

Industry's role in Vocational Education and Training Governance and Decision Making

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Abstract—This innovative practice full paper addresses the hypothesis that vocational workforce competence supply can be improved if a structured, strategic and long-term dialogue between local industry and local VET (Vocational Education and Training) governing bodies is established.

Demand for vocational workforce is increasing, and by 2040 the demand is expected to exceed availability of resources in most vocational sectors. According to the National Agency for Education Sweden needs to increase the scale of industrial vocational education, both in upper secondary level and in adult education. By 2035, lost productivity due to shortfall in the educated technical workforce is estimated to cost Swedish companies 990 billion Swedish Kronor.

An action research framework is used to bring together local decision-makers in a dialogue forum called in Swedish “Strategisk Verkstad och Aktion för Kompetensförsörjning” (SVAK). The goal is to improve VET systems through a new form of long-term dialogue in which representatives of the various system sectors meet to discuss challenges, practical solutions, as well as make joint decisions and implement initiatives.

Index Terms—competence development, industry, education

I. INTRODUCTION

The long-term resilience, development and transformation of engineering and technology sectors is dependent on access to relevant competence at the right time and in the right place. In the Swedish education system municipal government has a significant role in educating future engineers and technicians. However, there is no model for collaboration between the municipal and local industry decision makers in order to improve the availability of vocational skills needed by the industry. Regional development needs to go hand in hand with local industrial transformation ensuring that regional skill supply and demand are in balance.

There is a paucity of research addressing development and evaluation of systematic models for cooperation and collaboration between industry and VET governing bodies [6].

Our research hypothesis is that vocational workforce competence supply can be improved if a structured, strategic and long-term dialogue between local industry and local VET (Vocational Education and Training) governing bodies is established. To achieve this, an action research framework is used to bring together local decision-makers in a dialogue forum called in Swedish “Strategisk Verkstad och Aktion för Kompetensförsörjning” (SVAK). The goal is to improve VET

systems through a new form of long-term dialogue in which representatives of the various system sectors meet to discuss challenges, practical solutions, as well as make joint decisions and effect change.

This study focuses on the first step in establishing the SVAK-model, and emerging themes of collaboration relating to local VET competence supply. This provides early evidence that SVAK helps to develop innovative practices which, over time, can guide the industry and VET sectors in identifying the appropriate actions to gradually move the competence supply-chain in a desired direction.

II. BACKGROUND AND MOTIVATION

Demand for vocational workforce is increasing, and by 2040 the demand is expected to exceed availability of resources in most vocational sectors [2]. According to Swedish National Agency for Education every county in Sweden needs to increase the supply of industrial vocational education, both in upper secondary level and in adult education [3]. By 2035, lost productivity due to scarcity of resources is estimated to cost Swedish companies 990 billion Swedish Kronor [14].

In the industrial sector over the coming decade, the net supply of VET skills remains negative due to increasing number of retirements and decreasing number of educated, qualified VET resources [1]. In the county of Gävleborg, industrial companies are dominating the business sector. By 2035, the supply of VET skilled workforce in Gävleborg is expected to be approximately 24% lower than demand [1]. Thus, improvements in vocational competence supply should have direct benefits to industrial companies improving their productivity.

Both local industry and the municipal VET providers can play a role in improving VET skills supply. Local industries need to take active role in providing e.g. practice opportunities and the local VET providers tailor-make VET training to fit the local industry requirements.

Unfortunately, many potential employees have weak educational background. Such groups can for instance be drop-outs from upper secondary school, or immigrants and unemployed with skill-sets not needed by the industry. Despite validation according to national validation instruments, a partial skill-set is not enough if a formal VET qualification is missing.

These groups of potential employees are regularly disqualified early in the recruitment process [8]. Many adult VET providers are municipal whereby a collaboration between industry and municipality might lead to utilization of groups without formal certificates.

There are many factors that can affect the local competence supply such as challenges of unemployed groups mentioned above. Other factors can be e.g. decisions by organisers of schools both in public and private sectors, politicians' decisions effecting financing, governmental legislation and reforms, and technical development in the industry. From holistic systemic perspective, competence supply has many similarities to what in literature has been referred to as "wicked problems" [7], [10].

