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Fixotek: Implementing and Testing Urban Reuse and Repair Centers in Sweden

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Abstract. The Fixotek project is testing if dedicated community spaces in residential areas could help encourage residents to fix, lend, swap and recycle consumer products, thereby preventing waste generation and recovering resources locally. Four Fixoteks have been developed, in districts with different socioeconomic conditions in Gothenburg, offering regular open hours and events. The idea has been very well received by the community, with differences in how easily it has been taken up in some of the locations. Two of the Fixoteks engage local volunteers and have developed closer to local initiatives, while in the other two more efforts are needed to engage the local community. Non the less, the locations have allowed residents to reuse and repair beyond what was possible before. The project has been implemented with a multi-stakeholder consortium, which has given it a holistic approach to the implementation, but makes decision taking slow.

Keywords: Reuse Centers, Repair Centers, Knowledge Sharing, Circular Economy

1. Introduction

There is a great need to transform our economy to make it more sustainable. With this intention the EU Commission has created the circular economy action plan and a monitoring framework. In this action plan, it is stated that more efforts have to be dedicated to prevent waste from being generated, through activities such as reuse, repair and remanufacture [1]. This desired shift to a circular economic model, requires changes in consumer behavior, not only in how we as a society consume manufactured products, but also how we discard them once we are done using them. Research in sustainable waste management has often linked users' adoption of recycling schemes to how convenient these schemes are, identifying ease of access and distance to disposal centers as a main factor in their adoption [2]. There are many initiatives that have engaged in resource recovery through direct reuse, relocation and or repair. Some examples are second hand shops, swap shops (where people bring and/or take used items



in good conditions for little or no cost) [3], freecycle platforms, public refrigerators for discarded but edible food, food sharing, and bike kitchens. Many of these initiatives are self-organized by groups of volunteers that engage in these causes and are done with a social and/or environmental motivation, rather than for economic reasons [4]. Ironically enough, these are used as prime examples of a new “circular” or “sharing” economy, given that they are less resource intensive and provide more people with access to goods recovering materials from waste streams. Given their self-organized and voluntary nature, these initiatives keep little or no information about the materials they recover, making it difficult to quantify the effect these initiatives have in waste prevention. The challenge still lies in upscaling these initiatives and to see if they can be institutionalized in a way that helps further establish these sustainable practices among a wider group of citizens.

In Gothenburg, citizens are expected to sort their household waste, separating bio-degradable, and packaging waste from the rest that is destined to incineration at a combined heat and energy generating plant. Packaging waste is collected mainly through neighborhood close containers located in housing areas called “recycling stations”, which are financed by the extended producer responsibility for packaging in Sweden. Gothenburg has more than 300 recycling stations, with a population of approximately 570 thousand people. Recyclable items that are not packaging or bio-degradable are to be delivered to one of the six recycling centers in the city. Adult citizens registered as living in Gothenburg can get a recycling card, allowing them to visit the recycling center a maximum of six times per year for free [5]. The office for Sustainable Waste and Water from the municipality of Gothenburg (KoV for its acronym in Swedish) has a history of working with waste prevention. Since 2007, the recycling center in Gothenburg located in Alelyckan also promotes reuse. Visitors are asked if the items they bring can be reused, and if allowed by the user, the material is diverted to a second-hand shop or secondary material shop, both located on site. During 2010, 360 tons of waste were prevented at Alelyckan [6]. Since 2016 the municipal project Circular Gothenburg intends to promote ways in which to help citizens reuse and repair more material. Inspired by grass root initiatives engaged in resource recovery, they started exploring this question with an initiative called Re:Challenge. In collaboration with the NGO Miljöbron, Re:Challenge engaged municipal housing companies in a dialogue to learn how together with Chalmers university they could help generate spaces for reuse and repair. Based on previous experiences from the involved actors, multidisciplinary student groups were engaged to develop ideas for reuse centers in four locations in Gothenburg. Based on the results obtained from Re:Challenge, KoV decided to turn these suggestions into an innovation project to test “mini recycling centers” in some areas of the city, thus initiating the Fixotek project.

