

Mutual Benefits – Linking SMEs in Wood Industry and HEIs Using a Translator

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Abstract. The HEIs third mission is to collaborate with external organizations. In this paper we focus on how SMEs in wood industry can collaborate with HEI by using a link that can translate SMEs needs and challenges to HEIs offer. This is a first attempt to describe this function that we call translator. We have identified and described four translator roles in different scenarios in this paper.

Keywords. Research and education, knowledge transfer, knowledge translation, collaboration, Small and medium-sized enterprises

1. Introduction

Higher Education Institutes (HEI) have traditionally had two missions [1]; education and research. They also have a third mission focusing on collaboration with external organizations that aims at regional development [1]. The new research proposition from 2020 propose following (not translated to English): “*Högskolelagen ska ändras så att det anges att det i högskolornas uppgift ska ingå att samverka med det omgivande samhället för ömsesidigt utbyte och att verka för att den kunskap och kompetens som finns vid högskolan kommer samhället till nytta*” [2, chapter 14.2.2]. Research and education at universities should be aligned and hence co-production and industry engagement is becoming increasingly important for engineering education. The benefits of this co-production are more and more important to manage as the trend of emerging technologies such as sensors, digitalization and automation is fast in its development and implementation in today’s manufacturing. For SMEs in general and for SMEs in wood industry in particular, this fast evolvement in technologies and digital systems can be a challenge to manage to keep or improve competitiveness on the market. Here, SMEs can benefit in a joint structured way of collaboration with HEIs. However, according to [3], previous studies examining the interaction between companies and HEI often focus on larger companies, and SMEs are in many cases ignored or assumed to work as larger companies. When SMEs are included in studies about interaction with HEI, focus is often on innovations in SMEs or startups (see for example [3]). However, most SMEs in wood industry are not start ups or companies with new innovative products, more often old, established manufacturer of wooden products and there is a lack of research about linking these kinds of companies with HEIs.

The alignment between companies and HEIs is traditionally carried out by having researchers involved in education and by encouraging research projects to include and

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involve students and student projects. The assumption is then that the educated student will contribute to industry relevance in their contact with companies and as alumni. Contact with companies is often through final thesis work at most HEIs but can also occur in other student projects/activities such as Industrial Placement Course (IPC), Internship or Work Placement (LIA) or similar. These activities have historically been carried out based on individual agreements between the students and the company and focus more on knowledge transfer in an unstructured way. On the other hand, when a student activity is carried out within a research project, the researcher(s) have the possibility to plan ahead and have subsequent projects with progression in-between. Both the student-initiated project and the research-project initiated project can be seen as topdown, where the knowledge transfer is research → education → industry (see for example [4]). For many years, we have worked with a different long-term structured approach, with a bottom-up perspective, industry → education → research, that has been successful for both the HEI and the interactive companies. Here the industrial relevance was closely linked to education and research. This approach also assumes that the companies, often larger, are mature enough to take care of the gained knowledge and resources in terms of students as well as having knowledge about where to gain the knowledge. In a new development project funded by EU, we worked with manufacturing SMEs in wood industry and here we have identified that these companies are not always used to collaborate with HEIs and do not know what the HEIs can offer. SMEs in wood industry need both competence development internally as well as new competence and can be gained by collaboration with HEIs, but the alignment and collaboration needs to be done based on the SMEs requirement, experience, ability, and knowledge. To increase the collaboration between HEIs and SMEs, and to increase the understanding of how HEIs can support SMEs in remaining competitive and survive, a new way of working collaboratively is needed that create common meanings to share and access knowledge by using a bottom-up approach. Previous studies emphasize a link between HEIs and SMEs to achieved common meaning [5, 6, 7]. Based on this, it is identified a need to explore and describe the link between SMEs and HEIs. Therefore, the purpose of this paper is to increase the understanding of how to link research and education to practical relevance using a link between SMEs and HEIs.