Climate change and poverty are two examples of complex, difficult to solve problems which have been termed "wicked" [7], [10]. Even though wicked problems can be defined in diverse ways there are some common characteristics e.g. that every problem is unique, that there is no one solution for a wicked problem, every wicked problem can be a symptom of another wicked problem, and the causes of a wicked problem can be explained in various ways, depending on the worldview of the explainer and there is no ultimate correct end-solution for a wicked problem [7]. Working with "wicked problems" requires that special attention is needed in terms of approaching them in a structured, constructive and long-term perspective. Action research and Inquiry Based Approach provide appropriate frameworks [13].

III. PRIOR LITERATURE

A central element in the SVAK-collaboration project is for the participants to explore, understand, learn, and implement changes in the local VET demand and supply systems. Facilitating the collaboration between the local decision makers requires understanding of complex systems, working with power, being able to collect qualitative and quantitative data and turn them into positive contributions [4]. A process of exploration and experiential learning combined with defined process and facilitation are essential in navigating in such complex landscapes [10], [13]. According to Bradbury (2015) Action Research is "a democratic and participative orientation to knowledge creation. It brings together action and reflection, theory and practice, in the pursuit of practical solutions to issues of pressing concern." To bring about an improvement in the competence supply of VET skills a collaboration between the local industry and the municipal VET decision makers is initiated. A pragmatic and practice-led research approach has been adopted, which integrates Systemic Action Research with an Inquiry Based Approach (IBA). Methodologically this involves a qualitative design comprising successive cycles of planning, action, evaluation/reflection (See Figure 1), and adjustment, through which the research and practice will inform each other to bring about change and improvement [5].

Reason (2006) defines action research as a process where research is done with, for and by the people. It is a collaborative, participative and democratic process where knowledge

is created and shared between the participants. Fixed forms, methods and solutions are not possible as action research is also an emergent process where questions, priorities, relationships, and purposes may change over time. Mary Parker Follett, one of the early contributors to experiential learning theories describes a five-step adaptive learning process [9]; 1) involving personal intention and engagement 2) learning from this intention and engagement, 3) designing through co-creation informed by the participants differences, 4) enacting and acting on such designs and 5) adapting and learning from those experiences. IBA approach has many similarities to Follett's five-step process and has been developed to meet the challenges of situations like wicked problems [12]. To work in the complex environment of competence supply a long term, systematic and structured way of working is required. IBA proposes seven process principles for collaborative learning, joint governance, and systemic perspective [13].

- 1) Establish an inclusive and representative multi-stakeholder team
- 2) Provide equal opportunities for participation
- 3) Handle conflicts and dissonance constructively
- 4) Mitigate power asymmetries
- 5) Co-create knowledge about a wicked situation
- 6) Make decisions in consensus
- 7) Utilise the group's shared power and energy to change and develop

Learning processes need to occur across boundaries of disciplines, professional groups, organizations, and communities [11]. The process of experiential learning involves the learners in engaging in formulating questions, investigating, and exploring alternatives, experimenting and being creative, as well as taking initiative, making decisions, and taking responsibility for solutions [13]. Inquiry based approach can open spaces where collective social and organisational experiential learning can start. It can reveal resistances and repeated hindering patterns as well as open possibilities for new visions and new ways of working as the collective organization learns and develops [11]. Bringing the decision makers from the local industry and the local VET governance together in a dialogue forum enables them to inquire and intervene in the process of learning and address complexity, ambiguity and disconnections and find potential opportunities and solutions [11].

Finally, an holistic, systemic perspective is crucial to meet the complexity of the "wicked problem" of competence supply. In the words of Burns [5]: "A holistic approach to intervention is crucial because complex issues cannot be adequately comprehended in isolation from the wider system of which they are a part. Things that happen within one area affect, and are affected by, things that happen in other arenas, in ways which are often not easy to see. It is not enough just to see things holistically. Effective whole system change has to be underpinned by processes of in-depth inquiry, multi-stakeholder analysis, experimental action, and experiential learning, enacted across a wide terrain. Systemic action re-

