind us about the ongoing transnational discussion about degrowth and environmental or ecological justice-approaches to sustainability. (Rodríguez-Labajos et al 2019, Martínez-Alier 2021, Escobar 2018.) The notions from Kenya, Tanzania and Uganda, which emphasise that vocational and adult education should enhance industries, individuals and communities towards employment, entrepreneurship and economic growth, resonate with the discourses of environmental justice. They focus on fair global distribution of resources, wealth and well-being, and on fair division of labour and industries, when reducing harmful human impact to the environment, caused by the multinationals and consumption in the Global North. The comments from Chinese and some Finnish respondents, may be interpreted as alignment to the degrowth discourse, emphasising the need to abandon policies of exploitative economic growth and social

metabolism. This would require new ways of work and community life, reducing eradication of non-human nature in production and consumption. This implies *mutual learning from current and historical forms of self-sustaining and simple economy with low social metabolism* between Global North and South. This might allow collaboration in reducing the complexity in technology, industry, social interaction and governance.

5.3. What is at stake concerning universities' position, role and potential?

In all contexts, most respondents were not familiar with university curricula or programs, which relate to vocational and adult education, or did not want to comment on them directly. Still, the general critique about detachment and irrelevance of educational institutions from needs of industry, labour markets and society were most sharp towards universities. Hardly any comments were made on the role of universities in the global science-technology-state-industry nexus, which is critical for solutions for sustainable development.

The findings from **TAU** indicated that most non-university actors were concerned that *universities are not familiar with - or interested in - the realities of vocational and adult education institutions*, work life and industries, also concerning their contribution to sustainable development. One solution would be engagement of students from universities and vocational and adult educational institutions into collaboration with work life, which would also be beneficial for universities in their research and education. Another option is engagement in the constant upgrading of competences among staff, which is required for promotion of sustainability in economy and industry. Regulations and funding could support their continuous learning in universities, also in collaboration with other educational institutions. It was typical for Finnish respondents to put their faith in RDI (research-development-innovation)-activities. Especially the AMKE and OKM representatives expressed concern about the *lacking RDI-collaboration* between universities, educational institutions and work life. This resonates with the current political trajectory about raising the level of RDI funding in Gross Domestic Income. However, since most respondents were concerned that the dissemination of RDI funding is not fair and effective between different local communities, sectors and actors in industry, it may not be enough for tackling problems of unsustainability.

The findings from **BUAS and SCNU** indicate, on the one hand, that like all sectors of society, transformation of universities is expected to depend on central government policies. Their awareness of the importance of university programs and curricula, as well as of collaboration with key actors in education, industry and civil society would enable comprehensive change in the strategies and practices of universities. On the other hand,

since universities are key actors in reproducing and educating leaders and policymakers for society, fostering awareness may require self-directed initiatives and experiments by universities themselves.

Among **MU, Kisii, and KyU** respondents, universities were expected to take a more responsible role in developing vocational and adult education systems, curricula and practices towards sustainable livelihood in industries and communities. This is due to their politically, financially and epistemologically privileged position in society and education system. Universities could mobilise their research and teaching capacity into collaboration with actors from industries and communities, to explore current and traditional practices, to valorise them with scientific knowledge and theories, and to support vocational and adult education institutions and educators to provide relevant programs and pedagogy. This way universities also would educate new kinds of experts in administration, industry and civil society, to develop vocational and adult education for sustainability.

In all contexts, most respondents had adopted the prevailing transnational competence-based education and training vocabulary, which emphasises drawing the competences from the “needs” of dominant sector industries. This seemed to be the case, even if the competences were expected to be “green” to match the greening of industries. The overflowing talk about “work life” remained abstract and ambiguous. Implicitly it seemed to refer only to (assumed) current needs of companies and employers. There were few direct notions about students, workers, employees or communities as creators of alternative solutions for sustainable economic and social life.

However, it is crucial to see a larger theoretical frame to understand the effects of climate change and environmental crises. As Clarke et al (2020) show, vocational education should aim at “high road”, broad-based occupational profiles and curricula, providing broad agency to address demands for sustainability. They should not stay at the instrumentalist “low road”, just plugging existing skills gaps, but not empowering employees to transformative action. It is important for students in vocational and adult education to recognise how politics, economy, culture and technology affect vocations and societies. The challenge for promoting sustainable development through vocational and adult education is how to find a new synthesis between practical knowledge and theory.