The paper presents analytical conceptual [8] analysis of insights gained through both longitudinal immersion [9,10] in the field by all authors and an EU-funded development project involving wood industry, an industry organization representing the wood industry, and two HEIs

2. Theoretical background

2.1. SMEs in the wood industry

Sweden, a forest-rich country, has long traditions of craftsmanship and woodworking industry. Wood working industry is a large industry in Sweden, but most of the companies in this industry are SMEs, most of them are small companies with under 49 employees and family owned. These companies are often located in less industrialized areas outside cities [11]. The wood industry, consisting of sawmill, veneer industry and its further refinement to products, such as home building, furniture, packaging, and interior wood [11]. The family tradition is strong in these companies, and they strive for long term survival. The wood industry has been described as slow in adapting efficiency

increasing activities, improving productivity and ergonomics. Here, HEI can support the SMEs in becoming more competitive by supporting competence development and new requirements. According to a yearly survey by Trä- och möbelföretagen (TMF), companies in the wood industry need to recruit 7300 people the coming years [12]. These figures includes both blue collar and white collar as well as replacement recruitments and new recruitments. However, SMEs have a challenge in finding and attracting qualified workforce with the right skills [12]. Reasons for this are among other difficulties to find people with right experience or education as well as localization of company [12]. Another reason is that they are relatively invisible among students at HEIs.

2.2. Translator between HEI and SMEs in theory

2.2.1. Linking HEI to SME

Previous studies emphasize interaction, dialogue, and continuity between HEIs and SMEs as essential [5, 6, 7, 13]. For example [13] studied collaborative research projects and focused on how trust can evolve in the collaborative dialogue between companies and the project team. [5, p.76] write: “*The HEI workforce, if it is to engage SMEs, must therefore improve their awareness and understanding of SMEs needs and cultural differences*” One way to overcome this, is to use a link between the SMEs and HEI [5, 6, 7]. The link can for example be an intermediary organization [6, 7] or a one-stop shop at universities [5] or an individual [7]. However, the importance of a link applies to SMEs when there is no relationship. The larger companies often have direct contact with relevant departments at the HEI, which could be the employee’s educational organization, and in these cases a link constitutes an unnecessary extra communication channel [7].

Important requirements for successful linkage between SMEs and HEIs have been described by [7] as, insight into the user’s field of work, acceptance, continuity, and participation and equality. This resembles [5] process for facilitation of HEI/SME contact:

1. Awareness. The first step for successful collaboration is an awareness of each other and each other’s services.
2. Contact. Next step is contact. Contact describes how contact between SMEs and HEIs should be made and what happens if there are communication problems. If the first contact is not favorable for the SME, there will not be a collaboration.
3. Delivery. After the initial contact, the HEI needs to deliver relevant services to the SMEs.
4. Support structure and management via intermediary organization. In this stage, [5] propose a bridge/link between HEIs and SMEs to make the interaction more effective. This bridge can for example be an intermediary organization or one-stop shop at the HEI.
5. Embeddedness and continuity. To become successful for all partners, the relationship needs to continue even after the original purpose of contact or after the research project is fulfilled.

2.2.2. Knowledge translation

Boundaries for sharing and assessing knowledge are defined within a framework that includes three stages; transfer, translate and transform [14]. The traditional top-down approach focuses on knowledge transfer from HEI to companies and can be illustrated

that HEI inform companies about their research and educations. The knowledge transfer between research, education, and industry, is traditionally carried out by having researchers involved in education and by encouraging research projects to include and involve students and student projects. The assumption is then that the educated student will contribute to industry relevance in their contact with companies and as alumni.

The knowledge translation on the other hand, includes joint sharing and access of knowledge to create common meanings. Since the societal changes as well as the emerging technologies are evolving so fast, the identified need of incorporate external actors as well as stakeholders in engineering educations are important [4]. Furthermore, they identify a need for creation of a relationship between stakeholders in order to practice and learn in a transdisciplinary way. However, all multidisciplinary problems in i.e. industry do not fit into an educational activity [4], which indicates a need for a translation in-between the stakeholders – HEI and SME.

