

A pair of pliers is shown in a close-up, slightly angled view, resting on a dark, perforated metal surface. The pliers are metallic and have a textured grip. The background is a repeating pattern of small, square holes in the metal, creating a grid-like texture. The lighting is dramatic, highlighting the edges of the pliers and the texture of the metal.

FROM INTUITION TO IMPACT

**HOW CAN UNIFIX CARE MAKE
MORE EFFECTIVE DECISIONS WHILE
MAINTAINING ITS
'JUST DO IT' MENTALITY?**

Develop an expansion approach that enables Unifix Care to actualize its vision by guiding their decision-making process.

Preface

I dedicate this thesis to my father, the person who has been my inspiration to make the world a little better. With that in mind, I embarked on a project that I felt was not only meaningful in its subject matter but also held practical value. I am delighted to reveal that the insights presented in this thesis have had a direct impact on the trajectory of Unifix Care, and that's pretty cool!

I want to give a big shoutout to JC, who coached me throughout this project. Working with JC was more than just professional guidance; it felt personal and genuine. I'm grateful for the opportunity to collaborate informally, which made the experience all the more meaningful. Thanks for helping me navigate the project's complexities and making it possible for us to work together.

Maike, you've been an amazing chair for this thesis. I genuinely appreciate the trust you placed in both me and the project, especially during those moments when it seemed unclear where it was headed. Your feedback was incredibly insightful, and I'm glad I recorded our meetings because going back and listening to them gave me fresh perspectives that I missed the first time around.

To the fantastic team at Unifix Care, thank you for being supportive and flexible throughout the entire project. Our collaboration has not only led to great results, but it has also brought us together on an exciting mission that extends beyond this thesis. I look forward to continuing to build this company together and making a difference.

I would like to express my gratitude to all my friends who supported me throughout this project. There are too many of you to name, but if you come across this message, please know that your support meant the world to me. Thank you.

Last but certainly not least, I owe a special thanks to my incredible girlfriend, Elvira. You have been my rock, providing unwavering support even during the toughest times. Your belief in me and my work has been a constant source of support.

I present this work, enjoy reading it.

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Executive summary

You will be reading a comprehensive study that examines the shortage of instruments for performing surgery in sub-Saharan Africa and the wastage of quality surgical instruments in the Netherlands. The report explores the potential solution of repositioning the excess instruments to sub-Saharan Africa, focusing on three product categories identified by Unifix Care as having the potential to make an impact. The thesis investigates the important elements that determine the value of these second-life products in Kenya. The conclusion reached is that none of the three product categories will have a significant impact in Kenya, leading to the recommendation for Unifix Care to discontinue this proposition.

In the next part of the thesis, the report takes a higher-level perspective and examines the decision-making process of Unifix Care when approaching and investigating expansion opportunities. It highlights the limitations of the current approach, which is deemed non-strategic and unsustainable in the long term. The section discusses the significance of making structured decisions and proposes a suggestion to proactively predict market potential to avoid investing time and resources into unprofitable opportunities. A recommendation is proposed to prevent this by implementing a quickscan that forecasts market conditions in advance. This approach aims to stay focused on the most important activities. Moreover, this thesis promotes the application of an effectual approach in conjunction with proactive prediction methodologies and theories that align with the causation paradigm.

This project delivers:

1. A study on the adoption of excessive Western second-life surgical instruments in Kenya, analyzing the potential impact by means of a triple constraint analysis.
2. A recommendation for Unifix Care to enhance decision-making effectiveness and adopt a more strategic approach for future opportunities.
3. A decision support model that facilitates strategic decision-making for Unifix Care.
4. A strategic opportunity framework that aids Unifix Care in prioritizing its actions based on opportunity landscapes.

Reading manual

Abbreviations

SUSI: Single Use Surgical Instruments

RSI: Reusable Surgical Instruments

EI: Expired Implants

SLSI: Second-Life Surgical Instruments

CE: Conforms to European Union (EU) health, safety, and environmental protection standards

DSM: Decision Support Model

To get a quick read, only read the orange pages



Reading guide

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Challenges and project goal	PART 1 If you want to learn about Unifix Care and their goal
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Bury the proposition	If you want to know why the proposition of SLSI's won't work



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Project structure

This report is divided into two parts:

PART 1

Does the redistribution of surplus surgical instruments from Western countries offer value in Kenya? A case study on single-use surgical instruments, reusable surgical instruments, and expired implants.

PART 1 is divided into five chapters that explore the desirable, feasible, and viable aspects of redistributing excess surgical instruments in Kenya, organized according to the four categories of risky assumptions: 1) Product & Service, 2) Safety & Regulation, 3) Supply, 4) Pricing & 5) Conclusion.