Although concrete competences are essential for participation in and improvement of work life and communities, from an educational perspective they should be judged according to their contribution for equal and fair livelihood among humans and non-humans in local and planetary context. Instrumental concentration on competences does not leave room for

edification, critical thinking or transformative learning, which is important in all education, but fundamental for research-based education in universities. The question of gaps and silos relates to relation between theory and practice, which builds on autonomous research which addresses issues in the “real world”. Universities must take seriously the challenge of maintaining their mission of creating autonomous, critical and independent research and education, and at the same to be in collaboration and dialogue with the rest of society. It is crucial that universities know and analyse what happens in work life and communities, but they are independent actors, not their servants. Following Jason W. Moore’s (2015) interpretation, the making of livelihoods - ways of life and industry - happens dialectically between different instances and is culturally and technologically intertwined with nonhuman nature. Therefore, universities could promote a wider view of life and education, which is not reduced to technological, economic growth and competitiveness-centred approach to sustainability.

Universities have superior intellectual and research capacity, which can provide theoretical frameworks and educate professionals for transition to sustainable livelihood. Therefore, they should and could take responsibilities about collaboration across instances locally and across localities. However, their economic, political and epistemological position and responsibility towards sustainability of industries and communities must be explicit and contextualised locally, nationally and globally. This would have implications to whom and how they include in their knowledge creation processes and to whom they are listening. (see Ruuska 2017, Heikkinen et al 2021.)

5.4. What should be considered for future collaboration and projects?

There is an expanding pool of experiential and research literature, which emphasises that combatting planetary environmental, economic and social crises requires turning around the capitalist production and consumption logic simultaneously in the Global North and in the Global South. This is only possible through more place-sensitive and holistic solutions, integrating economic, social and environmental/ecological elements of a place. It does not mean narrowing but widening the local perspectives towards transformation of production and consumption, and interaction among humans and nonhumans, integrating diverse localities with the planet earth. Consequently, educational solutions are needed, which pay attention to a fairer division of work, resources, consumption, as well as a fairer economic, political and social participation, inside and between the Global North and Global South. (Escobar 2018, Rodriguez et al 2019, Quilley et al 2017, Martinez-Alier 2021, Haas et al 2017; Hickel 2021).

1. New mediating expertise is needed

The study confirmed that combating environmental, social and political crises through vocational and adult education requires new *mediating expertise*. We do not specify it as a certain profession, since it may emerge as a cross-disciplinary quality, integrated to various professional fields, or as a mutation of some existing professions. The caring for means of livelihood of communities, in their human and nonhuman socio-metabolic relations, in changing geo-social settings and geo-economic interdependencies, requires integrated knowledge and understanding of conditions and transformation potential of local livelihoods and their global interdependencies.

According to the study, the *lack of mutual and collective understanding* of horizontal and vertical linkages and interdependencies of work, occupations and communities across production and commodity chains, is hindering actors to advance livelihoods, which are also ecologically sustainable. Mediation between worldviews, interpretations and positions should enhance individual and collective agency. This requires critical examination of occupational, social and economic hierarchies and experimenting new livelihood-assemblies between human and non-human actors. Since the economic, social and ecological aspects of cohabitation are inseparable, the mediating expertise should *enhance connections between currently separate vocational and (popular/liberal) adult education* and integration of economic, social and political spheres. Universities as spaces for critical and creative thinking and research could educate mediators as “organic intellectuals” or “catalysts” to support agendas towards sustainable livelihoods between actors and localities.

The contextualised vocational and adult education activities should enable sustainable livelihood which integrates participation in work and community life locally and across interdependent localities. (cf. Quilley et al 2017). The governance of vocational and adult education is horizontally and vertically complex and contentious, locally and across localities. The mediating expertise would include *recognition and historical understanding of diversity of actors, organisations and institutions* (stakeholders) with their different worldviews, traditions, capacities, resources and power towards sustainable development as livelihood. On the one hand, it requires knowledge about occupational, industrial and community structures and practices, and how they are linked to vocational and adult education activities. On the other hand, it requires knowledge about steering mechanisms, affecting occupational, industrial and community structures and vocational and adult education activities. Mediating between different spheres, requires the *ability to communicate and collaborate* across the diversity of actors.

2. Contextualised and dynamic expertise

The starting point for shaping new expertise should be the *environmental, economic, industrial and social realities in local context*, and their global and planetary interdependencies. Therefore, the expertise requires critical scrutiny of universalist agendas for livelihood, such as UN's sustainable development goals, EU's and most national governments' eco-modernist green deal-policies, as well as degrowth and environmental justice-movements. The expertise should recognize the existing positions and profiles of educators and other professionals in vocational and adult education, and the current patterns and practices in their education, which differ from context to context. Yet, understanding the history of current state of affairs locally, nationally and transnationally, provides potential for change. Therefore, while being humble in learning from different actors, mediating expertise should also be dynamic in *supporting transformative action* towards democratising work and social life among humans and between humans and non-humans.