Action Research Cycle

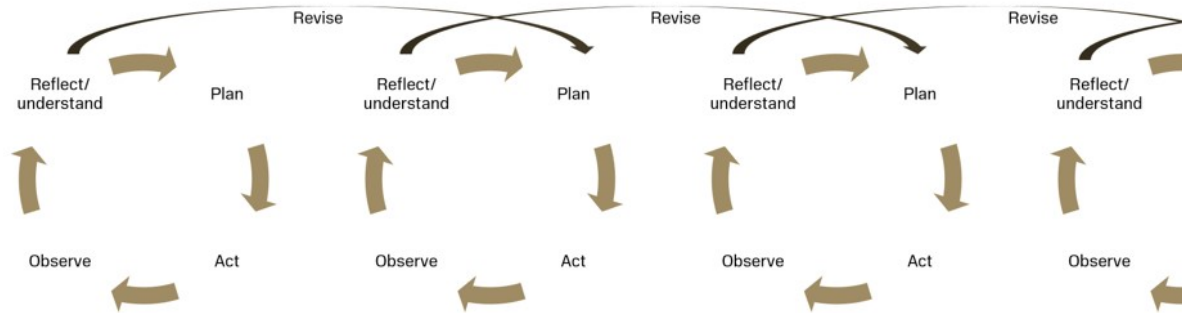


Fig. 1. SVAK Action Research Framework.

search offers a learning architecture for this sort of change process.”

IV. STUDY DESIGN AND METHODOLOGY

For this research project, the ultimate objective is to improve the VET skills availability through facilitated and coordinated process of dialogue, collaboration, decision making and joint action. Considering that competence supply involves many stakeholders, organisations, industries, perspectives, and even public opinions it is crucial to have a systemic perspective to collaboration, action, and research [5], [10].

The SVAK-group consists of local decision makers involved in the competence supply “system” both from the demand and supply perspective. The overarching principle is that the participants together have the intention to explore and experientially learn about the competence supply system, collectively decide on actions as well as have the mandate and power to implement changes in their respective organizations. Action Research and IBA support the dialogue-process in rigorous research-based methodology ensuring structured reflection, learning and adjustment are fed back into the dialogue-process in all its steps.

The IBA process principles are used as a guideline in designing the SVAK-model and process. Relevant stakeholders for the problem area are identified. Participants in the SVAK-workshops are selected based on their role’s relevance and personal interest in the local competence supply system. Workshops are planned and booked well in advance to ensure that all have an opportunity to plan their participation. Power differences do exist, and are acknowledged; however, the facilitation strives for giving all participants opportunity to voice their ideas, opinions, doubts as well as proposed solutions. Decisions are made in a participatory process, and where the facilitator(s) have an instrumental role and responsibility in making room for and highlighting differences of opinions and perspectives. The workshop is structured in such a way that the participants can listen, learn from each other, and come up with ideas and voice their opinions regardless of their power mandate or organisational belonging. Given priorities

are discussed and agreed upon, as well as are proposed actions. Finally, each participant commits to owning or supporting one or more of the proposed activities, thereby utilising the whole group’s power and energy to drive change.

V. DATA COLLECTION AND ANALYSIS

The SVAK-project comprises four Action Research (AR) cycles, from a meta level perspective (one municipality over several years) to micro level (one workshop). At this stage in the project one workshop has been conducted. This workshop was organised in line with the IBA principles; relevant representation and participation, equality between the participants, building shared knowledge over time, transparency in decision making, and using shared power and energy to change and develop [13].

Participants were representatives from the municipality of Sandviken and decision makers from the global high-tech engineering group Sandvik from site Sandviken. Representatives were chosen based on the relevance of their role to the problem area, their interest in competence supply topics, as well as their mandate to take relevant action in their respective organisations.

From the municipality of Sandviken the head of local government, and directors and highest level management from the areas of, industrial growth, local enterprises, labour market, and school education were present. Ages ranged from 40-65, included both men and women, and all participants had extensive experience in their respective field. Sandvik representatives in the group included the site HR manager, site and sustainability manager, Sandvik Sweden HR manager and subdivision manager, ages ranging from 40 to 55, all with long employment histories within the company.

An AR-cycle of planning, action, observation, and reflection was followed. A specific focus area was selected for the first workshop which was industrial technical adult vocational training.

AR Planning Phase: Informing research participants regarding the research project verbally and via email. Preparing reading material relevant to focus area. Email with project

information, agenda, research-person form as well as reading material was sent to participants two weeks prior the workshop.