Discover

Discover the factors that determine if SLSI's can be of value in the Kenyan healthcare sector.

Define

Build a framework to decide which products can be of value in the Kenyan healthcare sector.

Pivot

The proposition of SLSI's won't work.

PART 2

How can Unifix Care make more effective decisions while maintaining its "just do it" mentality?

PART 2 consists of four chapters. The initial chapter provides an internal analysis of Unifix Care, discussing their current status and activities, along with the presentation of the identified problem. The subsequent three chapters, namely 1) Expansion Strategy, 2) Future Products and Services, and 3) Decision Support Model, focus on conducting in-depth studies and analyses. These chapters aim to support Unifix Care in making strategic decisions that align with their vision and facilitate its realization.

Discover

Understand why it is important that Unifix Care can make decisions more effectively while still maintaining its "just do it" mentality.

Define

Present design brief.

Develop

Build a strategy for expansion
A model for effective decision-making.

Deliver

Method to determine strategy
Decision support model.

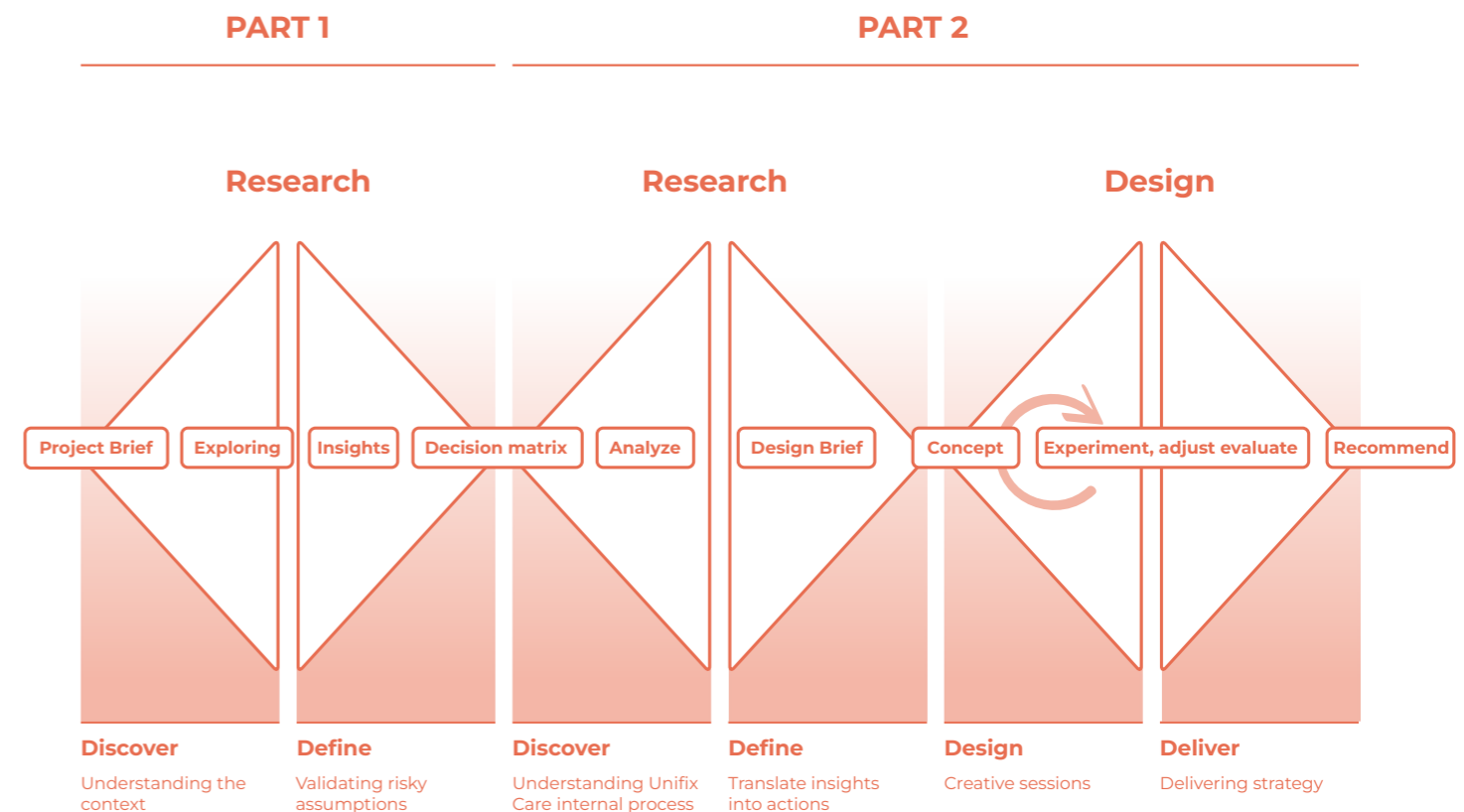


Figure 1. Project approach structure

Project context

What stakeholders were involved?