KoV started the Fixotek project in June 2017. Roughly translated as “Fixary” (i.e. a fixing library), the project brings recycling centers closer to residents and encourages sustainable practices such as reusing and repairing in neighborhoods by providing a dedicated open community space in residential areas. These spaces, called the Fixoteks, will allow for neighbors to fix, lend, swap and make household items, with locally available secondary material.

This article presents how the project was planned and includes initial observations from running the Fixoteks, as well as reporting on the first four project stages (of a total of eight). The creation and set up of one of these facilities, built out of reused construction materials, is also described. This material is used to share the initial lessons learned in the project, as well as to discuss its implications and suggest actions for how to continue facilitating the described sustainable consumption practices.

2. The Fixotek Project

The Fixotek project (originally called “mini cycling parks”, or mini kretsloppsparken in Swedish) was developed by the Municipality of Gothenburg in collaboration with two public housing companies in Gothenburg (i.e. Bostadsbolaget and Familjebostäder), the local tenant association (i.e. Hyresgästföreningen) and Chalmers University of Technology.

The project was formulated as an innovation project to generate knowledge on how mini cycling parks could work as meeting points and teaching centers to facilitate sharing, reuse, repair, creative reuse, and recycling of hazardous waste. During the project four mini cycling parks, located in housing

areas with socioeconomic and contextual differences, would be developed, tested and evaluated. The content for each center was to be defined in a co-creative process between the project partners, service personnel and engaged citizens. The project expected to fulfil the following goals:

- Make it easier to get rid of waste
- Change attitudes to resource management
- Create new meeting spaces
- Reduce littering/increase collected waste
- Make it easier to recycle/reuse/repair/share
- To create jobs and job training possibilities
- Increase citizen demand for products that are simple to maintain and repair

The districts chosen to host the Fixoteks were Hammarkullen, Majorna, Rannebergen and Bergsjön, based on the results obtained from the Re:Challenge project. These districts and the location for the Fixoteks are described in more detail in the next section. The Fixoteks in Hammarkullen and Majorna also include mini recycling points where neighbors can bring hazardous, electronic, and small amounts of bulky waste.

The project was divided into the following stages:

1. Start: Project leaders and other project organization are defined (directing board, reference group and local project groups), resulting with an established project organization on the 30th of September, 2017.
2. Planning: Previous projects are analyzed, co-creation and dialog processes are planned and evaluation tools are discussed, resulting in a plan for the developing of each location by the end of 2017.
3. Development: The locations are prepared, the services and activities these centers will offer are defined through co-creation activities, and evaluation tools are defined. This results in locally rooted concepts for each location and a defined set of evaluation tools to be used, by the end of March, 2018.
4. Test: The centers start their operations and gather the predefined data. The testing phase is planned to last 12 months, starting in April, 2018 to the end of March, 2019.
5. Evaluation: Data is evaluated and the legal and economic barriers to running such centers are identified, resulting in a summarized evaluation report by the end of May, 2019.
6. Decision about continuation: A decision is made whether or not to continue operating each of the four centers, including potential major adjustments that might be needed. The decision is to be made by the end of April, 2019.
7. Establishing and/or ending: Resources are allocated to continue running the centers, or the necessary activities to terminate the centers are done for each location. This will result in either a long term established operation, or an end of operations at each location by the end of May, 2019.
8. Handover/Termination: The results are delivered to the relevant actors and the project is finished by the end of June, 2019.

This article covers the first four stages of the project. This section informs about the first stage, section 3 presents the neighborhoods selected for the Fixoteks, section 4 describes the planning and development stages, and section 5 describes the preliminary results and main conclusions.

