

Article

Sustainable Innovations in Small Enterprises for the Transformation of the Primary Healthcare Sector

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Abstract: Small enterprises face multiple and complex challenges when developing digital technologies. The aim of this article is to explore the role of sustainable innovation in small enterprises in relation to the ongoing transformation of the primary healthcare sector. The purpose is to gain understanding of innovation processes within the framework of sustainable development, applied to a local primary healthcare center. Data were collected through seven semi-structured interviews. A qualitative thematic analysis was conducted. Five themes appeared in relation to the ongoing transformation of the primary healthcare sector: (1) The process of sustainable innovation in a long-term perspective; (2) the companies' views on innovations in healthcare; (3) effects of innovations in healthcare; (4) sustainable product or service development, and (5) the role of collaboration in the innovation process. The companies expressed a positive attitude to new innovations, as a natural part of developing the companies. The article concludes that incremental development of tools in small businesses supports the transformation of processes and services in the primary healthcare sector. Cross-disciplinary teams in collaboration facilitates the necessary learning and the required creation and sharing of knowledge.

Keywords: healthcare; digital innovation; sustainability; small enterprises; incremental development; collaborative learning; knowledge integration

1. Introduction

Digitalization and new technology are growing areas within the healthcare sector in recent years. Many clinics and healthcare providers have limited access to digital technology [1]. However, there is potential for development of digital technology in the healthcare sector. Understanding the motivation and need of the professional healthcare practice and of the patients may be helpful for small enterprises that develop innovative digital technology. In this way the healthcare sector can develop enhanced healthcare systems, such as electronic health (eHealth), based on digitalization [2]. eHealth could be used to increase the quality of healthcare services provided by the healthcare sector for health-related issues (e.g., glycemic control and weight loss) and psychological issues (e.g., depressive complaints and anxiety) [3]. Hence, it is important that the innovative technology fulfill the demands set by the healthcare organizations and also be suitable for the patients interacting with both technology and the healthcare provider. Also, pandemics like COVID-19 call for an increased need and faster development of digital technologies in the healthcare sector, to follow up health-related information at a distance. Services aimed at the ageing population and patients with chronic diseases are especially needed, to reach the goal of social distancing in society. However, healthcare organizations are complex and do not usually have a tradition of developing innovations together with small enterprises [4].

Small enterprises therefore face multiple and complex challenges when developing these digital technologies and different related healthcare services, as eHealth technology.

Healthcare budgets in western countries are under pressure due to an increasing ageing population, today and in the decades to come. Thus, there is a need for more innovative, efficient, and high-quality healthcare services [5]. The healthcare in Sweden, as well as in the other Scandinavian countries, is currently undergoing a transformation process. Healthcare should be provided as close to patients and their homes as possible, minimizing the need for hospital admissions. Thus, local primary healthcare centers have to provide a larger portion of healthcare to citizens and be able to meet patients' different needs of care in their home environments. This situation calls for new digital technologies and new work methods. The primary healthcare centers can in this transformation process contribute to the innovation of new appropriate digital technologies and services in collaboration with small enterprises.

Innovation in the primary healthcare sector refers to the act or process of developing new ideas and devices that imply new methods of providing healthcare. Innovation is not only about reforming the work at one single primary healthcare center, but it is about developing digital technologies and new work methods that can be more widely diffused and implemented at many primary healthcare centers [6–8]. Innovations should lead to higher efficiency, be safe and convenient for patients and the primary healthcare sector to use, and they also need to be seen from a commercial and technological perspective [9]. The innovations therefore must be sustainable over time, thus contributing to an improved environment, as well as economically sound and supportive of the society [10]. They also need to be easy to use, and not too expensive to buy and implement.

In order for small enterprises to survive and be sustainable, they need to create a flexible strategy that meets the needs of the primary healthcare sector [11]. There is uncertainty whether innovation investments will be successful, and this entails a risk for small enterprises. Little research has been conducted in sustainable innovations in small enterprises [10,12]. Innovation in small enterprises has been studied, for example, based on the resource-based view (RBV), where appropriate resources will be used for innovation, and innovation is determined by the strategy and resources of the small enterprises [13]. Collaboration with the primary healthcare sector and its patients is of vital importance when developing innovative technologies for the primary healthcare sector with a sustainable perspective. Small enterprises have to involve both internal and external knowledge and competences when searching for sustainable innovations and exploiting business opportunities [14,15]. Therefore, relationships between professional users, patients, and small enterprises have a crucial role in developing innovations in the primary healthcare sector [9].

The aim of this article is to explore the role of sustainable innovations in small enterprises in relation to the ongoing transformation of the primary healthcare sector. The purpose is to gain understanding of innovation processes within the framework of sustainable development, applied to a local primary healthcare center. The study links to the participating companies' work on sustainability and innovations, adapted and transferred to local situations in healthcare. In this study, we investigate seven small enterprises' views on innovation and development of technological artifacts and services for the healthcare sector. Further on, we explore what kind of obstacles they see, and how they aim to reach successful business cases. The article focuses on the impacts of products and services. The contribution of this article could be summarized as follows.

- Incremental development of tools for use in the primary healthcare sector needs to take into account changes and the transformation of processes and services in primary healthcare.
- The perspectives of both healthcare staff and patients should be included in the collaborative development, as they are important actors.
- Cross-disciplinary teams with participants from both the small enterprises, primary healthcare center—both staff and patients—as well as academia, facilitates the necessary learning and the required knowledge creation and sharing
- Incremental development seems to ensure that products and services are adapted to a primary healthcare sector in transformation.

- Sustainable healthcare processes and services need to be developed in order to benefit from innovative tools, to increase efficiency in healthcare and higher quality in healthcare for the society.