The expertise should recognise the *diversity in interpretations of concepts*, such as vocational and adult education, work and industry, as well as their embeddedness in economic, political, social and ecological contexts. Promotion of sustainable livelihoods requires new expertise to go deep in seeking traditional ways of coping with work and managing life, and in finding out local philosophies, which the students in vocational and adult education and in universities are exposed to and building on during their studies.

3. Curriculum and program innovations for new expertise

Like any expertise, the emergence of mediating expertise requires certain educational solutions. They must recognize and adjust to the political, economic and social realities of each context, and therefore start from revising existing qualification frameworks, occupational structures, curriculum and program structures. We would rather speak about *new expertise than a new profession* since it must build on the contextual realities. Nevertheless, it should integrate knowledge and competences from the world of vocational and adult education in their political, economic and ecological environment, and from their local, national and planetary interdependencies and governance. The status and functioning of universities and higher education institutions in education and industrial systems, and their patterns and interaction with non-university actors vary across contexts. Still, everywhere they are critical actors in *educating experts into leading positions in governance, in industrial, educational and civil society organisations*. They have the intellectual, financial and human

resources for taking the responsibility for creating new expertise - “organic intellectuals” - to promote sustainable industries and communities locally and across localities.

The new curricula, programs and expertise should not remain at the level of identifying contemporary needs in the labour markets. They should enable continuous interaction with relevant non-university actors, dialogue and negotiation between universities and its environment. This requires *new concepts, strategies and practices in development of curricula and programs* among actors, for example community-based solutions in planning and implementation of courses, thesis studies and research, from the perspective of sustainable livelihood.

4. Co-creative and experimental strategies and practices

The current strategies and practices in curriculum and program development in universities and higher education institutions are also outcomes of local, national and transnational negotiations and struggles. Despite contextual differences, they seem still to reproduce political, industrial and academic elites, and apply top-down policies. Despite the rhetoric, participatory practices seem often internally and externally selective and illusory. However, the *functioning of university curriculum and program development* is an under-researched topic and largely ignored in programs and agendas towards sustainable development. Therefore, the transformation of strategies and practices to enable emergence of new, mediating expertise, must start from a co-creative and experimental process among actors from universities and higher education institutions and “relevant” non-university actors. It should include co-research with self-critical analysis of the status quo, mapping of experiences and expectations, with continuous reflection on experimenting new strategies and practices and on their outcomes as new expertise.

The transformation of curriculum and program strategies and practices is also an issue of university ethos and democracy. The new strategies should be built collectively by recognizing the experiences, challenges - such as lack of resources and power - and ambitions of *staff at the grassroots*, who finally are responsible for designing and implementing curricula and programs, as well as *students* who are exposed and translate them into their own careers. Instead of an individual project, the co-creative experiment should aim at more fundamental transformation in the ethos, policies, strategies and practices of universities and higher education institutions.

The co-creative and experimental process should be *sensitive to diverse tensions and oppositions*, concerning attitudes and interpretations of different actors about relations

between theory/research and practice, between academy, work life, communities and policymakers/governance, and most important between the Global North and Global South.

5. Building bridges: collaboration across Global North and Global South

The planetary balance in social metabolism cannot build on global scaling and dissemination of the exploitative solutions from the Global North. The new mediating expertise should *integrate local and planetary perspectives towards livelihood and social metabolism*, which is promoted by co-creative experimenting of new curricula and programs. Both theoretically and practically grounded awareness about the environmental, economic and political interdependencies and contextual diversities, requires collaboration across contexts, which makes them visible and concrete. Partners of collaboration should identify cases of economic and social units and sectors of industry, which enable them to analyse their commodity chains and social metabolism, and connections to vocational and adult education. Among suggestions about special sectors or commodity chains - beyond notions of all sectors being important - by respondents were

- Most advanced sectors towards sustainability, for example forestry, logistics or construction sectors (TAU)
- Locally vital sectors, such as fishing and food industry (KyU), leather, textile and food industry (MU), arts and crafts and food industry (Kisii)
- E-commerce as an example of digitalisation of the global trade (SCNU)
- All mentioned the importance of ICT-sector, but the link to sustainability or livelihoods remained still obscure.