AR Action Phase: The workshop was organised in sections, with some work in smaller work groups and some in full group. Section one was to do a SWOT-analysis (Strengths, Weaknesses, Opportunities and Threats) of the focus area in smaller groups and then present the results in large group. Section two was to make a prioritisation of identified areas in based on which areas are executable on short term (identified as “Q (quick fix)-areas” and which areas need longer period, identified as “F (future)-areas” to execute to improve competence supply in small group and present the prioritisation in the large group. The third section was to identify a few realistic executable activities under highest ranking Q and F in small group and present the findings in large group. The concluding section was for all the participants to reflect over the defined actions and indicate which of the identified activities they were prepared to support and/or own. Every participant had to choose at least one action to support and/or own.

AR-Phase Observe: The workshops were recorded, both using a voice recorder in small group work and video recording in the large group. The recordings were transcribed, and the transcriptions were anonymized. In the anonymized transcript, participants were given standard Swedish names for ease of reading and analyzing the transcripts. Video material was only used to support transcription. Only the written, anonymized transcriptions were analyzed.

AR Reflection Phase: Reflection proceeded in several stages – feedback from the participants concerning: planning and pre-reading, execution, and post-production and feedback. Project teams (organisers of the workshop) personal reflections on the successes and improvement areas for future workshops. Proposed activities with designated owners and supporters were circulated and finally incorporated into a project plan for execution. Reflection also guided the planning of a subsequent workshop with a different focus area.

AR Revision Phase: Based on the process and outcomes of the workshop, post-workshop activities and research findings a new AR-cycle can now be initiated and the future AR-cycle steps will be revised when and where necessary.

The current article analyses the qualitative data derived from the workshop transcript. The transcribed data was separated into two data pools, one concerning statements from the industrial representatives and one for the VET education and municipal representatives. The data was analysed first to identify high level themes and thereafter, multiple times to identify underlying themes, which provide a more nuanced view of the discourse we observed.

VI. RESULTS

Analysis of the the SWOT-discussion identified categories of approach in two dimensions **operative** and **strategic**. Within each of these dimensions further analysis reveals sub-categories in the discourse between industry, municipality and VET education providers. The four high level themes

are, *rapid industry and technology development*, and *slow response in matching vocational education* and the *high level of unemployed and non-Swedish speaking immigrants* and *Attractiveness*. Though the last two of these categories are most visible only in the operative dimension. In relation to the themes are also identifiable barriers. In particular those concerned with legislation, investment thresholds, and regulatory procurement process. All citations are linked to fictitious names to preserve the anonymity of the study informants.

a) Operative dimension:

Rapid technological advance

One industrial representative raised the fact that the Sandvik is decentralised and there is no common way of fronting cooperation and dialogue with the local VET provider. All divisions and units have their own roles, channels, and ways of working, based on their internal needs. In addition, there is no unified way of working or single contact person regarding practice periods, but it seems that “the person who currently has available time” gets the task of handling practitioners.

Other citations supporting this category include the following.

Ebba: “Design education from trends and development in the world” and “Design education together with the industry”. “A threat [to industry’s development] it is a too slow process in terms of adjustment to changes”. “Education needs to rapidly adjust to new technology”

Inadequate response in VET systems That there is a challenge with adequate and matching VET competence supply to local industrial companies’ needs, is agreed by all parties, although with slightly different perspectives, depending on the participant’s role and organisational belonging.

As Vera says: “adult VET agency/authority prioritises distance education because you can have more students for the same cost, but there is a significant difference in quality. As an example, a private VET provider in a neighbouring municipality got approval and funding for a distance education but had to close down the education due to the fact [that they did not get enough applicants], the students did not think that the VET education fulfilled their requirements”

From the industry perspective some of the issues were the difficulty to find persons with selected VET skills and the lack of mechanisms to influence local VET education.

Unemployed non-Swedish speaking

The language barrier emerged as one of the main challenges to be addressed. An industry representative says: “sometimes, even if a person has right the competence, the lack of language skills prevents employment.” Here, the production constraints and legal requirements to have an operating knowledge of the Swedish language are seen as insurmountable barriers to employment.