The remainder of this article is structured as follows: Section 2 gives a theoretical background to sustainable innovation and its relations to healthcare organizations; Section 3 provides the empirical setting as well as methods for data collection and data analysis; Section 4 presents the findings of the study, which are discussed in Section 5; Section 6 concludes the study and suggests a few topics for future research.

2. Theoretical Background and Literature Review

Within the framework of different types of innovation processes, studies and methods that investigate how small enterprises and organizations manage environmental issues are continuously being developed. This is reflected by an increasing number of studies on sustainability and innovation issues over time [16,17]. Sustainable innovation is here understood as the development of new products, processes, services, and technologies that contribute to sustainable development and the well-being of humans [18]. Studies that concern sustainability and innovation issues are commonly at a theoretical and conceptual level, and at a regional level of scale [19]. Studies that link sustainability and innovation issues to what happens in a local context, and at the small enterprise level, are sparse [16,17]. Existing research has not acknowledged the qualitative and contextual conditions to a great extent [20], and little attention has been given to how small enterprises manage sustainable innovations in the current knowledge-intensive context [12]. Small enterprises can contribute to the development of local communities by improving the well-being of the population [21].

Studies of sustainability and innovation issues are commonly connected to business models and products, and various organizational and environmentally oriented tools. Horgan et al. [4] claim that it is necessary to bring innovation into healthcare and investigate the willingness of small enterprises to be at the forefront of developing digital healthcare technologies. This study focuses on the development of innovative products in small enterprises that will be used for sustainable services and processes in the primary healthcare sector. It is important to focus on sustainable innovations in small enterprises where learning and knowledge integration is needed in collaboration with the primary healthcare sector. Collaborations and inter-organizational knowledge flows promote innovation [22].

2.1. Sustainability in Small Enterprises

Sustainability issues have gradually been making their way in an increasing number of lines of businesses over time, also in small enterprises and organizations, with different shapes, patterns, and sizes. Initial resistance to sustainability issues was long associated with manufacturing companies and organizations that had some kind of environmental impact. Sustainability has generally been associated with environmentally hazardous activities, and companies with such activities must comply with environmental laws and other requirements related to ecological issues and human rights [23,24].

Environmental and sustainability business operations have also spread over time to service-based industries due to demands from customers and insights on business benefits [25]. There are studies of sustainability work and innovations in companies and organizations operating in the manufacturing industry and service business, conducted on different geographical scale levels. However, few studies clearly link sustainability and innovation issues to service-based organizations operating at a local level, especially in the healthcare field [26]. Moreover, existing research within the field of service and process innovation is insufficient, according to Zahoor and Al-Tabbaa [27]. Very few studies have investigated innovation in relation to sustainable performance of small enterprises, especially the innovation of digital technologies for the healthcare sector. This is confirmed by Rauter et al. [28], who argue that most research has focused on the meso or macro level of innovation. Also, the issue of how to tackle innovation when knowledge from various sources is integrated, has not been carefully considered [28].

The sustainability issue has, in a local and proximate context, a connection to arguments put forward by Wärneryd and Hilding-Rydevik [29], among others. Global environmental changes are rarely the consequence of a few businesses or a few people's actions. It is rather a large number of small, local actions that together bring about significant changes in the environment and play a significant role in innovation creation, allowing for the flow of knowledge among the members in a local group of actors [30]. Wärneryd and Hilding-Rydevik [29] argue that the issue of global sustainability should in fact be regarded as a local issue rather than a global issue. This means that a universal and holistic systems perspective on sustainability issues should be complemented with particular local perspectives [31]. Relationships with various local actors are important, such as other enterprises, customers, and other stakeholders in the society, such as incubators, investors, and academia [32,33]. Hence, is it necessary to study such cases of relationships and remain flexible to geographical scale, in order to obtain a better understanding of different types of relationships [30,34].

2.2. Innovation in Small Business Firms

Since the same local relationships apply to innovation issues as to sustainability issues, the quality of local demand is important [35,36]. The local context is an important factor for a small company to consider in order to develop into an innovative and competitive player [37,38]. Companies and organizations with local customers that put demands on them have the best chances of succeeding in an international market. It is necessary to take into account the local conditions and get familiar with the dynamism in business communities (see also Dobuis and Roto [39]). Muzzi and Albertini [40] argue that over the last few decades, it has become evident that small enterprises rely on networking to get access to innovation and larger knowledge bases (see also Gausdal and Nilsen [41] and Scuotto et al. [12]).

Sustainability work in companies and organizations has, from a historical perspective, been developed at the intersection of environmental regulations and competitiveness. Porter and van der Linde [42,43] argue that the relationship between regulations in the environmental field and competitiveness should be viewed from a dynamic rather than a static perspective. Harsh environmental requirements can steer companies and organizations in a positive direction in several types of areas. It can generate innovations that increase productivity, thereby increasing competitiveness. This often leads to better and more efficient resource management. Similar arguments are presented by Blättel-Mink [44], Gouldson and Murphy [45], and Drake et al. [46]. Porter and van der Linde's [42] ideas about the need for environmental regulations are especially important for forcing ecological innovations. These thoughts can also be transferred to the healthcare business area and to this study, as healthcare operates within specific regulations. Specific regulations apply to, for example, innovation using eHealth based on cloud technology [47].

The exposition of different theoretical frameworks on sustainability, innovation, and local adaptation is necessary to reflect and analyze different approaches to achieve sustainability, innovation, and local adaptation. Most research on sustainable innovation is quantitative, and surveys are the most commonly used data collection method. By case studies design, it is possible to gain a more in-depth understanding of innovation in small enterprises [27].

