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Project Implementation Model with Postponed Requirements Definition: Findings from the TeknoHUB Project

Abstract: This article is related to the TeknoHUB project, which aims to enhance the technological, automation, and digitalization capabilities of SMEs in Upper Savo, Finland. The project identified common technology gaps within the group of participating companies and formed interest groups to develop a model for capability renewal. This paper reports on a project implementation model where the definition of project work packages and their contents is postponed to better align with the needs and inputs of the companies. By delaying the decisions on the research topics and their details, to be made in a facilitated collaborative process of the first phase of the project, the model increased the commitment and participation of the companies.

Keywords: collection of industry requirements, postponed definition of project work packages, project model

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1 Background

The TeknoHUB project (06/2021..11/2023) was initiated based on the needs of SMEs in the Upper-Savo region in Finland. These companies realized it was necessary to develop their technology, automation, and digitalization capabilities to prepare for future investments and development actions. The companies considered their own ability to advance automation and make investment decisions as limited, which practically slowed down the implementation of development actions or the realization of their results, thereby hindering the growth and renewal of the companies.

To address these needs, the overall goal of the TeknoHUB project was to improve the rapid digital and technological adaptability of supplier companies and SMEs in Ylä-Savo region, improving conditions for significant and rapid growth in response to changing customer demand and operating environments. Additionally, the aim was to encourage SMEs to collaborate with universities to ensure that they have the latest available knowledge to support their technology development efforts. The project also aimed to develop collaborative peer learning among companies by pursuing specific, limited technological targets selected by the companies within the work package participants.

Unlike in typical collaborative development or improvement projects, in TeknoHUB only the upper-level goal for improving digital and technological adaptability was given in the grant decision. However, the actual work package structure and the package contents such as the tasks to be performed were partially left open. The first phase of the project was to collaboratively define the content of the work packages, i.e., to decide the main themes for the development and improvement actions. However, according to the requirements of the funding instrument, the work packages needed to be chosen so that each package served more than just one participating company. On the other hand, to ensure the motivation to participate, for each company, there needed to be at least one work package that addressed the technology and digitalization gaps relevant to the company.

The project was divided into three individual phases: Phase 1) Identify technology and digitalization gaps, form small interest groups around the gaps, and create a model for capability renewal for the next phase. Phase 2) Rapidly improve key technology capabilities through technology transfer, pilots, and demos, and start R&D activities with research institutions. Phase 3) Develop the 'TeknoHUB' model for ongoing collaboration between companies and educational institutions, which can be used to establish new investment and development projects.

In addition to the upper level goal, the types of tasks to be performed in the work packages were partially predefined. In the project funding decision, a significant portion of the funding for the second phase was reserved for the students conducting their thesis research. Their research topics focused on minimizing the technology gaps identified in the first phase and increasing knowledge in the content areas of the project work packages.

The aim of this article is on the first phase and the beginning of the second phase of the TeknoHUB project: feasibility study and needs assessment from participating companies, and definition and prioritization of research topics and technology pilots developed in the technology study phase. The research questions addressed in this article are: **RQ1.** What kind of process can be used to identify the needs of SME companies and produce information that supports those company needs for new technology intake? **RQ2.** What research needs or knowledge gaps do machine shops and similar SME companies have?

2 Materials and Methods

The method we followed to tackle the postponed definition of work packages and their detailed content included the following steps: 1) We first found out the current state and future needs of companies with semi-structured interviews to CEO and other top management. The interview sessions lasted 2..3 hours and were recorded and analyzed later. A factory tour was included to have a look at the facilities, machinery and processes used, the manufactured products, the operations, and the way of work. 2) We formed a technology needs matrix from the interview data and the factory tour observations. Matrix included a list of technologies with topical grouping, our own description of technology, and indices indicating company interest. In the matrix, 42 technologies were listed.

3) The matrix was introduced to the companies and they could refine the results. They prioritized technologies according to their own interests. Each company had a total of 6 points available to distribute over their desired technologies to research. Points could be allocated to 1..6 technologies, giving the company a possibility to weight their choice. In addition, time period for applying technology was asked with three options: 0..1 year, 1..4 year, or later. 4) Based on interest index, company prioritization points, and time spans, we established weighted score for each technology. Based on score and company prioritizations we re-grouped the table and made proposals for three work package themes out of the topics and companies. Each company had primary and secondary interest groups defined. The outcome was then handed over to the companies for final comments.

5) The companies were divided into three interest groups. Based on the available resources of the companies, they chose one to three interest groups to participate in. The role was either participant or follower, each company having at least one participant role. A coordinator and technical experts from research organizations were nominated for each interest group. The proposal for the technologies to focus on was also made. 6) A workshop was organized to introduce the work packages and agree on the operational models, responsibilities, rules, and reporting. The second half of the workshop was conducted within the interest groups and started the work package activities. 7) The facilitated initial workshops defined the work packages and had three main outcomes: It defined the final theme and aim for each work package, the final set of prioritized key topics, and prioritized the set of key questions the participating companies would like to solve in each topic.

Workshops with companies were associated with steps 2), 4), 6), and 7). The commitment and inclusion of the companies was essential to successfully complete this initial phase of the project. At the same time, it tightly defined the direction and success of the project.

The first phase of the project included steps 1..6 and the second phase started with step 7. After this, each of the work packages started their normal project and research activities. In the TeknoHUB project, it meant actions such as literature review, arranging webinars on core topics with invited experts, benchmarking trips, pilots, and technical demonstrations, BSc and MSc thesis, and collaboration across other research projects.

3 Results

The main result of our paper and the answer to RQ1 is the method used to define the structure and contents of the work package for the technology needs of SME companies. The process and its details will be described in the final paper. In the full paper, we will present the results of the activities and data collected from the definition steps, which will answer the RQ2. The full paper also includes an analysis and discussion of our findings based on the implemented project.