3. Translator in different scenarios

We are inspired by [10] description of translation of knowledge between actors, and therefore we call the link between HEI and SMEs translator. The translator is: *“A person who knows the academic world and its driving forces and the business world with its driving forces”* [7, p.129]. In this study we use this description of translator to identify and describe translators in different scenarios in practice.

We have identified three scenarios with different translator roles between HEI and SMEs in wood industry: translator at HEI, translator at intermediary organization and translator at SMEs. In this chapter we will illustrate these three scenarios and translator role further. The identified translators in the different organizations are summarized in Figure 1.

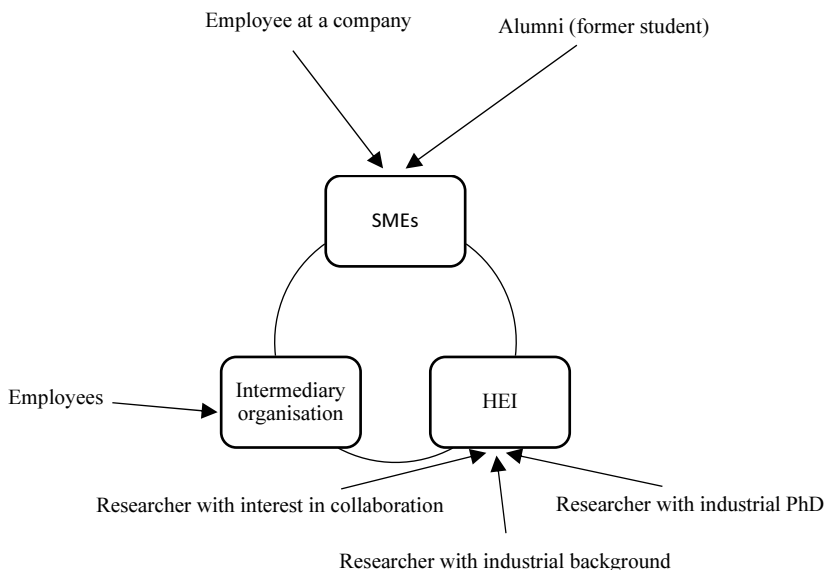


Figure 1. Identified translators in different organizations

3.1. Translator at HEI

The translator can work at a HEI, often as a researcher. The translator needs to know the academic world as well as the industry, and therefore the translator is often a researcher with an industrial background or an industrial PhD. However, we have also identified translators at HEI that do not have this background, but a keen interest and driving force for collaboration. In our example the translator is a researcher who participate both in education and in research projects. The research projects are co-funded by companies and the research projects are applied and contribute to both academia and industry. The researcher had no contact with companies until she/he got in contact with a company at a conference (late in his/her PhD studies) and was invited to lecture at the company. The company was satisfied with the delivery in terms of lecture and from this their relationship started. The researcher had continuous contact with the company and invited them to participate in research project. In the research project other companies participated that was invited by the other researchers in the project. The researchers in the project had continuous close contact with the companies in the project and lectured for them when needed. The researcher was aware of the companies needs and delivered what they expected. This resulted in new research projects and invitations to collaborate with SMEs in wood industry.

3.2. Translator at intermediary organization

Intermediary organizations are described in previous studies [4, 5, 6]. In Sweden there exist several intermediary organizations that have large networks of companies and work closely with the companies. An intermediary organization is the IUC, *Industriella utvecklingscentra*, working to develop manufacturing SMEs [15]. The network consists of regionally owned IUC-enterprises in Sweden and work to develop manufacturing SMEs. They also work towards increased collaboration between manufacturing SMEs, HEI, government etc. and are a natural link as they work in between the SMEs and HEIs.

Our example derives from one IUC. The project managers at the IUC have traditionally worked as translators between SMEs and education, projects, initiatives, and external organizations. When working with HEIs, the collaboration has often aimed at education, research, or research related activities.

The project managers, that are mostly practitioners, have close contact with SMEs visit or talk to them regularly, and have deep knowledge of the companies needs and challenges. They do not see themselves as consultants as they do not sell services but set the SMEs in contact with relevant initiatives, organizations, or educations. Some of the project managers have a background in HEIs or have worked with HEIs and they have direct contact with the HEIs.