There are links to competitiveness, when it comes to the ability and interest to introduce various forms of environmentally related tools. Porter and van der Linde [42] refer to studies that show that the most internationally competitive companies are those that have the capacity to constantly improve. This links to the central parts of the environmental management standard ISO 14001, regarding continuous improvement of environmental performance. What characterizes a certified environmental management system is that different parts of it are in constant movement and development. Porter and van der Linde [42] deem that powerfully constructed environmental standards can create innovations and generate increased competitiveness. They argue that stern environmental requirements could influence companies in a positive direction. Human resources are considered a key success factor for the implementation of policies and practices, and for boosting sustainable

performance in healthcare organizations [48]. Hopefully, this promotes sustainable development (see also Florida and Davison [49]).

Small enterprises often need to have an entrepreneurial view of their innovative development of products and services. They need to conduct innovative activities that emphasize creation of customer value, and use their resources in an effective way [50]. Hence, there needs to be a fit between the product and the needs in the primary healthcare sector (i.e., the intended market for the small enterprises in this study). However, incremental product development in the primary healthcare sector is not a strategy that primarily supports fast breakthrough. Innovative technological applications that will be used in patient care need to be evaluated in terms of their effectiveness and safety [51].

3. Research Method

This study focuses on small enterprises' sustainable innovations in the healthcare sector. More specifically, it focuses on digital technologies that aim to transform the work practice in order to provide better and more efficient healthcare in local primary healthcare centers. As there is a scarce amount of research on qualitative and contextual conditions, and little attention to how small enterprises manage sustainable innovations in the current knowledge-intensive context, this study contributes to filling this gap [12,20].

3.1. Empirical Setting

The study is conducted within an ongoing Interreg Sweden-Norway project, where innovative digital technologies will be tried out in a test environment at a primary healthcare center. The project has received funding from the European Union to develop innovative digital technologies and new work practices in the primary healthcare sector. The geographical area is characterized as a sparsely populated region with about a third of its population over 65 years. The project has been going on for one year and has two years left. It is a collaborative project with participants from small enterprises, primary healthcare centers, and researchers from both Sweden and Norway, where the cross-border added value is important. The participating small enterprises are all aiming to develop innovative and useful digital technologies and services for the primary healthcare sector, and have been included in the project based on their interests in technological innovation in the primary healthcare sector. The digital technologies will be tested and evaluated by professionals and patients at the test environment at the local primary healthcare center and the implementation will hopefully lead to new work methods and procedures. The small enterprises are striving to reach a sustainable use of these technologies in the primary healthcare in Sweden and Norway, and stay on the market for many years. Initially, one primary healthcare center is used as the test environment—a center open to innovation and with a history of trying out innovative work methods prior to this project. This primary healthcare center is located in the western part of Sweden, not far from the Norwegian border.

The study is part of the Interreg project, a development project in the border region of Sweden and Norway. The study can be positioned within a so-called triple helix model for collaboration on innovation and sustainability issues. Within this border project, that means collaborations between universities, municipalities, companies, and organizations at regional and local levels.

Examples of innovative digital technologies can be tools for communicating with patients at a distance, such as tools for eHealth. It can also be tools that support gathering and evaluation of health-related data from patients with, for example, asthma, diabetes, or cognitive needs. The small enterprises will provide the digital technologies to the primary healthcare center, and professionals at the primary healthcare center will ask patients to try digital tools that could be suitable for that patient from a specific patient group. The innovative digital tools will then be tested, and the researchers will evaluate how the digital tools met the expectations and how they affected and transformed the work practices.

In this study, the small enterprises were interviewed in order to gather data about the role of sustainable innovation in relation to the ongoing transformation of the primary healthcare sector.

To understand the innovation process and the needs for the small enterprises and the potential impact of new technology, the study begins by focusing on the small enterprises.

3.2. Data Collection

Gathering rich data about innovation in small enterprises requires a qualitative approach. In this article, we have not been interested in describing numbers, frequencies, and counting statements and expressions, as quite a low number of interview participants are included. Any formal generalization using a quantitative approach has not then been possible. Hence, this study aims to reveal in-depth knowledge about the sustainable innovations in small enterprises for the transformation of the healthcare sector [52]. As there is a scarce amount of research on qualitative and contextual conditions in this area, we would contribute with qualitative knowledge of the phenomenon. Therefore, semi-structured interviews were used as a method of data collection. This type of interviewing requires curiosity about what the interviewees tell, in order to collect a rich set of data. It also requires the interviewer to listen, understand, and be reflective, to be able to follow up statements with more detailed questions. Such interviews also need to be well planned [53]. An interview guide was used as support so that the same questions were asked at each interview [54]. The semi-structured interviews provided opportunities to ask follow-up questions, and were used to confirm, reflect on, and get a deeper understanding of the participants' stories [55]. In semi-structured interviews some thematic questions are prepared beforehand, but there is a need for improvisation during the interview [56]. The interview questions concerned collaboration in innovation processes, how the interviewees want the primary healthcare centers and other actors to contribute, expectations and difficulties in sustainable innovation, and how primary healthcare activities can stimulate development of sustainable innovation. The interviews also provided opportunities for the interviewees to reflect and discuss, when interviewed by the researchers, and they could at the same time get better insights into the project and the aim of it within the primary healthcare sector.

All authors, in groups of two at each interview, conducted each of the seven interviews. The interviews lasted for about one and a half hours each, and were tape-recorded. Interviews were held with representatives from seven different small enterprises, strategically selected based on experience. In five companies, one person participated in each interview, and in two companies, two persons participated in each interview. The participants were either business leaders or development leaders. Two enterprises were from Norway and five were from Sweden. The participants of the study are described in Table 1.

Table 1. The participants in the interviews.