TU Delft, Unifix Care, Dutch Government, Private hospital facilities in Kenya, Public hospital facilities in Kenya, County Government of Kisumu, TFHC, NABC, other start-ups, YES!delft, Medical doctor (orthopedic surgeon), Medic (second-life surgical instrument distributor), surgical instrument specialist, TU Delft professors, Innovation expert, strategic portfolio management consultants, TU Delft students.

What was my role in this project? What made it complex

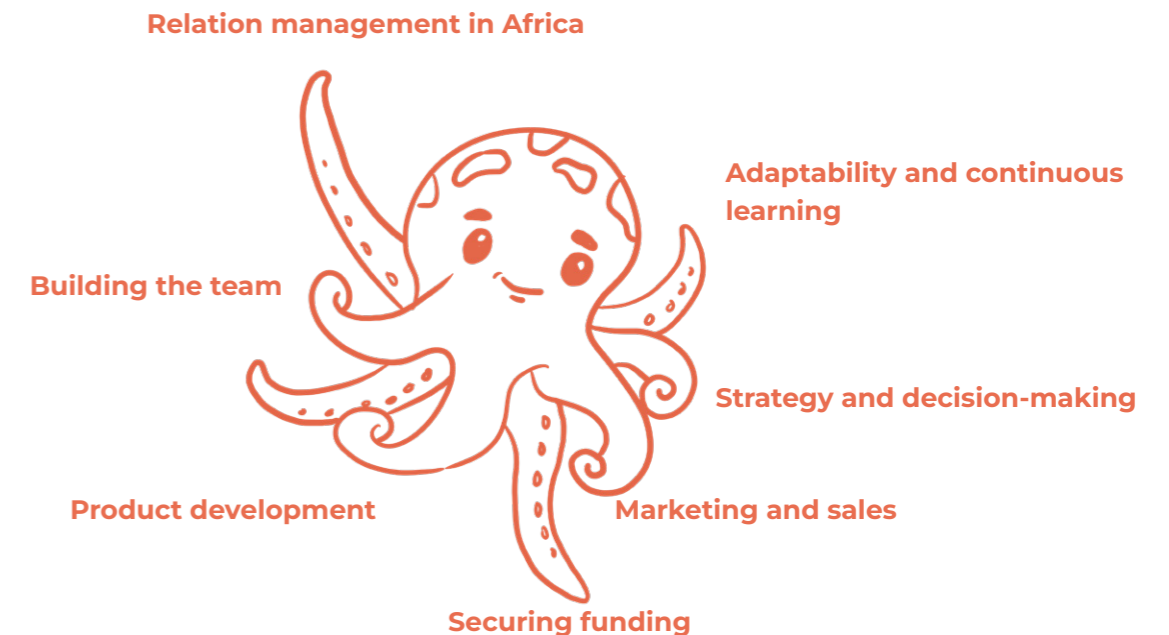
This project demanded a unique role for a graduation student, combining my responsibilities as an entrepreneur with my personal goal to graduate SPD successfully.

The balancing act created a complex project that demanded a lot of my organizational skills to combine hands-on entrepreneurial responsibilities with research. As entrepreneur, I had to juggle multiple tasks and focus on various aspects simultaneously, much like an octopus. I had to possess a wide perspective, encompassing multiple facets of the business. This broad view allowed me to tackle diverse responsibilities and navigate through various challenges. However, as a researcher working on my thesis, I needed to adopt a different mindset. The mindset and approach of a researcher I would like to describe as using a magnifying glass. Choosing a specific focus and delve deeper into that particular area, consciously ignoring the irrelevant context.

The challenge arose from the need to switch mindsets between these two roles. It required a conscious effort to transition between the broader entrepreneurial mindset and the more focused and structured mindset of a researcher. However, this challenge proved to be immensely valuable, as it heightened my awareness of problem-solving approaches and enhanced my ability to structure my thoughts effectively.