The SMEs included in the IUCs network have a lot of ideas of smaller projects, but no time and resources to work with them. Most of them had neither any experience of working with students and academia as they did not know what academia offers. Due to this, a new project to increase collaboration between the SMEs, intermediary organization, and two HEIs was developed. In the project, an essential activity is matchmaking, to match the ideas from the SMEs to HEI and vice versa. The project managers at the IUC visit companies and identify their needs and challenges. The first question they ask companies is what they need and what their challenges are. The ideas from SMEs are channeled from the translator/project managers at the IUC to contact

persons at the HEI. Then the HEI helps to translate the ideas to suitable activities at the HEIs. If the company is not used to work with HEIs, the translator often suggests beginning with a project for students, for example a thesis project. The contact at the HEI mediate the information to relevant lectures or researchers, i.e., a bottom-up flow. The information and communication are also top-down, as the project members from HEI can visit companies together with the coach to present the HEIs offer and have a dialogue with the company about suitable HEIs offer for the company.

3.3. Translator at SMEs

In our study we have identified two types of translators working at SMEs. The first one is former students that have knowledge of HEIs offer and direct contact with the HEI. A former student, got in contact with research already in her bachelor thesis as she did her thesis work in a research project, and she kept contact with the people in the research projects when she began to work. When she got employed by a SME in wood industry, the first thing she did was to contact the people she knew from HEI working at the intermediary organization to discuss competence development for the employee.

The other example is a CEO at a small family-owned wood company. First, a project manager at the intermediary organization acted as translator. The project manager was aware of the CEOs needs and challenges due to a continual and interactive dialogue between the company and intermediary organization. Due to this, the company participated in a research project with the intermediary organization and a HEI. The CEO was satisfied with the research project as it helped both the CEO and company to improve and develop. When a translator at the HEI was searching for companies to a new research project, the intermediary organization recommended the translator at the HEI to contact the CEO. Due to this, the company was invited to participate in another research project that supported their improvements even further. Before participating in the research projects, the CEO and company had no relation to the HEI, but after participating in the research projects they now know what the HEI can offer and have also direct contact with the HEI. The CEO have today the translator role in the company.

4. Results

[5] described the stages as a top-down approach for knowledge transfer, but in this study, this is applied for knowledge translation. We have identified all the stages in our examples, but the stages were conducted in different order and sometimes iteratively. Therefore, we propose an alternative figure based on [5]’s stages with a more flexible approach to how knowledge can be translated between SMEs and HEIs, see Figure 2. The translator is placed in the middle in our approach as the translator is critical for the knowledge translation. Next stage depends on the situation. For example, in the case with a translator at HEI, the first step for linking companies and HEI was the delivery of a lecture that started the trust and awareness and

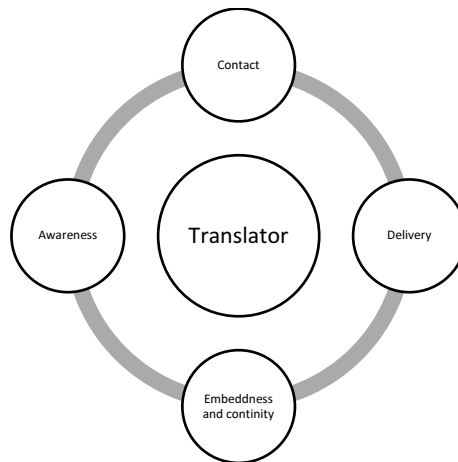


Figure 2. Linking SMEs and HEIs using a translator for knowledge translation (based on [4])

embeddedness, and in the case with translator at intermediary organization it was contact with the SMEs and awareness of HEI. The stages are iteratively and depends both on the translator's awareness of SMEs and HEIs and vice versa. If a SME is not mature enough to engage in student projects, they keep continuous contact until the SME is ready. In our examples, some companies began the collaboration with participation in a research project, and this is enabled with the translator's awareness of the company needs and challenges as well as maturity and interest. The trust, here included in embeddedness and continuity are also included in all examples. In the case with the CEO, the translator at the intermediary organization delivered successful results that resulted in trust. The translator also trusted the researcher at the HEI and connected these two parts. This was a continuous process for over four years. Another example are the translators at the intermediary organization who have built the trust in continuous contacts and successful deliveries in terms of successful student projects to the SMEs. This resembles [6], description that the translator's experience and working methods needs to be characterized by equality, dialogue, and respect for the person they collaborate with.