2.1. Project partners, their roles and project organization

The office for Sustainable Waste and Water of the Municipality of Gothenburg leads the project, and is responsible for running the centers, hire workshop leaders and plan for waste management in the locations. The municipal district offices for the districts involved also participate in the project by assigning representatives from their respective organizations to contribute with their knowledge of the areas, local expertise and connections. The working time dedicated to the project is a combination of in-kind and project financed part-time positions. The only two positions completely financed by the project are the two location managers hired to run the four centers. The organizational structure of the project is shown in Figure 1.

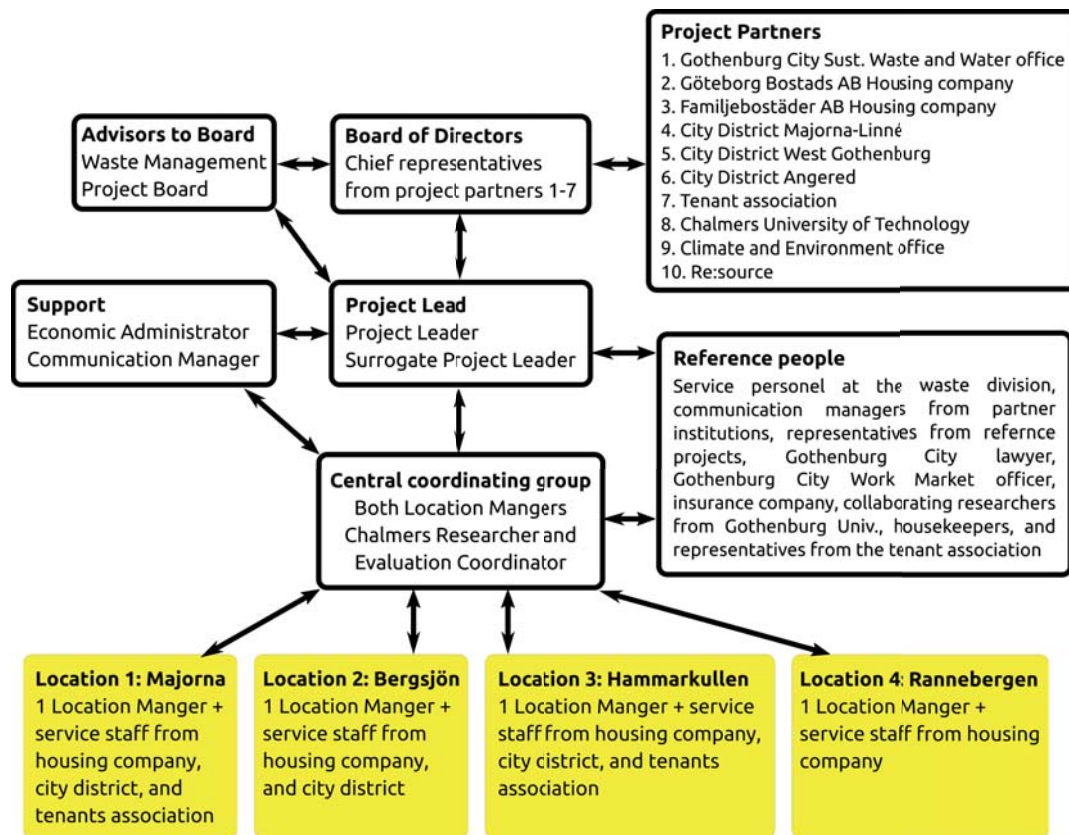


Figure 1. Fixotek Organizational Structure

The housing companies provided a suitable space in their buildings to establish the mini cycling centers, and helped manage and prepare the space for this purpose. The tenant association brought tenants' interests into the project and facilitated dialogues with tenants from the selected areas. The university helped define how to measure and evaluate the social and environmental impact of the project, and will later analyze the collected data to generate a scientific article and the final project reporting. All project partners were expected to participate with their expertise and knowledge, help spread information about the project through their institutions' communication channels, provide information required by the project leaders or location managers and assist to their respective project meetings.