This graduation was a balancing act between being an entrepreneur and a researcher

MY ROLE AS AN ENTREPRENEUR



MY ROLE WRITING A THESIS



TYPE OF ACTIVITY

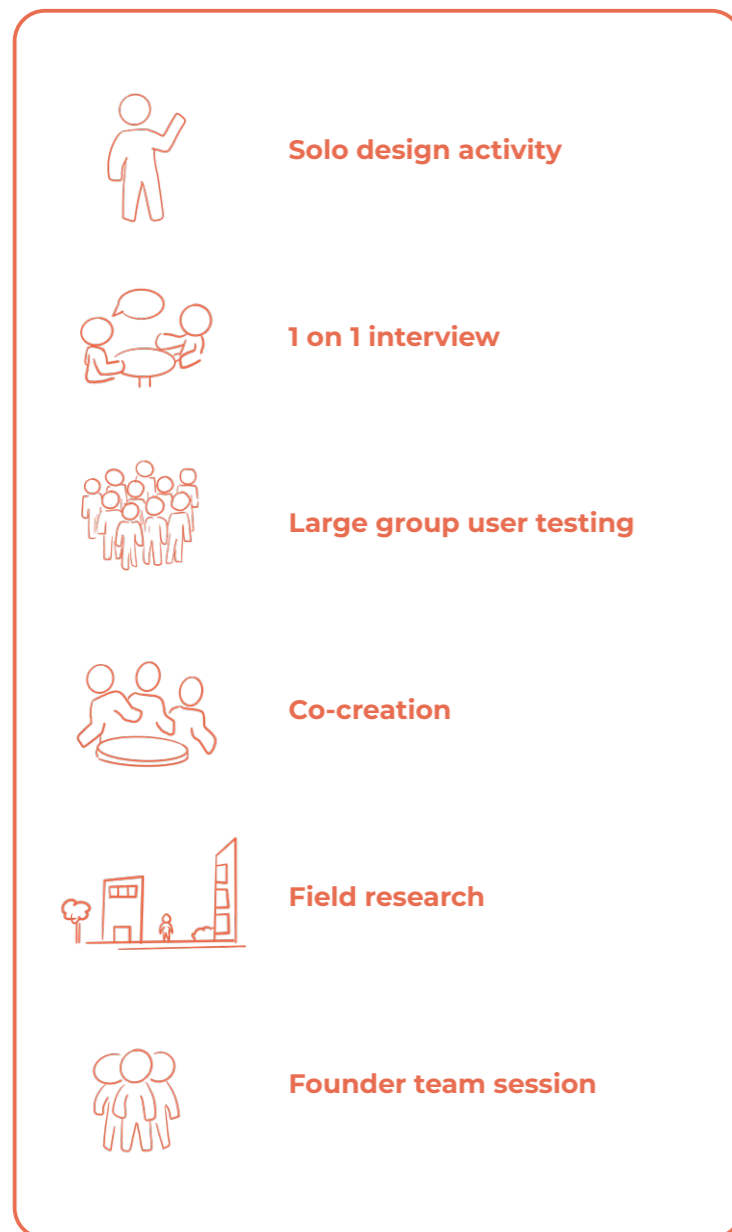


Figure 2. Legenda of types of activities

Key project activities

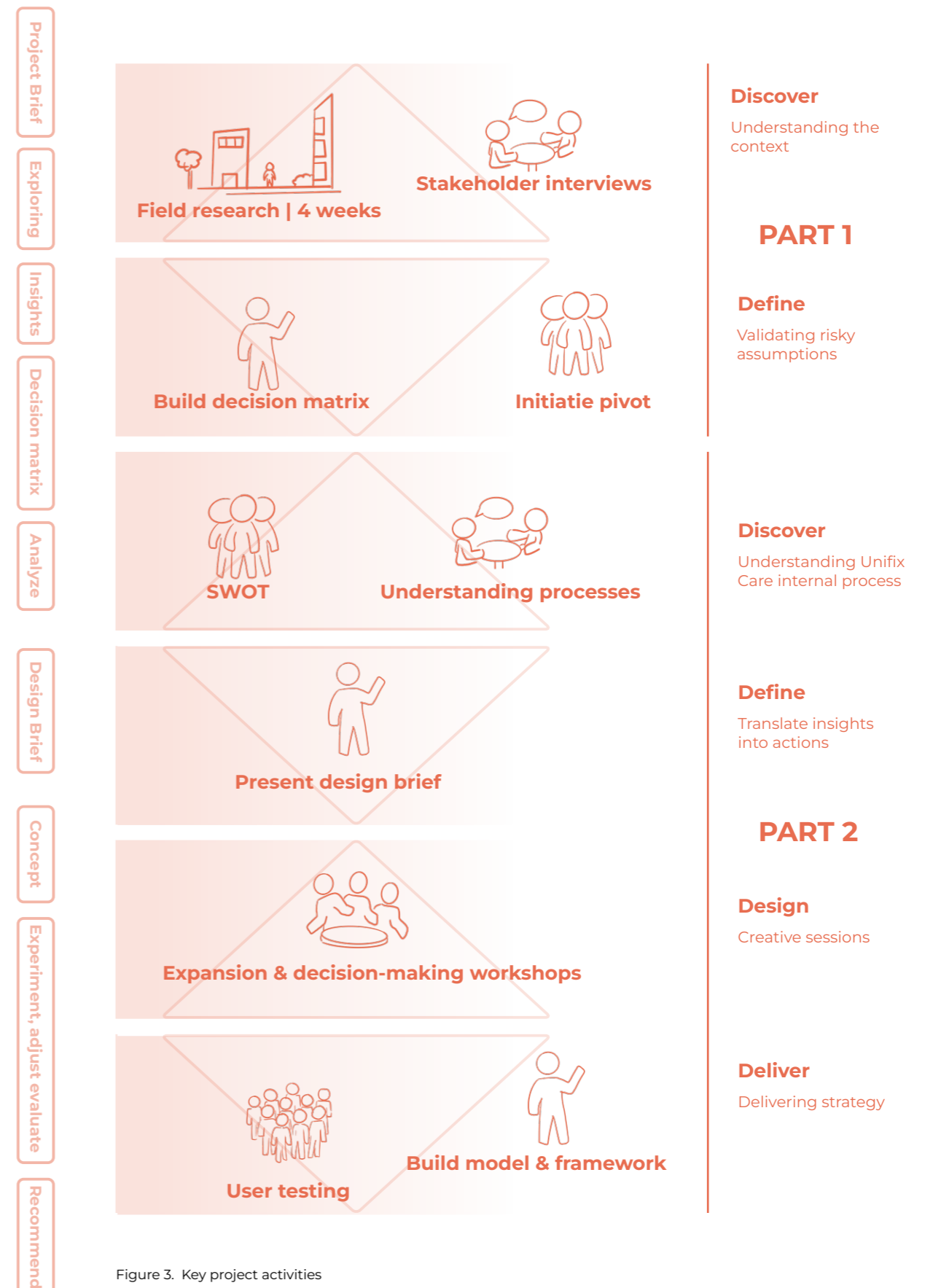


Figure 3. Key project activities

A black and white photograph showing a hand holding a pair of surgical forceps. The hand is positioned in the upper left, with fingers gripping the handles of the forceps. Below the hand, a large number of various surgical instruments, including forceps, scissors, and probes, are scattered across a dark surface, likely a surgical tray. The lighting is dramatic, highlighting the metallic surfaces of the instruments and the texture of the hand.

PART 1

Does the redistribution of surplus surgical instruments from Western countries offer value in Kenya?

A case study on single-use surgical instruments, reusable surgical instruments, and expired implants.

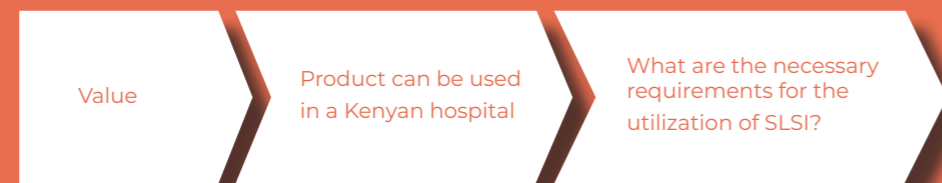
Introduction

This study aims to explore the potential value of redistributing excess surgical instruments in Kenya, with a focus on single-use surgical instruments, reusable surgical instruments, and expired implants. This study is performed for Unifix care, a company with a mission to make quality healthcare equipment accessible for all communities worldwide. Unifix Care has identified a need to explore new market opportunities in Kenya and is seeking strategic advice to determine which of the three identified product categories can potentially create the most value, as well as provide insights on an effective implementation strategy.

The objective of this study is to offer strategic guidance to Unifix Care regarding the identification of a product category that can generate value in Kenya, as well as provide insights on the appropriate implementation strategies.

By conducting a thorough analysis of the three product categories, the study will provide recommendations on the most feasible, viable and desirable option in the Kenyan market for Unifix Care to pursue, while also considering and researching risky assumptions that were established in collaboration with the Unifix Care team. This study will also work towards a roadmap for implementing Unifix Care with chosen strategy, enabling them to maximize the value of excess surgical instruments in the Kenyan market.