Vera: “to have a more flexible approach to SFI (Swedish for Immigrants) learning in classroom versus learning at work would be helpful”.

b) Strategic dimension:

Rapid technological advance

Even for a large company, finding technicians with maintenance skills is particularly difficult. In many areas the industry is looking for people with competence in several areas, such as mechanical, automation, mechatronics, and electrical skills. None of the Swedish industrial programs provide this breadth of education. However, one recruit to Sandvik from an upper secondary Vehicle and Transport Program turned out to cover all these areas as part of her education with standard curriculum (in a modern automobile you need to understand among other things mechanics, automation, mechatronics and electricity). In the following discussion it was observed that education program names can also be misleading in terms of actual competences. In addition, some industrial programs do not necessarily provide the skills that are sought after and rigid program structures might hinder education development that meets industrial development needs. Such definitions and limitations were not necessarily a positive signal to people looking to the industry as a workplace, and can be especially negative when they regulate perceptions of the relevance of the education system.

Ida notes that “Design education is an emerging trend and worldwide development. Design education together with the industry. A threat [to industry’s development] is the painfully slow process in terms of adjustment to changes. Education needs to be able to rapidly adjust to new technology”.

Inadequate response in VET systems

The systemic perspective of the competence supply system was relevant to many stakeholders. The municipal participants expressed that developing and changing with VET environment ought to be easier if you had control of the whole “competence supply chain” as it would be both faster and easier to “make adjustments along the entire competence supply chain.” From the municipal perspective there was a greater emphasis on structural challenges, such as municipal legislation, investment priorities, long change processes and the internal and external status of vocational education.

Awareness of adult vocational education and training, its potential, and its importance as a competence supply channel varies in a large company. In some local Sandvik-divisions the cooperation with the local VET school was frequent and perceived as important and prioritised for their competence supply, while in others there was no connection and scarcely any knowledge.

As Indra says; “It takes time to establish new types of education programs and new processes. Decision processes [to start new education program] can take 5-7 years and by then the train has already left the platform”.

Another common theme was the desire to have closer cooperation, which was expressed in a variety of ways: “design vocational education in collaboration with the industry”, “neutral discussion forum”, a win-win situation of hiring “cutting-edge expertise technicians” from the industry to improve the quality of the vocational education being also a development opportunity for the individual technician as well as relevant

representation of industry in the steering forums for the relevant VET programs.

Attractiveness

The public perception of industry as a workplace and vocational education was also experienced by many participants as problematic. It was agreed, from different perspectives, that the image was antiquated. Both industry and municipality participants agree that role models, storytelling and raising interest for the technical occupations are crucial to attract more people to the training and to the industry. The marketing of vocational education is important, but even more important is that it leads to employment and that the applicants see the industry as their future branch where they have opportunities to grow and develop in a safe environment. As one participant expressed: “An external workplace safety trainer still today uses images from the 1960’s in their training material – illustrating industry with an older man in an oily blue overall in a messy environment with dirty old machines” and further “even though we have modern automated, digitalized and robotized production, the standardized Swedish traffic signs directing to the industrial area in Sandviken still show an “old factory” and not a modern industry.” The discussion concluded that there are many signals upholding an antiquated image of what industrial work, and industrial education looks like.

VII. DISCUSSION

The SVAK-workshop model is an iterative action research cycle design, integrated with the IBA-method. A concrete facilitators guide [12] was used to create an environment emphasising participatory, democratic, creative and innovative dialogue. Transcript analysis confirms that most of the process prerequisites were visible in the dialogue, and the participants actively took part in the SWOT-analysis. The process analysis illustrates stakeholder reflections from different perspectives, which increased the participants understanding of the overall complexity of the competence supply system. Additional analysis of the dialogue-forum process for verbal markers reveals that there were no obvious conflicts, and the participants interactions were categorised as being open and receptive, and showing characteristics of active listening. Investment in trying to understand other perspectives is clearly visible in the coded dialogue.