Company Name	Number of Participants	Participant's Role	Nationality of Company
Company A	1	Company manager, physician	Norway
Company B	2	Development managers	Sweden
Company C	1	Company manager	Sweden
Company D	1	Company manager, developer	Norway
Company E	2	Company manager, developer	Sweden
Company F	1	Development manager	Sweden
Company G	1	Development manager	Sweden

3.3. Data Analysis

The interviews were transcribed verbatim and all collected data from the interviews were analyzed by the authors using an inductive qualitative thematic analysis [57]. This is an approach for identifying commonalities and differences in the qualitatively collected data [58]. Guided by the research question, the thematic analysis aimed to identify and interpret key features of the data [59].

The thematic analysis was made manually, using the table function in MS Word. The conventional thematic analysis describes an approach whereby codes are developed through multiple readings of the interviews. Such an inductive approach helps discover meaningful underlying patterns, focusing

on relationships between different parts of the data [58]. The analysis emphasizes the role of innovation for the sustainability of small enterprises and the impacts of the innovations on business sustainability.

Two of the authors conducted the thematic analysis together, and discussed the themes repeatedly. It started with the text being read several times to get a sense of the whole, based on the purpose of the study. For the inductive qualitative thematic analysis, a back and forth process was applied, between the text and the authors' experiences, and between parts and the whole, which created new understanding of the knowledge domain [60]. During the analysis phase, the codes and the initial themes were also discussed with the other two authors several times in order to identify analytical themes. The discussions aimed at obtaining high validity and rigor of the qualitative study. The resulting themes and their contents are presented in the results section.

The following five themes were identified as interesting in the context of exploring the role of sustainable innovation in small enterprises in relation to the ongoing transformation of the primary healthcare sector.

- The process of sustainable innovation in a long-term perspective.
- The companies' views on innovations in healthcare.
- Effects of innovations in healthcare.
- Sustainable product and service development.
- The role of collaboration in the innovation process.

4. Findings

Based on the seven interviews we could detect a positive attitude within the companies to new innovations; they see it as a natural part of their business development. The innovation process is seen as part of the continuous incremental product improvement when breaking new ground in a new field. They work with continuous quality improvement and are very focused on providing a well-adapted product that should help the patients, and also make the work tasks at the primary healthcare center easier and more efficient. Some of the companies are also focused on providing digital products or services that enable patients to get care wherever they are located, and a more flexible process for monitoring of patient data by healthcare staff. Based on the overall discussions, the companies mention usability, good interaction, and good feedback for continuous improvement as key elements for a sustainable product or service. Understanding the specific healthcare context is also crucial. In this section we will also look into the expectations of the companies on an applied test bed and investigate the role of academia in the application of innovations in this test bed. Next, we will describe more details from the interviews structured in the five identified themes mentioned above.

4.1. *The Process of Sustainable Innovation in a Long-Term Perspective*

An innovation can be a product or a service, but from the interviews we learned that the real innovation is often how the product or service is used, and how it effects the organization and the healthcare provided to the patient. The technology in itself is often not new, but it provides new ways and perspectives for the care provider to see and treat patients. Digital solutions also increase the possibilities to get care at home and at remote locations. Company A describes innovation as the new processes and methods created in primary healthcare when introducing their new products. They deliver a solution or a platform, but the actual innovation is service oriented. Several of the interviewed companies agree with this. The innovation is born in the interaction between humans and from the long-term perspective to help patients by providing new ways to follow up, plan for, and support them in their recovery from illness.

Companies C and G state the importance of research collaboration for fruitful innovations. Research plays an important role in innovation, and by participating in several research projects they get an edge when developing new solutions. By participating in research projects, they also get access to new data and have the ability to test and develop the products with the latest technology and

knowledge in the field, by combining clinical data with practical evaluations. Research results can thus be included into their products and new solutions can be created.

The companies also describe how innovations in a long-term perspective must be developed based on the estimated impact of a new function in an existing or completely new product, but also the potential business case. Companies B and G mention the importance of listening to the customer so that one does not end up with a product or service that healthcare sector does not want. There must be a balance between how much work is required to develop the new function, its potential impact on healthcare, and if it is possible to sell. To sell a product and actually get it implemented takes time. Most companies talk about long turnover times and complicated purchase routines and legislation. Company F continues the reasoning about time and states that the time between pilot project and actual product must not be too long, something Company G also agrees on. If it takes too much time, the product loses momentum from being new and exciting, to something that never comes. A long-term perspective is therefore important and crucial for company survival. Company D describes that successfully selling an innovation requires good and “right” contacts inside the healthcare sector.

Company E mentions the importance of a surrounding network of investors, incubators, and innovation courses to develop successful and sustainable innovations. As a small company with an idea, it is not so easy to start from scratch, they describe. A new company often needs help to develop a business case and business models. The ideas need to be tested and evaluated by the healthcare providers to see if they are successful. The process to reach good quality often takes much time.

An incremental growth focused on the medical goals has taken place in all the interviewed companies. Company A highlights the importance of communication in the incremental growth. When the company started to grow, and they had to split into different teams of developers, they could notice problems arising from not having the same communication between the developers anymore, and especially with the medical physicians. It is important to continue to track the original medical goals and feedback from the physicians to develop a good product. Communication and collaboration need extra attention in the project management.

The collaboration with physicians and the knowledge based in the healthcare organization was found to be a very important factor for developing successful innovations—especially in the cases where the technology itself is not the main innovation but rather its application.

4.2. The Companies' Views on Innovations in Healthcare

As described in the previous section, the time from idea to implemented product or service can be very long. This is perhaps typical for the healthcare sector. The legislation for services and products used within this sector is rigorous and the financial models for procurement are quite complex. All companies bear witness about how much time and effort it often takes to launch a new product in healthcare organizations.

Company F describes how the legislation can be a problem or hinder in development of healthcare products. The product or service has to be evaluated and clinical data must show benefits or potential for the product or service. The requirements of evidence-based procedures are very high in order for a product or service to get accepted. The possibility to perform clinical trials in a test bed is therefore very important in order to demonstrate the potential of a new innovation.