The project's central coordinating group defines evaluation and continuation criteria, and is responsible for reporting. The project directive board includes chief representatives from all project partner institutions, with the exception of Chalmers, and is the main decision body of the project. Each location has their own project group. The locations that also include mini recycling points, have representatives from the tenant association involved in the corresponding project group.

3. Background about the selected districts

Gothenburg is Sweden's second largest city and Scandinavia's largest port. It has a strong industrial background, housing, even today, car and truck industries and large ferry companies. The four areas chosen to house the Fixoteks have different conditions. Bergsjön, Hammarkullen and Rannebergen are located at the end of the public transportation network towards the north-east of the city. They all have largely international working-class populations. Hammarkullen was developed as a housing program in the 60s, intended to provide homes to car industry workers. However, during the 70s large numbers of refugees were located in this area, marking it with an international heritage. Today the international community that lives in these three areas are refugees, but also expats that find it difficult to find housing

in more central areas of the city. In Hammarkullen alone there are inhabitants with backgrounds from over 80 different countries and more than 100 languages are spoken.

Up until the 60s, Majorna was an industrial working-class area, located near the port. Now it has become a vibrant neighborhood, with several museums and cafes for its middle-class population.

Table 1. Basic facts about the locations that house Fixoteks

Name	Location	Population	District	Socio-Economic level	Size
Bergsjön	North-east	7700	East Gothenburg	Working class	150 sqm
Hammarkullen	North-east	8500	Angered	Working class	100 sqm
Majorna	Central	10800	Majorna-Linne	Upper-middle class	145 sqm
Rannebergen	North-east	4600	Angered	Working class	100 sqm

4. Planning and Development stages

Once funding was granted, the project leaders drafted a plan and collaboration contract to be signed and approved by the board and all partner institutions. Once the participants were assigned by each institution, the project kick-off meeting was held on the 14th of Sept. Development then ran in parallel for the four locations based on several overarching topics. The project lead sent out four status reports to the project partners. The first three reports are summarized in Tables 2 and 3, detailing how the project developed before the Fixoteks opened their doors to the general public.

Table 2. Overview of the central project development.

	1st Report 12th October 2017	2nd Report 29th Nov. 2017	3rd Report 17th April 2018
Organization	<ul style="list-style-type: none"> - People assigned to working groups - Project plan and contract drafted - Kick off meeting 	<ul style="list-style-type: none"> - Location managers hired - Project plan and contract sent to partners and board for comments - In Dec the project will use a new management system 	<ul style="list-style-type: none"> - Project plan and contract approved and signed by project partners
Communication	<ul style="list-style-type: none"> - Com plan completed - Com team defined - Marketing agency hired to do branding 	<ul style="list-style-type: none"> - Brand and graphic guidelines finished - Fixotek is the official name - Slogan: Fix, lend, swap and build - Facebook page launched 	<ul style="list-style-type: none"> - Fixotek is on the municipality's web page - Instagram account launched - Several news reports about Fixoteks were done around their official openings -Project was presented in GBGs popular science festival
Social and environmental evaluation	<ul style="list-style-type: none"> - Workshop done to define what to evaluate - Researchers from another project might collaborate 	<ul style="list-style-type: none"> - Results from "what" workshop sent to partners for comments and adjustments - Workshops to define how to evaluate the project are planned 	<ul style="list-style-type: none"> - A guide of evaluation has been done and data is being collected at all Fixoteks
Evaluation of economic and legal implications	<ul style="list-style-type: none"> - First dialogue with second hand actors about collaboration and competition 	<ul style="list-style-type: none"> - Municipal office investigates barriers and possibilities for collaborating with external partners 	<ul style="list-style-type: none"> - Evaluation on how to continue the Fixoteks after the project started - Need and possibilities for upscaling to other areas in the city are evaluated

Each local project group defined how their Fixotek would be implemented, considered how to provide the services and distribute the components needed for operation. All planned spaces included a Swap

section, a textile workshop and a building workshop. The Fixoteks that also include mini recycling centers have containers where residents can bring material for recycling, beyond what is covered by the existing extended producer responsibility program for packaging waste.