Interdependencies and localness were not emphasised in questionnaires and interviews; therefore, respondents made few concrete suggestions about which might be both exemplary and vital sectors or issues from this perspective. However, in experimenting programs and curricula for new expertise, the collaborative exercise should allow comparative analyses of *local cases/pilots as links in global commodity, industrial and occupational chains*. It should show main gaps in vocational and adult education provision towards sustainable livelihoods, locally and across localities. Partners should learn historical reasons and pathways to the current situation, which would allow visioning solutions for sustainable livelihood. Through co-creation and implementation of new curricula and programs, partners could empower workers, employees and communities to *experiment technologies, production and consumption which would be simpler and more controllable locally and democratically*. Through participatory co-research, partners could follow-up,

analyse and reflect together the factors which are critical for developing new practices for curriculum and program development.

Both the respondents and the research team found it fruitful to continue collaboration between contexts, which are exemplary for the diversity and interdependencies in socio-metabolic relations and livelihoods. This would allow deeper co-creative experiments including co-research and engagement of key non-university actors and stakeholders. Furthermore, it would enable research-based conceptualisation, theorisation and political and practical recommendations about promotion of sustainability, to be critically reflected and applied in other contexts. The following table shows interest among all respondents to survey, though not all replied to the item.

Table 5.2. Interest in future collaboration among participants of the study.

	Number of respondents	Interested respondents (%)
TAU	18	33
SCNU	80	75
BUAS	30	77
MU	20	65
Kisii	28	93
KyU	26	73

5.5. Methodological reflections and recommendations

The preparatory study was based on mutual familiarity and previous developmental, teaching and research experience among partners, but it had to be designed and implemented in a truly brief time and with minor resources, which primarily allowed data collection and documentation by junior researchers in all contexts. However, it was also a methodological exercise about contextualised framing and implementation of research, which would aim at mutual learning and dialogue.

The shared preliminary interest and the framework for data collection was adjusted to the realities of each context. The entire process built on virtual communication and moderation through Moodle digma-platform, maintained by Tampere University, accompanied by email-correspondence, regular zoom-meetings, and some ad hoc WhatsApp-messaging. To discuss and test the provisory findings, the research team tried to engage respondents of the study, and colleagues and students from partner universities in correspondence and in

virtual workshops. This succeeded best in BUAS and SCNU, where the study focused on their own university, and was integrated into their teaching and supervision.

Due to lack of time and resources and technical and management problems in communication, the research team could not analyse, interpret and report the study as deeply and collaboratively as planned. The differentiation of outcomes from surveys and interviews remained superficial, although the composition of respondents and informants differed quite much across the contexts. There was minor opportunity for mutual reflections on the factors influencing the content and quality of data, and to which extent they were affected by the formulation and implementation of the study - for example social desirability bias - or by the characteristics of participants and contexts. A more detailed analysis would have been needed to make explicit and interpret several inconsistencies and contradictions in the data. This was most problematic in ambiguous distinctions made between universities and vocational and adult education. Furthermore, especially in MU, Kisii and KyU studies, there were contradictions between positive notions and criticism and expectations about relevance and collaboration.

Despite shortages of the preliminary study, it provided ample and rich data, which can be used for further research. It was also an opportunity for partners to team building, mutual understanding and practising cross-cultural interaction and collaborative research, which is indispensable for closer and deeper research-based collaboration in the future.

From the preliminary study, *some recommendations* can be suggested for future initiatives for research-based collaboration:

- Optimally, collaborative action is embedded in the regular structures and activities of participants - in universities such as curricula, courses, practicums and thesis studies. Influential co-creation and experimenting requires long-term collaboration and commitment by participant individuals and institutions. Even if short-term funding would be needed, promoting sustainable livelihoods should be long term and strategic, not cannot rely on ad hoc-project funding.
- The aims, objectives, research and development designs and methods must be framed and adjusted to the contexts of the participants.
- Consequently, the future experiment would apply a multi-level, multi-actor approach, integrating community-based, national and global analyses into co-creative transformation of degree and program development strategies and practices.
- Partners should map the key actors and stakeholders for collaboration in their context, and clarify their motivation and way to engage in the process

- Based on findings, each partner should discuss what kind of cross-disciplinary teams (such as educational sciences, administrative and environmental sciences) should be created in universities for developing the pilot concept further
- It is important that partnerships have opportunity to physical familiarisation of all contexts, but the all the activities of collaboration should be coordinated, documented and managed through joint virtual communication and operational methods (digital workspaces, meetings, data collection and sharing etc.).