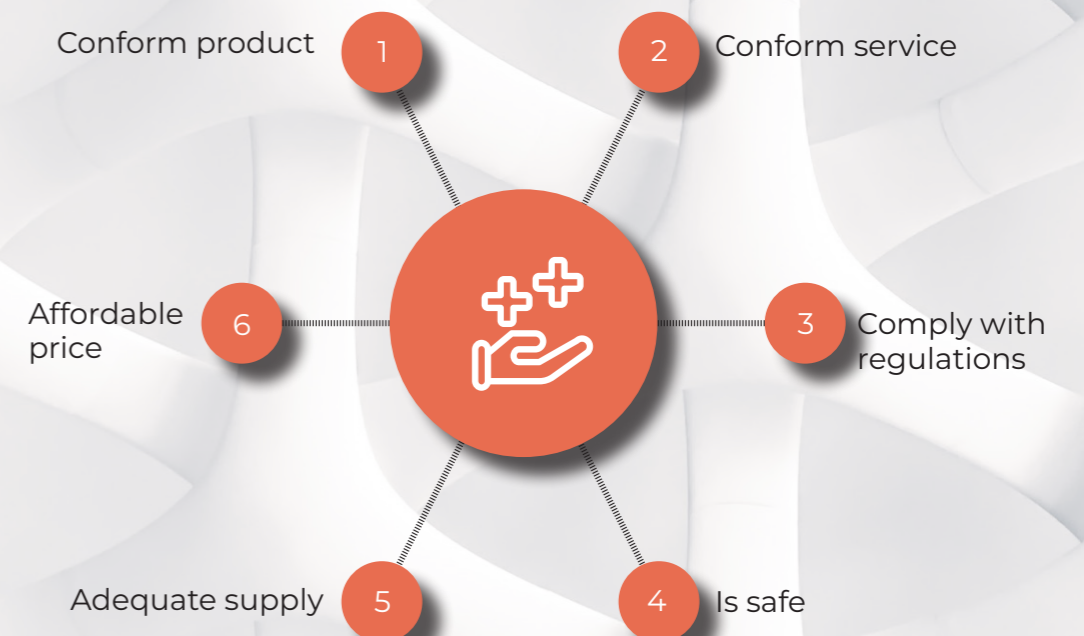
Second-life surgical instruments are valued in Kenya



For SLSI to be valued in Kenya they need to be conform market standards, comply with regulations and safety standards, and be adequately delivered for an affordable price.

In order to investigate the potential value of redistributing excess surgical instruments in Kenya, this study will analyze three product categories of Unifix Care: disposable instruments, reusable instruments, and expired implants. More will be explained on these categories in the next paragraph. Based on multiple interview sessions with the Unifix Care founders, the team has formulated risky assumptions that need to be validated in order to answer the research question. For this research, I made sure that these assumptions are clustered into four categories: 1. product and service, 2. safety and regulation, 3. supply, and 4. pricing. Through local field research in Kenya with participants, the study will aim to validate each of these assumptions, providing insight into the feasibility and desirability of redistributing each product category. The study will then draw on the findings to identify the most promising option for Unifix Care to pursue.

Requirements for utilization of SLSI



The requirements are translated into risky assumptions that will be validated for each of the product categories

Risky assumptions

0. Introduction	Second-life surgical instruments are valued in Kenya	
1. Product & Service	Unifix Care can provide a market conform product using SLSI	Unifix Care can provide a market conform service using SLSI
2. Safety & regulation	Unifix Care products comply with local regulations	Unifix Care products are safe to use
3. Supply	The supply of Unifix Care is adequate	
4. Pricing	Unifix Care products are more affordable than current alternatives	
5. Conclusion	Second-life surgical instruments are valued in Kenya	

Figure 4. Risky assumptions

How to decide?

Each of the risky assumptions will be assessed using the following rating system:





-  **Pass** - Assumption confirmed
-  **Half pass** - Assumption nearly confirmed, minor adjustments may be required.
-  **Inconclusive** - Insufficient data to conclude
-  **Fail** - Assumption busted

Figure 5. Risky assumptions rating system



Unifix Care second-life product categories

Unifix Care offers second-life products, which have already been used in Dutch hospitals but can still undergo additional use cycles. These instruments are obtained from partner hospitals in the Netherlands. To ensure their quality, the partner responsible for sourcing instruments carefully selects those in good condition from the hospitals. Before being handed over to Unifix Care, these instruments undergo thorough cleaning. Unifix Care then conducts another round of selection to ensure the instruments meet their quality standards.

Expired implants, on the other hand, are sourced from a different partner who is a wholesale retailer specializing in orthopedic surgical products. This partner possesses a significant quantity of expired surgical implants that are typically destroyed. However, instead of being discarded, these implants are sent to Unifix Care to assess if they still hold value.

Among all the products received from their partners, Unifix Care believes that these three product categories hold significant potential to provide added value to the Kenyan market. The following paragraph will describe these instruments in further detail.



SUSI

Single Use Surgical Instruments

SUSIs are designed to be used only once during a medical procedure to reduce the risk of cross-contamination and infection transmission.



RSI

Reusable Surgical Instruments

RSIs are designed to be sterilized and reused multiple times during medical procedures, offering a more sustainable and cost-effective alternative to single-use instruments.



EI

Expired Implants

EIs are medical devices that have exceeded their expiration date, and are no longer recommended for use in surgical procedures. The EIs have remained in their original packaging.