Most of the companies describe a positive attitude towards innovations within healthcare organizations. Company C considers the healthcare sector as mature and ready for technological solutions, but with very specific requirements. However, the competence when it comes to functional requirements is often low, and the technology is allowed to set the rules instead of the needs.

Company C describes how the healthcare sector often believes that it is buying a complete solution, and that the technology sets the rules that they must adapt to. While the reality is usually another, the lowest bidder in a procurement process often sells a product they have not yet created. The product could very well have been adapted to the specific needs of the healthcare provider. This is

also dependent on and a consequence of the economic models. A procurement contract is very time consuming to set up and includes a lot of detailed requirements. Several companies compete for the contract, usually by offering the lowest bid. The problems usually start when the product is later implemented and used in a real context. The care provider then realizes what they need, and that they should have asked for something different than the product described in the contract. However, the contract is often already signed, and it is very problematic and sometimes not legal to change the functions and services defined by the contract. If too large changes are introduced, a different company can request a new negotiation and a new contract. Hence, in fear of breaking the contract and the bidding process, the healthcare provider sticks to the solution they got delivered, even though it does not fit their needs.

Company A explains how an advanced medical product or service requires knowledge within the field, something that can be difficult for a regular software service provider to acquire. They have the skills in programming and creating technical solutions, but achieving substantial and sustainable impacts in healthcare organizations requires something more. The product or service is often primarily a tool, and it is the context where it is used that is important. To be able to understand the healthcare providers' needs and challenges, several of the interviewed companies either have medical staff hired within the company, or a very close collaboration with healthcare providers. Company E describes how they collaborate and cooperate with physicians to evaluate their material and the content of their products. They also adapt their products based on feedback they get directly from the clinics.

When the context where the innovation will be used is complex and the users are professionals with a high level of expertise, the demands are high for developing well-adapted and well-designed innovative products and services. This is perhaps not unique for the healthcare sector. However, there is usually a larger distance, knowledge-wise, between the users and the engineers that develop technical products and services in the healthcare sector, compared to, for example, a mechanical or automated process in the manufacturing industry.

All companies describe the process of implementing new innovations as slow. The medical staff are interested and motivated to try new solutions, but problems usually arise when a change process is initiated, and new routines have to be introduced in the organization. Company B describes that changing work practices is a very slow and difficult process, and maintaining the changes requires a lot of energy. They also state the importance of adequate management within the healthcare organization when it comes to testing and implementing new innovations. Just like we earlier described how Company D states the importance of good and "right" contacts within the organization, this is valid also when it comes to testing.

Another source of problems when trying to introduce an innovation within the healthcare sector, as well as most governmental organizations in Sweden, is the economic model. Company C describes how the human or the patient is often forgotten behind the economic model and the decisions are made based on a very local budget even though the patient is affected by several organizations and levels of care. Several companies describe how one medical unit does not want to invest and pay for a product when the return of the investment will end up in another part of the organization, hence in a different budget. To get different healthcare providers to see the patient from a holistic perspective and collaborate across boundaries of resources and budgets seems to be very difficult.

Also, the internal hierarchies, based on old military standards, can create problems when it comes to innovations within the healthcare sector, according to Company C. It seems to matter who comes up with a suggestion for a new solution. If a nurse suggests an investment, the organization will turn to the responsible medical physician to check if it is a good idea. The particular physician must then be involved and interested in the particular case if anything is going to happen. Again, the good and "right" contact as stated by company D seems to be important.

4.3. Effects of Innovations in Healthcare

Innovations in the healthcare sector often affect both the medical staff and the patients. It is therefore important to keep both those stakeholders in mind when designing products. Different views with different types of information can, for example, be used to separate different groups but still create a feeling of belonging and inclusion. The interviewed companies state that the general goal of all their products is to create more efficient processes and better healthcare. They would like to create better communication between the different levels of care providers. Easier access to experts and better quality in the care given. Many of the innovations included in this study are aiming at examining more patients faster, discovering illness in patients earlier, and creating better prognoses for the patients. The innovative products and services aim to increase efficiency in healthcare, thereby creating economic benefits for the healthcare system in general.

Most of the innovations in this project are digital in some form and make it possible for the patient to receive care at home or make follow ups and tests at home, independent of where they live. In times of COVID-19 this is perhaps more important than ever. For example, many primary healthcare centers related to asthma/COPD care in Sweden are currently not conducting spirometry examinations due to the intensified risks from COVID-19. A digital innovation that patients with this condition could use at home and that allows them to receive regular evaluation and care without the risk of being exposed to COVID-19, could be very useful. Digital innovations and new ways of communicating with physicians at a distance seem to be very important now. The force of change will likely open new possibilities for new solutions. New technology will be available, and the situation of social distancing will probably contribute to limiting the resistance to change.

4.4. Sustainable Product and Service Development

The interviews showed that the products and services often affect both the medical staff and the patients. Designing good products and services that are functional for both groups is hence crucial for the innovations to be sustainable. Products should not be too intrusive and should be user-friendly and create a good user experience for users with different needs and requirements. The effort to learn and begin to use a new tool should be minimal in order for the tool to continue to be used. User experience and usability design are therefore two factors that affect the sustainability of an innovation, especially when the user group is rather diversified. The product should also last over time and be possible to adjust to new procedures or needs. The design must therefore be flexible. The companies solve this by iterative updates and close collaboration with the healthcare sector. Continuous feedback on the product or service keeps it up to date. However, this could be problematic when a product is scaled up and used by multiple care providers. A customizable and component-based product could then be a solution to accommodate different requirements.