Table 3. Overview of how the Fixoteks were developed and established.

	1st Report 12th October 2017	2nd Report 29th Nov. 2017	3rd Report 17th April 2018
Bergsjön	<ul style="list-style-type: none"> - Fixotek room chosen - Planning for job training post 	<ul style="list-style-type: none"> - Ongoing work to prepare the Fixotek room - Open house on the 2nd of Dec including an ideation café 	<ul style="list-style-type: none"> - Fixotek launch 21st of March - 62 visitors for opening event (40 tenants/22 employees)
Hammarkullen	<ul style="list-style-type: none"> - Ongoing work to prepare the Fixotek room - “Design & Build” course start working - Open house meeting planned for Nov 	<ul style="list-style-type: none"> - Ongoing work to prepare the Fixotek room - “Design & Build” course done with first stage - Open house meeting planned for the 9th of Dec 	<ul style="list-style-type: none"> - Fixotek was launched the 20th of March - 149 visitors for opening event (114 tenants/35 employees) - “Design & Build” course continues on second stage
Majorna	<ul style="list-style-type: none"> - Ongoing work to prepare the Fixotek room - Dialogues with groups that are interested in participating - Ongoing planning for job training post and open house meeting 	<ul style="list-style-type: none"> - Ongoing work to prepare the Fixotek room 	<ul style="list-style-type: none"> - Fixotek launch 19th of March - 130 visitors for opening event (84 tenants/46 employees) - Most visitors per open hour from all locations (~25/day) - Two NGO started using the space, Solidaric refrigerators and a Toy library
Rannebergen	<ul style="list-style-type: none"> - Fixotek launched 23rd of Aug - Tenants have access to the place by lending a key - Several tenants have volunteered to keep the space open - Dialogue meeting with local tenant association planned 	<ul style="list-style-type: none"> - The Fixotek is kept open by volunteer tenants - Ongoing planning to start with regular activities in spring and more personnel at the location 	
General	<ul style="list-style-type: none"> - Contact with NGO to offer student projects that would help furnish the Fixoteks - List of infrastructure and tools needed will be defined by each location team - Ongoing plan for waste services for HK and MJ - Legal questions around how to hire people have been presented to KoV legal advisor 	<ul style="list-style-type: none"> - Student work suggested to furnish with upcycled items - Tools and infrastructure have been purchased - Two collectors ordered for HK and MJ plus an additional container for e-waste - Insurance company investigates how to cover the Fixoteks - Talks with the involved district offices to offer job training posts to manage the Fixoteks 	<ul style="list-style-type: none"> - Collaboration with two student groups furnished the unopened rooms - Four participants started job training - Regular workshops are planned, so each location has a workshop every other week - Second hand shop will get leftover clothes from swap areas

4.1. Building the Fixotek Hammarkullen with recovered building materials

A collaboration was created between the Hammarkullen Fixotek project, the city planning office and two Chalmers Architecture master studios, Design and Planning for Social Inclusion and DARE2build,

in order to build an additional workshop that included material storage and tools for repair as well as a pavilion for waste sorting. It was a two-phase project. The first phase started in September 2017 with a group of six students from the Chalmers Architecture master studio, Design and Planning for Social Inclusion, who were given the task of engaging the project stakeholders as well as local community organizations and inhabitants in a participatory design process focusing on the design of the workshop and recycling pavilion structures. A series of co-creative methodologies and workshops were performed by the students to engage the local actors in the development of the project and ensure it was grounded in the actual needs of the community. After extensive fieldwork and documentation, the students developed a proposal for the Fixotek workshop and a recycling pavilion. The teachers of the studio then engaged members of the design firm ONOFF in Berlin to guide the students in construction of the first phase, the workshop. Over approximately three weeks in November 2017 students and ONOFF constructed the workshop space using largely all recycled materials, the main structure consisted of two 40-foot recycled shipping containers.