Figure 6. Three type of product categories



Figure FIXME. SUSI instrument example and SUSI instruments of Unifix Care inventory



Figure FIXME. RSI instrument example and RSI instruments of Unifix Care inventory



Figure FIXME. EI example and expired implants of Unifix Care inventory



1

Product & Service

This chapter investigates the potential value of second-life surgical instruments in Kenya. The primary objective is to examine the requirements that enable these instruments to become a market conform product including an accompanying service. Market conform is when a product or service aligns with prevailing market norms, standards, or expectations. Through field research, the requirements are determined, and it will be confirmed whether the product categories of Unifix Care will confirm the market standards.

In order to get a clear understanding of the value and the requirements of a market conform product and service around second-life surgical instruments, this chapter begins with explaining the three risky assumptions related to this topic followed by the applied research and sampling method. A risky assumption is an uncertain belief or premise that, if proven incorrect, could have significant negative consequences for Unifix Care. business. The Risky assumptions are based on the belief of the Unifix Care founder team for the proposition to be successful. Subsequently, the results and conclusions are shared, giving insight into the conformity of second-life surgical instruments in the Kenyan market.

Assumptions

1.1 Second-life surgical instruments are valued in Kenya

In order to assess the alignment of Unifix Care's value proposition with the Kenyan market, it is important to initially investigate the perceived value of second-life surgical instruments in Kenya. The valuation of products in this context is contingent upon their utilization within Kenyan hospitals. Hence, it becomes crucial to understand the potential utilization frequency of use of Unifix Care's products, thereby validating the underlying assumption.

1.2 Unifix Care can provide a market conform product using second-life surgical instruments

For Unifix Care to offer a market-conforming product, it is necessary to gain an understanding of the criteria that determine market conformity for each of the three product categories. An overview of these categories and the corresponding elements that establish market conformity is presented in Figure 7. This table has been constructed through the results of expert interviews in the initial phase of the field research in Kenya. (Appendix A, B & C) The goal was to determine the product requirements for a product conform product for each category of second-life products. The product requirements will be validated in the results paragraph.

SUSI	RSI	EI
Low-quality material	High-quality material	A uniform product that connects to the low-tech infrastructure
Ok performance	High performance	Focus on trauma implants
Pre-sterilized product	Needs sterilization	Pre-sterilized

SUSI	RSI	EI
Low-quality material	High-quality material	A uniform product that connects to the low-tech infrastructure
First-time use (low infection risk)	Higher chance of infection	

Figure 7. Product requirements per product category

1.3 Unifix Care can provide a market conform service using second-life surgical instruments

For Unifix Care to offer a market-conforming service, it is imperative to gain an understanding of the criteria that determine market conformity for each of the three product categories. An overview of these categories and the corresponding elements is presented in Figure 8. This table has been constructed through the results of expert interviews in the initial phase of the field research in Kenya. (Appendix A, B & C) The goal was to determine the service requirements for a conforming service for each category of second-life products. The product requirements will be validated in the results paragraph.

SUSI	RSI	EI
Includes a 1 year warranty	Includes a 1 year warranty	Includes a 1 year warranty
Composed as a set	Composed as a set	Composed as a set, including necessary tools
Delivered	Delivered	Delivered

Figure 8. Market requirements per product category



Interview set-up



Interview set-up

Method

To validate three risky assumptions influencing Unifix Care's proposition, 32 in-depth interviews were conducted with healthcare professionals in Kenya over a time period of 4 weeks. Participants were selected to ensure a diverse representation in terms of roles, hospital types, expertise, and locations. The snowball sampling method, specifically exponential discriminative snowball sampling, was used due to limited time, budget, and participant availability. This approach involved recruiting one subject per referral, determined by the researcher based on research objectives. (Simkus 2023)

Distinct approaches were observed between local experts and Dutch professionals during the interviews. Local experts followed a structured interview guide (see Appendix A) addressing various topics related to the assumptions. Dutch professional interviews, lasting up to 4 hours, also used the same guide but incorporated more personal and informal conversations, fostering candid and comprehensive responses. (Birks & Mills, 2015)

Interviews were documented using physical notes and consolidated into a daily report capturing significant findings. For complete reference, the appendix labeled as "C" contains the comprehensive daily report.