In many of the companies, the design process involves combining the knowledge of developers, designers, and internal medical staff. Either the company was founded by a medical physician, or they have close contacts and collaboration with medically educated staff. The innovations are born from the needs of healthcare providers or patients. Developers, designers, and medical staff then work closely together to develop an innovative product or service. This collaboration then often continues.

Company B keeps an updated list with new ideas based on needs and wishes from healthcare providers. They use feedback as a driving force for new solutions, as constant change and development can lead to better products. By getting more time with healthcare providers they can get better feedback. The ideas on the list are then prioritized based on impact for the users, and the best ones gets implemented. The companies plan which functions to develop both in the long and short term. Company F states that the developers must be open to problems and feedback, so the final product can be better. With a transparent process and sharing of information the results are usually of better quality. Company G describes how they often call and contact their customers and users to get continuous feedback to keep themselves updated on the product quality and usability. This is a process also used by the other companies in the study.

4.5. The Role of Collaboration in the Innovation Process

As described in Section 4.1, research could play an important role in development of innovations, both from the perspective of getting access to new findings as well as evaluating and getting empirical feedback on a product or service. It is also important for companies to be able to show research results and academic collaboration to earn trust and credibility, from a marketing perspective. New innovations and products must also be tested rather quickly. The innovations need to get out of the lab and used in practice. Faults and problems discovered early cost less to fix. A test bed and access to a primary healthcare center can support such field tests. The test bed can provide real situations to evaluate the innovation, and to get feedback from both healthcare staff and patients.

All companies hope that the project and the test bed will provide practical test cases where they can investigate the market potential. The project will hopefully also give them the ability to empirically test and evaluate their innovations and the actual interactions between healthcare staff and patients. A test bed can add knowledge from the patients' perspective, and help the companies further develop their products. The test bed feedback can then be used to improve the products, which could lead to new prototypes or even new innovations. Company B wants the project to help them get their solution approved on different levels in the healthcare sector, as well as to conform to the regional structures and regulations in using cloud computing. Company C gives an example of how ideas like gamification and similar techniques could be used to get the patient to use the tool or software without being constantly reminded of their medical condition, while instead becoming more aware of their health and how to improve it.

Further on, the companies want to learn more about how their innovations facilitate interaction between care providers at different levels. This project, however, focuses specifically on the interactions between the primary healthcare center, its staff, and patients. Collaboration between cross-disciplinary teams at the test bed could support better and smoother introduction of new products. The academia, together with the test bed, could support the staff at the primary healthcare center so they feel more confident when using innovations. The academic partner could support with competence development, starting up, and using new solutions.

The companies would also like to further expand their contacts and build a network of primary healthcare centers and other healthcare providers, in order to demonstrate and disseminate their products. Companies D, E, F, and G hope the test bed can provide better collaboration and that the academic partner can help with introducing their products and follow up on interaction and feedback. They also hope the researchers can push the innovation process further and help with providing new knowledge and better understanding. Innovation is seen as a driver and motivator for new knowledge in the company but also to encourage new staff members.

Another aim of the companies is to provide closer connection between the primary healthcare center and the patients. Using their tools as mediators, they hope to improve communication and understanding of why the patient is feeling the way they do, but also for the patient to understand why they are asked to do or take certain measurements. This will hopefully lead to better understanding between the two parties, and a better care situation. It is also important to investigate if the patients understand their sicknesses better and if communication via digital tools can improve their health. This can be done by collecting health data over time.

Company C sees great potential in a test bed that provides opportunities for testing their innovation in a real setting, as well as opportunities to talk to healthcare staff and patients directly. They describe that it is usually easy to get contacts at a large hospital, but to be able to collaborate with a primary healthcare center is often more difficult. They hope the test bed will provide an opportunity to evaluate their new products from a scientific point of view. They both want to get access to real cases, but also have a researcher following the tests and evaluating the results. Their products have been tested in Norway and England earlier, so to understand the Swedish context at a primary healthcare center is also interesting for them. It could also be interesting if the academic researcher could facilitate reflection around the new products or tools. That could make both the staff and the patients think

about how things could change and how it could affect health, but also about work processes and internal structures within the organization.

Company C sometimes finds that implementation is problematic in research projects. The tools and artifacts are usually tested and researched, and the aim is often to implement something after the project. The companies would, however, like to raise the ambition from the start and actually implement during the project, but this seems to be a challenge with the current economic models and for the legislations regarding investments. Therefore, close relationships between professional users, patients, and small enterprises is of crucial importance for the development of innovations in the primary healthcare sector.

4.6. Summary of Findings

For each of the five themes presented the key findings is presented in Table 2.

Table 2. The five themes in the study and the key findings.

The process of sustainable innovation in a long-term perspective	<ul style="list-style-type: none"> • The effects of innovations in healthcare organizations • Technology provides new ways and perspectives • Digital solutions increase the possibilities to get care at home and at remote locations • New work methods in primary healthcare • Innovations are service oriented • Research collaboration is fruitful for small companies • Potential of business case is important • Contacts inside the healthcare sector are important • Communication and collaboration with different professionals
The companies' views on innovations in healthcare	<ul style="list-style-type: none"> • Launch new products in healthcare organizations requires much time and effort • Legislation can act as hindrances • Rigorous evaluations are required • Important to have a test bed to perform clinical trials • Low competence in defining requirements in the healthcare sector • Positive attitude to innovations in the healthcare sector • Developing medical products and services requires knowledge within the healthcare field • Slow implementation processes since it takes time to change work processes
Effects of innovations in healthcare	<ul style="list-style-type: none"> • Important to keep both medical staff and patients in mind when designing innovations • Focus on creation of more efficient work processes and better healthcare • Focus on creating better communication between patients and different care providers • Faster access to healthcare and better prognoses for the patients • Increase efficiency in the healthcare sector • Possibilities for patients to receive care at a distance

Table 2. Cont.