The outcome of the approach is in all cases knowledge translation between SMEs and HEIs, beginning with the SMEs needs and challenges and thereafter translation of this knowledge to the HEI. This is a reverse flow from the traditional top-down where knowledge is transferred from research-education-industry. Here we begin with the industry needs and challenges and this is translated into students' projects and thereafter to research, or with industrial needs and challenges that are translated to research and thereafter to education.

5. Discussion

This paper aims at exploring the translator role and the definition in chapter 2.2.2 is a first attempt to define the translator role. This definition will be further developed in next step of this research.

We have identified different translators among researchers in engineering with different backgrounds. These researchers have worked close with companies in wood industry in several research projects and continues to have contact with the companies

even after the projects end. Often these researchers have an industrial background or has been an industrial PhD, but there also exist researchers as translators without this background as showed in the example. Most researchers in the engineering field co-produce knowledge in co-funded research projects, but not all of them are translators as to our definition. According to [6], important factors for being a translator is the researcher's competence and interest to translate theories to practice as well as working method for collaboration. However, this study does not focus on why some researchers tend to be more interested in collaboration with SMEs and what characteristics they have. In this study, we focus on exploring the different translator roles.

The continuous contact is vital in all the described cases and here the translator play an important role in having the continuous contact with both SMEs and HEIs.

First, the intermediary organization acted as translator, but due to continuous contact with HEI, the CEO himself is now a translator. This example shows the importance of continuous contact, successful deliveries and trust between the different peoples involved in the collaboration.

SMEs, HEI, and students and will benefit from working with translators that link HEI and SMEs:

The benefits for the **SMEs** are that they can get help to solve their challenges as the translators translate the company need to relevant HEI offer. If the SMEs, for example need to increase productivity, students can conduct their thesis work at the company.

The benefits for **the HEI** are the possibility for long-term planning where the same supervisor can follow several student projects that are associated with the same company project. The HEI can also provide, for example, international students with high quality projects.

The benefits for the **students** are that the project they are carrying out will have real impact at the company and that supervisors, both at the HEI and the company, will be invested in the project. Fellow students will also benefit from guest lectures from the company. And, as with all internships, this might be the initiation of summer work, final thesis and perhaps a blooming career? The long-term result for all three groups of stakeholders could, besides networking and enhance partnership be joint research projects, industrial researchers etc.

This is a first attempt to understand the phenomenon we identified, and this study focus on describing and illustrating the translator role and how it can support SMEs in the wooden industry as well as linking research and education to industrial relevance. Even though the article by [5] is over 20 years old, much of the study and the results are still relevant. In their description of contact, they wrote that many SMEs are aware of potential benefits of working with HEIs, but that the relationship did not prosper because the first contact was not favorable due to different reasons. Our study is the first attempt to overcome this bridge so that the contacts with the HEI are favorable and will benefit both HEIs and SMEs. This can be achieved by using a translator who are aware of both the SMEs and the HEI. However, more research about this is needed and due to this, we will continue to explore and later explain the translator role. Next step will be to further explore and explain the translator role using Figure 2 and [14]'s framework.

6. Conclusions

The initial results indicate that a stronger link between research and education when industrial relevance is the key objective requires a new role – a translator between the

HEI's offers and the company requirements. Here we want to present a third way of working together – by beginning with companies needs and challenges, and thereafter aligning and assigning student projects to company-initiated projects, designed to solve long term challenges. This enables the reverse bottom-up flow: industry → education – > research.

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