According to Nelson [9], Mary Parker Follett expressed already over 100 years ago that “our challenges are not technical challenges – they are adaptive challenges of how to best capitalize on our very diversity, the diversity our people, their talents and their perspectives”. Considering the different aspects involved in the complexity of the competence supply system, this still seems valid today. Many, if not most, solutions to the competence supply challenges can be found in the local environment where the local industries and the local VET providers collaborate – and not in technical solutions. In this sense, Follett’s five-step adaptive learning process, which was originally intended for ordinary citizens [9], seem to work very well in this context. The participants selected in SVAK were involved with personal intention and engagement

and they were willing to learn from each other's intention and engagement in the SWOT-workshop. In the full SVAK-workshop there was some evidence of the last three steps of the learning model i.e. designing through co-creation informed by differences, enacting and acting on such designs and adapting and learning from those experiences, however, these are not analysed as part of this paper.

Several parts of the SWOT-analysis indicate that industry's current involvement in the VET governance is not enough, and that for the purpose of improved VET supply, increased involvement of industry in VET governance was desired and affirmed both from the industry and the municipal representatives. Some examples were the lack of relevant industry representation in the adult higher VET steering boards and the lack of knowledge of adult VET programs and the possibility to influence the same.

"To have forums for decision makers would complement the forums we have today" says municipality representative. "How you capture our needs on short- and long-term perspective, how we articulate those needs for ourselves, so that when you ask, we answer in a way that matches your question – that process is not clear to me" says an industry representative. This indicates a number of hinders: 1) How vocational training captures short and long term needs of the local industry 2) How industries formulate their competence supply strategies in their own environment 3) How industries communicate this to local VET governance and VET providers and 4) the communication between education and industry matches so that there is a common understanding on what is asked and what is answered. Identifying, discussing and addressing and acting upon such problems is at the core of SVAK-concept.

Technical development within industry e.g. in areas of AI (Artificial Intelligence), automation, electricity, and digitalisation is both rapid and of unprecedented scale. From a competence supply perspective this is a concern, as visibility of how vocational education matches the industry's rapidly changing needs is not clear. On the other hand, it was brought up that the industry themselves may not have clear competence supply plans and may not have a common way of expressing their needs neither internally nor externally. An additional challenge was that at least in parts of the company the vocational industrial technical programs do not match the industry needs and a broader education is needed. I.e. it is not enough with just automation, or mechanical skills in isolation, but, to manage an automated industrial cell you need a range of skills in automation, electrical, mechatronic and mechanical skills, to name just a few. Currently, upper secondary VET does not provide such industrial programs with this type of broader technical context.

Systemic perspective as such was only briefly discussed, however, summarising the main topics brought up in the SWOT discussion regarding competence supply chain, high level of complexity rise into view. Topics included were for example: legislation, governance and ownership of various parts of the competence supply chain, and antiquated image of industry, technical occupations as well as vocational training.

Further topics were e.g. rapid technical development, lack of both short term and long-term structured dialogue between the industry and vocational education on both operational level and on governance level. Immigration is a large part of population growth thus being a large potential for future workforce. However, poor Swedish language skills, low prior education levels and a lengthy process to even qualify for adult vocational education were seen as major hinders for both education and employment. The industry does not have a common way of articulating their needs neither short nor long term to the VET providers which makes it difficult for the VET providers to interpret one company's needs let alone the needs of a multitude of companies. Further, the company sometimes is lacking appointed responsible to handle practitioners and sometimes is let to be handled by the person who has currently time available.

Many of the areas are interconnected. Some examples could be for example that prioritisation of investments in one area of the municipal education system cause lower priority in some other area. Often these prioritisations are political decisions, which may change based on which political parties are currently in power. Changes in national education legislation and regulation may cause changes in VET financing, thus directly impacting local prioritisation. Industry's ability to describe their needs has a direct impact on the VET provider and the need for VET resources, facilities, skilled teachers, and financing. Reducing unemployment reduces, e.g. the level of benefit dependency, improves quality of life for the individual, and enables local municipal governance investments elsewhere. Therefore, channelling unemployed through e.g. a VET system into employment in industry is of interest both for the municipality and the industry. Immigrants and in-migrants as well as the industry's development and growth have an impact on e.g. development of new residential areas, schools, education and training, health services, and infrastructure. Industrial development places requirements on matching VET content, speed, and delivery to stay competitive.

VIII. CONCLUSIONS

The focus of this research paper was on studying the first step in establishing the SVAK-model, and the emerging collaboration themes relating to the local VET competence supply, studying the research question "Industry's role in VET governance and decision making."