Sustainable product and service development	<ul style="list-style-type: none"> • Crucial to design products and services that are functional for all user groups • Products and services need to be user friendly and easy to use, for diversified user groups • Flexible design that is easy to adjust based on different requirements • Close collaboration with medically educated staff • Innovations born from needs of a healthcare provider or a patient • Feedback as a driving force for new innovations
The role of collaboration in the innovation process	<ul style="list-style-type: none"> • Collaboration is important for evaluation and for empirical feedback • Showing research results and academic collaboration builds trust, credibility, and gives marketing benefits • Access to a primary healthcare center enables field tests • Can provide approval in the healthcare sector in line with regulations • Academic partners can help with competence development and evaluation • Participation in development projects helps promote products and services

5. Discussion

Creating sustainable innovations in the primary healthcare sector and optimizing the transformation process requires a holistic view of the whole process involving care givers as well as patients. The small enterprises and primary healthcare centers benefit from collaborating in the process of developing and implementing innovations. However, innovations relating to medical technologies that healthcare staff and patients use have largely been overlooked so far [9]. Studies on how innovations meet the preferences of users and patients, and create efficiency or quality in service delivery, are scarce. The companies in this study are looking forward to continuing the collaboration and working together with the primary healthcare providers. The collaboration may also help the small enterprises survive and be sustainable over time. Kim and Kim [11] are of the opinion that a flexible strategy can help small enterprises survive and be sustainable. Strategies for cooperation with external companies can enhance the innovation performance of enterprises, as confirmed by Kim and Kim [11], but we have not found any results in the existing research regarding how small enterprises collaborate with primary healthcare centers to develop sustainable and innovative digital technologies.

5.1. Collaboration for Development of Sustainable Innovations in the Primary Healthcare Sector

Change and adaptation can be a painful process even when it leads to a better result in the end. It is common to use new and old solutions in parallel due to lack of faith or practice in the new solution and new routines. It takes courage and motivation to introduce an innovation into a process or organization. Incremental product development seems crucial for successful and sustainable innovations, even though the small enterprises raised the long time needed for development and collaboration with the primary healthcare sector as a limiting factor. A limitation to breakthrough is actually the incremental product improvement, as emphasized by York and Danes [50]. To develop something innovative takes time and resources, and good collaboration is necessary to develop new technological solutions adapted to both the primary healthcare sector and patients, as this study confirms. The time span of parallel processes can be shorter if the enterprises, professionals, and patients develop new solutions together, and if the healthcare professionals feel included and participate, thereby enhancing positive attitudes to the developed tools. The new product and service will then also be better adapted to the needs and requirements of both the healthcare professionals and the

patients. Thus, collaboration is of vital importance for small enterprises that develop sustainable innovations [14,15]. Collaboration is also of a certain importance in the primary healthcare sector as small enterprises are dependent on the users as the healthcare staff and their patients. By keeping an updated list of new ideas and needs based on real problems in the healthcare sector, the innovations can be adjusted and improved over time, creating a more sustainable development process, but these innovation processes need to involve the primary healthcare sector. This requires an innovative work practice at the primary healthcare centers, but it also requires that enterprises are responsive to the needs in the primary healthcare practice. Otherwise the ideas and innovations may not be adaptable to the existing practices. By working in cross-disciplinary teams or within a triple helix relation [61], knowledge and ideas can be shared and synergies in product development can be reached. Specifically, evaluation and empirical feedback could be enhanced in the collaborative environment created in the studied empirical setting. The benefits of a good triple helix relation can also be seen in many other sectors [62,63]. However, in this primary healthcare related setting we have outlined different roles of different parties in the collaboration, within the triple helix relation.

From this study it can be concluded that some factors seem to be important for small enterprises to develop successful innovations. For example, early start up help like incubators and support with developing business plans and business cases, seem to be important. Also, the possibility to get help and support from investors with capital funds is important. Reaching a sellable solution or product takes time and the enterprise must be able to survive during the initial development. Van Geenhuizen and Ye [32] also claim that using open knowledge networks may contribute to sustainable development and transitions in high-technological small enterprises. Involvement of investors and guidance from customers can speed up the work process and shorten the time to reach the market. A network of different customers and a facilitating test bed could also help shorten the time to market. Academia can support in evaluation of the product, educate the participants, and mediate between different stakeholders that often have different views on an innovation. Academic research can also help to create a more holistic view. As such, knowledge collaboration with researchers at universities is important for learning and knowledge integration [27]. This study also highlights competence development as an important factor for the collaboration with academia. As little attention has previously been given to small enterprises and how they manage sustainable innovations in a knowledge-intensive context [12], this study contributes with specific knowledge about sustainable innovations in small enterprises that develop digital technologies for the primary healthcare sector. This is an important contribution as this sector has the potential to develop digital technologies that can improve the quality of healthcare, and as this sector is overlooked in this respect [9].

All companies in this study raised the importance of having real cases to test their innovations and prove their business case to others. This is an important contribution of this study, as to our knowledge, no such research has previously been conducted. Legislation and organizational aspects create very specific conditions that need to be considered when working with primary healthcare, and real cases to show potential of a product or service is crucial [37,38,50]. Legislative regulations greatly affect the performance of healthcare, and the small enterprises have to comply with the regulations related to cloud computing, among other things. Most of the companies in this study also have medical professionals involved in the company to smoothen the product development. Knowledge from various sources is important in innovation [28]. However, as this phenomenon has not been carefully considered before, at least not at a micro level [28], this study gives important insights into sustainable innovative development in the primary healthcare sector. The healthcare sector is diversified in different parts of Sweden, and spreading and sharing best practice and knowledge between regions and healthcare providers seems to be a challenge.