Appendixes

Appendix 1. Questionnaire-form

The form was translated into Finnish and Chinese but all of us used the following as the basis:

1. Introduction

Dear respondent

Universities of Tampere (Finland), Mzumbe (Tanzania), Kisii (Kenya), Kyambogo (Uganda), Baoji and South China Normal University (China) are preparing a project to promote collaboration between universities, trainers of adult and vocational educators, administration and leaders of adult and vocational education, and representatives of local community and industry. The aim would be to create practices, which would lead to new kinds of programs and curricula (BA/MA/Dr degrees). These should educate experts, who are able to develop adult and vocational education for sustainable development of local communities and industries.

Your responses and views are most valuable for preparing the project. They are treated anonymously and confidentially. By participating in the survey, you indicate that you understand the purpose of the questionnaire and agree that responses are used for research only.

3. Opinions about relevance of current programs and curricula for experts in vocational and adult education; how is environmental and social sustainability taken into account in current training of experts? (scale 1-5, very relevant-not relevant at all; open comment section)

4a. Who are involved in interaction and collaboration between actors in developing adult and vocational education programs and curricula? (Multiple choice - Universities/educational institutions, political institutions, organizations, others; open comment section for specific information/opinion/development/critical issues)

4b. Opinions about current interaction and collaboration between actors in developing programs and curricula? (scale 1-5, very good-very bad).

4c. What should be improved in the course or curriculum development collaboration? (for ex. Difficulties, open question).

5. Critical issues for promoting local community towards sustainable development? Critical issues for promoting adult and vocational education towards sustainable development? (open question).

6a. Critical issues for promoting local industries towards sustainable development? (Multiple choice - no more than three: National policy, Economic development, Corporate culture, Ecological environment, Relevant talents, Technology, Fund support, Others-please specify).

6b. Why did you choose the above factors?

6c. What are the most important industrial sectors for promoting sustainable development? (Multiple choice: Food Industry, Medical industry, Tourism industry, Internet industry, Transportation industry, Machinery and Chemical Industry, Others - please specify)

7. What kind of experts/professionals are needed to promote adult and vocational education for sustainable development in local communities and industry, where – educational institutions, administrations, industry? (examples: university (academically

trained), vocational/university (technically trained), university (administrative training), in the industry (work-based learning; open question).

8. Who should be involved in creation and implementation of programs for experts to promote adult and vocational education for social and environmental sustainability in local communities and industries? (local choice, including “others, who”, why; open question) (choice for ex.: universities, local communities, local organizations, local colleges or others/Universities, Organizations, Corporations/Local businesses, Ministries, NGO’s, Others)

9. Relevance of starting project, among different stakeholders to experiment with new practices in creation and implementation of new programs and curricula for new kinds of experts? (scale 1-5, very relevant-not relevant at all; why is it relevant/what could be the benefits of new programs, open question).

10. Interest to participate? (scale 1-5, very interested-not interested at all).

11. Any other issues, questions, comments to researchers etc.

Appendix 2. Interview guide

Interviews were implemented in languages of each context. The following guideline was used, although questions varied regarding the interview process.

1. Intro and instructions (similar to questionnaires)

2. Position and status of informant; Relation to adult and vocational education

3. The relevance of current programs and curricula for developing adult and vocational education for sustainable development in community and industries?

From the point of view of training professionals (scale 1-5, 5 the best)

From sustainability view (scale 1-5, 5 the best)

4. State of interaction and collaboration between actors/stakeholders in developing and implementing programs and curricula? Reasons?

How good is the current collaboration between different stakeholders (educational institutions, industry, policy organisations, local communities)? (scale 1-5)

5. Need for new expertise in developing adult and vocational education? Critical issues and sectors of industry? Reasons?

Any ideas of improvement, problems or other comments regarding the first two questions (open question).

What are the most important aspects in developing VET and adult education towards sustainability and endorsing local communities? (open question)

Which sectors and fields of VET are the most important or in need of development? (open question)

What kind of expertise and professionals are needed in the future? (open question)

6. Need and visions for new collaborative practices in developing and implementing programs and curricula for new experts? Who should be involved and how? Reasons?

Who are the most important stakeholders and actors in future collaboration? (open question)

7. Relevance of starting pilot project for experimenting new collaborative practice in creating programs and curricula of experts for adult and vocational education promoting social and environmental sustainability of local communities and industries?

How important do you find the development of new programs and curricula? (scale 5-1, 5 very important and 1 not important at all)

How interested are you to participate in future development (scale 5-1, 5 very interested, 1 not interested at all)?

8. Any other issues, questions, comments to researchers. (open question).

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