The complexity of a competence supply system has similarities to "wicked problems". Action Research methodology with Inquiry Based Approach method were used to address the complexity, and local decision-makers were brought together in a first dialogue forum. It is too early to draw firm conclusions on whether the SVAK-model improves competence supply of VET skills to local industry. However, our analysis confirms the model's usefulness in terms of increased understanding, learning and collaboration opportunities between the different sector representatives in the local competence supply system.

Rapid technical and industrial development accentuates the need for faster response, and a better, and broader, match between VET education and industry needs. To enable VET providers to respond, relevant competency profiles need to be articulated and communicated. Industry must be able to articulate their needs, both for themselves, as well as for the vocational education provider. Weil (1977) notes that: "As we face more and more that is unknown and not capable of being understood or controlled, we must approach learning and change as relational and improvisational processes. This inevitably means building cultures that support new forms of collaborative inquiry and action research". The SVAK-model promises to be a such a new relational and improvisational approach, which contributes to a robust culture of collaborative inquiry and action research.

Our long term hypothesis is that the SVAK-model helps to develop innovative practices which, in the long term, can guide the industry and VET providers and VET governance. Using this forum we can identify appropriate actions to gradually move the competence supply-chain in a desired direction. Several future SVAK-workshops are planned and over time, our data collection and analysis will focus on the whole learning process from exploratory and experiential learning to forming actions and committing and implementing actions.

IX. VALIDITY AND RELIABILITY

Reason (2006) defines quality in action research as our ability to see which choices we have and make in our research, and their consequences, as well as to be able to express our choices in a transparent way. Due to the complexity of the problem, and the stakeholders' determination to actively develop the industry and municipal collaboration, choosing a pragmatic approach and action research was the first obvious choice. IBA has been used as a practical approach, method, and tool to work with wicked situations [12]. The explorative process of SVAK, and the participants shared knowledge and experiential learning bring out concrete activities that the participants make a shared commitment to address in each organisation. In SVAK-collaboration we can see what Reason (2006) calls knowledge in action.

Both the project owners and the project funders are highly motivated to find ways to collaborate between the industry and the VET providers to find ways to improve the VET skill supply. The different stakeholders form an Advisory Board; the project owners, KTH (The Royal School of Technology) and the project funders. The board gives guidance to the project leader in both industry-project and research matters. The aim is to ensure that both projects support and guide each other and both deliver high quality which is of relevance to all the stakeholders.

X. ETHICAL CONSIDERATIONS

The research project collects, analyses, and stores personal information of the research project participants. This also includes the project resources and external facilitators. It is important for persons participating in research to understand

which personal information is collected, how it is stored and how the integrity of the research persons personal information is used and preserved. A consent form template from The Swedish Ethical Review Authority has been used to ensure that all relevant ethical principles have been covered. The research persons have been informed about the research project in advance via email. They received a second email with information about the project and the research person consent form, this to ensure that all participants had enough time to read, reflect and understand the content of the consent form, and to ensure that they understand why and how their personal information is gathered, how it is stored and used. All participants signed two copies of the consent form of which they kept one as their personal copy and one is archived in the project archive. Original data is kept separate from anonymized data and only the researcher has access to the original data and the code key. Anonymized data has been shared between the authors for data analysis purposes.

XI. FUTURE WORK

The joint purpose of the SVAK-model and process is to establish a dialogue-forum for a long-term strategic and structured collaboration between municipal VET governance and local industry decision makers. The process will continue in Sandviken municipality and other industrial and technical companies are on their way to join the dialogue-forum. In addition, several municipalities are interested in implementing the SVAK-model in their contexts. Some of future research questions could be: - Has the mix of participants an impact on the dialogue-forum collaboration? - How does the experiential learning become evident working in the SVAK-model? - How does the dynamics in one SVAK-group change over time? - Does SVAK-model have an impact on availability of VET skills locally? - How are SVAK-activities prioritised and implemented? Do the implemented actions have unintended systemic effects? - How is knowledge shared in SVAK-group? - Does the model lead to empowerment and action beyond research project? - Industry has high sustainability ambitions. Can VET providers work with industry to develop VET education to meet the industry's sustainability skills requirements?

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