The second phase consisted of additional modifications to the workshop structure built in phase one as well as the construction of a meeting place and recycling pavilion where users and staff of the Fixotek could sort their waste for recycling. Building upon the initial participatory processes done in phase one, a detailed design process began for phase two through the pilot case for a new design studio called DARE2build, this studio consisted of 10 students, both architects and engineers. During the entire month of June, 2018, the students constructed the recycling pavilion and meeting place with their teachers, members from ONOFF Berlin as well as a group of local high school students. This construction was also made out of mostly recycled materials and its main structures are a recycled 20-foot shipping container, and a pergola made from waste ventilation pipes. A local artist was also engaged to work with the students to design and paint all the structures.

5. Conclusions and lessons learned so far

Since the Fixoteks were inaugurated (see Table 3 for exact dates) regular opening hours have been provided by the project personnel. Additional events and extra activities have been organized regularly, with each Fixotek offering workshops every second week.

From the project aims described in Section 2, the project has already succeeded in creating new meeting spaces and job training positions. It has also made it easier to reuse, repair, and get rid of waste for recycling locally. At each location different characteristics and uses have been observed. For example, the Fixotek in Ranneberg is an incredibly popular swapping location, while in Majorna there is more variety in the activities, most likely due to the use of the space by additional volunteer associations i.e. the solidaric fridge (Figure 2) and the toy library initiatives. In Hammarkullen, the space has become a popular hang for school kids after their classes. This presents the difficulty, that unsupervised children demand a lot of attention from the staff, who are not trained for that. Nonetheless, one of the job trainees working in Hammarkullen is very motivated, he has learned to sew and is happy that his job allows him to assist the local community in more sustainable practices. Reuse has been mainly facilitated by the swap corners, with some items like books and home accessories not being so popular as the clothes. Repair has been mostly done in the sewing corners (Figure 3) and bike workshops. Repair of electronics has also been done, on dedicated events, but only where experts were on site to help the participants.

An in-depth analysis of the data collected during the test period is to be done during the spring of 2019. This analysis needs to be done to determine if the project has reached its remaining goals (i.e. Change attitudes to resource management, reduce littering/increase collected waste, create jobs and increase citizen demand for products that are simple to maintain and repair). The detailed report is planned to be delivered by the end of May 2019.

Based on the location managers' observations and user feedback received, the following trends have been identified:

- The Swap section of the Fixoteks tend to be the most popular ones, especially in Rannebergen.
- The workshop space for textiles and bikes are the second most popular spaces.

- Tool lending is the least popular feature of a Fixotek. Possibly due to available tool selection or the Fixotek visitors do not necessarily build at home.
- The mini recycling centers available have been used often and are well received by the neighbors.
- It has been easier to attract a large number of participants in Majorna that in the other locations.
- Interest in the Fixoteks is based on reuse and repair, but more so as a social meeting place.



Figure 2. Introduction to sewing workshops promoted on Fixotek's Instagram account.



Figure 3. Also, on Instagram, informing that the solidaric fridge in Majorna is full.

The Fixoteks have already helped spread sustainable consumption practices. It has been easier to get working in Majorna, where the population seemed already to understand the concept with little need for explanation. Interesting to note, that Majorna is the highest income area out of the four centers. Project staff have had to explain often in the other three locations, that they do not repair things for the neighbors, but rather provide the space, tools and assistance for them to do it themselves. However, a deeper understanding of the context in all locations is needed to better communicate and engage with the local communities. This will hopefully be possible by analyzing all the data collected during the test period.

Already now, the project lead feels that two years is too short a time to be able to establish, test and evaluate the operations of these centers, since it takes time to inform inhabitants about the project and see changes in behavior. Also, the large collaboration that the project is based on has proven to be both positive and negative for this type of innovation project. The partners' different perspectives bring a holistic view on the project, however, makes it difficult to make quick decisions.

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