Innovation can be seen as an incentive when hiring new staff both at companies and at primary healthcare centers. New staff can get the ability to prosper and strive for new ideas and new solutions. With an open climate for change and new technology, the staff is encouraged to find new solutions. However, innovations often have a high initial cost and might be difficult to get into a new market.

There are many regulations and laws concerning patients' safety when it comes to new technology. The companies describe that it is not too hard to get people to talk to, but to get access to actual test cases with real patients is difficult. But through collaboration and a broad network it is easier to get a product tested and approved. Here, academic research can play a fruitful role as well, by supporting objective evaluations of innovations, and enhancing learning and knowledge creation. As claimed by Zahoor and Al-Tabbaa [27], it is important to explore in greater detail how sustainable innovations in small enterprises can benefit from mediators, and this study has contributed to this call for more knowledge in the field of sustainable innovations in the primary healthcare sector.

5.2. Sustainable Transformation in Healthcare

A digital innovation in itself opens up possibilities for new solutions, such as the patient conducting their own regular examinations of the condition at home, which may give a more stable medication and reduce the need for physical follow-up meetings at the primary healthcare center. The healthcare staff's access to information about specific personal conditions of patients can lead to a better understanding of patients and may in turn improve the quality of healthcare services [3]. Digital technologies that give objective information about the patients' condition can improve the communication between patients and healthcare professionals. The professionals can also identify specific barriers that each patient has, and in this way the care can be individualized to just that person. In this way, the patients' adherence to their medication can be improved over time [64]. However, in order to benefit from innovative tools, sustainable healthcare processes and services need to be developed. By increasing efficiency in healthcare through digitalizing the primary healthcare sector, innovations can lead to efficiency and economic benefits for the whole healthcare system in general [45,46].

It is important to not forget the patient perspective when introducing innovations, and how patients will be affected. When it comes to services and software solutions like apps or digital tools, it is very important that the content can be further individualized and focused on the person. The content should be adapted or be possible to adapt. Structure and logic should be aligned with new work processes within the healthcare situation and adapted to the patients' needs. Simplicity and fit to physical processes are two ways of trying to adapt. The innovation must earn trust and credibility. To reach this, the service or the technical solution benefits from combined knowledge and collaboration between developers and healthcare providers in learning processes [22]. Some of the companies started as collaborations between different stakeholders with different abilities and knowledge, and the innovations were created based on that. Such a product developed from an established collaboration is likely easier to integrate and should be possible to use more quickly [39,50]. Then a better and more intuitive tool will be designed to better fit the context.

The design should support both the contextual expert user and the novice user of the software or technical solution per se. The innovation must also be compatible with the current computer system and other technical solutions used at the primary healthcare center to not add extra frustration and time to interact with it [65]. However, innovative tools that support the primary healthcare are quite difficult to design as they, per definition, are new and transform the processes and services at the primary healthcare center [1]. However, it is important to remember that an innovation does not have to be complete from the start and fulfill all needs from the very beginning. Incremental development supports adaptation and further development of the services for the possibility to adapt to future needs.

Another challenge related to primary healthcare services and tools is the storage and sharing of data. Sensitive data is gathered and combined with medical records and other information. It is crucial to store and transfer this type of data safely, to reach sustainability. When it comes to interfaces, it is also important to know who can see and access what. The companies need to get approval from the patients that participate to be allowed to store any data at all, but more critical is that the companies have the approval from the regional government. Cloud services must be assessed, and it must be clear to both patients and professionals what could happen to the data. The World Health Organization [65] lifts the lack of evidence base on benefits and harms regarding digital health implementations. A test bed

may provide better evidence of digital solutions and be a piece of the puzzle to cover this shortcoming. The World Health Organization [66] also suggests that digital health innovations can make it easier to get access to health professionals such as experts, as this study also suggests.

A sustainable innovation needs to have a design that is functional for both healthcare staff and patients. The product should not be too intrusive and should be user-friendly and create a good user experience for users with different needs and requirements [51]. This is something that is connected to general guidelines for design and usability [67].

6. Conclusions

The aim of this article was to explore the role of sustainable innovations in small enterprises in relation to the ongoing transformation of the primary healthcare sector. The purpose was to gain understanding of innovation processes within the framework of sustainable development, applied to a local primary healthcare center. A qualitative study, where participants from seven small enterprises were interviewed, brought forward some interesting results. Incremental development of tools for use in the primary healthcare sector needs to take into account changes and the transformation of processes and services in primary healthcare. The perspectives of both healthcare staff and patients are important in the development, and they should be included in the collaboration. Even though incremental development is a limitation from the perspective of delivering a product or service to the market in a short time, incremental development seems to ensure that products and services are adapted to a primary healthcare sector in transformation, and take different challenges into account. Thus, sustainable innovations can be achieved in the primary healthcare sector, and a sustainable market for the small enterprises can also be established. Cross-disciplinary teams with participants from the small enterprises, primary healthcare center—both staff and patients—as well as academia, facilitates the necessary learning and the required knowledge creation and sharing. Sustainable healthcare processes and services need to be developed in order to benefit from innovative tools. By increasing efficiency in healthcare through digitalizing the primary healthcare sector, innovations can lead to economic benefits and higher quality in healthcare for the society. To develop and design sustainable innovative tools for a primary healthcare in transformation is a challenge. However, it is important to remember that a sustainable innovation does not have to be complete from the very beginning. Incremental development supports adaptation and further development of the services with the possibility to adapt to future needs.

For future research it would be interesting to include the patient-centered approach, and study how the innovative digital artifacts can support the primary healthcare in providing more efficient care for the society. In relation to that, it would be interesting to investigate how work processes in primary healthcare can be made more efficient. Moreover, the learning process within the collaboration of different professionals in both small enterprises, primary healthcare, and academia needs to be studied in greater detail, to understand how collaborative learning really takes place.

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