Interviewees

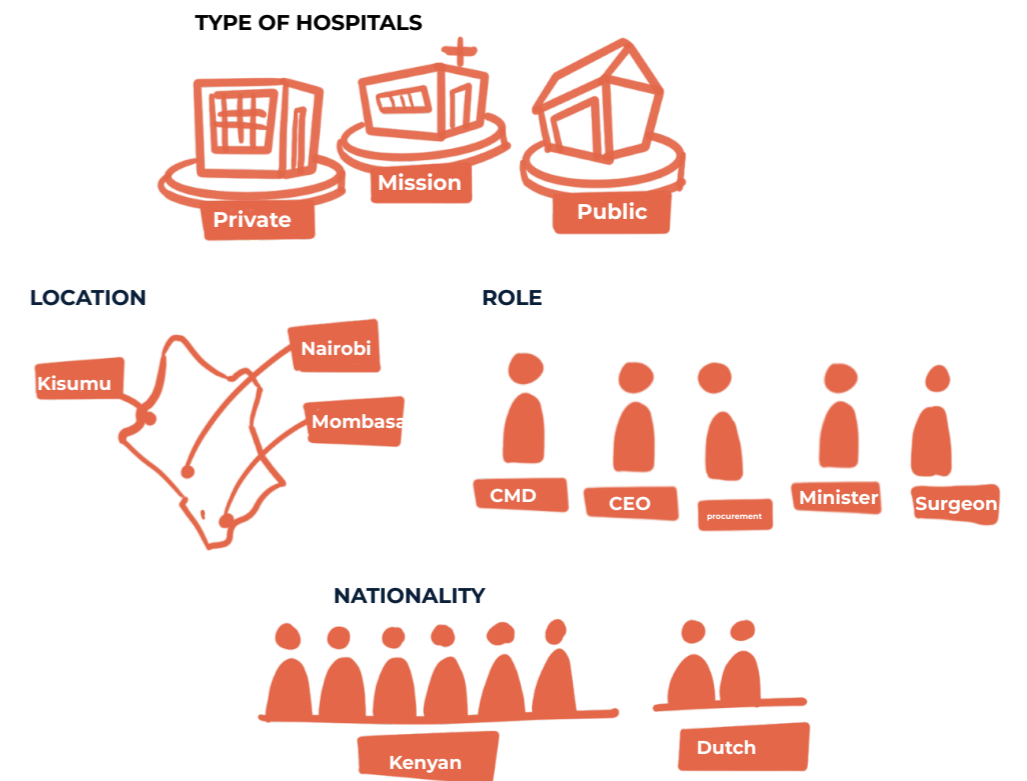


Figure 10. Variety of interviewees during the field research in Kenya

Results

1.1 Second-life surgical instruments are valued in Kenya		
SUSI	RSI	EI
As long as it works, it can be used. If it can be used, it is valued.	As long as it works, it can be used. If it can be used, it is valued.	If they are safe, they can be used even after expiry. If it can be used, it is valued.

Figure 11. Results of the valuation of SLSI in Kenya

In this chapter, the results will be presented as a concise summary of the findings obtained from the daily reports, aiming to validate the specific risky assumption under examination. These results will be presented succinctly to ensure clarity and ease of understanding, as they have already been derived from a comprehensive analysis of the findings.

SUSI RSI The participants had no issue with buying used surgical instruments as long as the price, quality, and warranty are satisfactory. By most, no distinction was made between SUSI and RSI. “brand-new or used, as long as it works and it’s good we will continue to use it.”

EI “I would want the implants, but they must be safe.” The participant emphasized that there is a market for the implants if the quality of the current implants can be demonstrated to be the same as it was five years ago.

1.2 Unifix Care can provide a market conform product using second-life surgical instruments		
SUSI	RSI	EI
Low quality material	High quality material	Uniform product that connects to the low-tech infrastructure
Ok performance	High performance	Focus on trauma implants
Pre-sterilized product	Needs sterilization	Pre-sterilized
First time use (low infection risk)	Higher chance of infection	

Figure 12. Results of the study of a market conform product

SUSI The main reason to use SUSI is to minimize the risk of infection, this is lost when reusing resulting in a low-quality overall performance. Aside from that, SUSI could lead to the deterioration of the autoclave and other instruments in the vicinity due to the detachment and corrosion of the applied coating.

RSI are market conform, it must be noted that no predetermined parameters were used to assess the instrument. The assessment was done based on the experience of the experts.

EI The market for specialized EI is minimal (such as hips) since they are very brand dependent. Vroemen (2023) suggests going for uniformity as the facility infrastructure is very limited and low-tech in most health facilities in Kenya. Since the implants are expired, a sterile product must be guaranteed. At his moment, this cannot be assured by Unifix Care.

1.3 Unifix Care can provide a market conform service using second-life surgical instruments		
SUSI	RSI	EI
Includes a 1 year warranty	Includes a 1 year warranty	Includes a 1 year warranty
Composed as a set	Composed as a set	Composed as a set, including necessary tools
Delivered	Delivered	Delivered

Figure 13. Results of the study of a market conform service

For all three categories, the service requirements can be met by Unifix Care apart from 1 crucial factor. Healthcare facilities order and use these products in pre-composed sets, not individual instruments. This means Unifix Care must compose sets to provide a market conform service as seen in Figure 14.

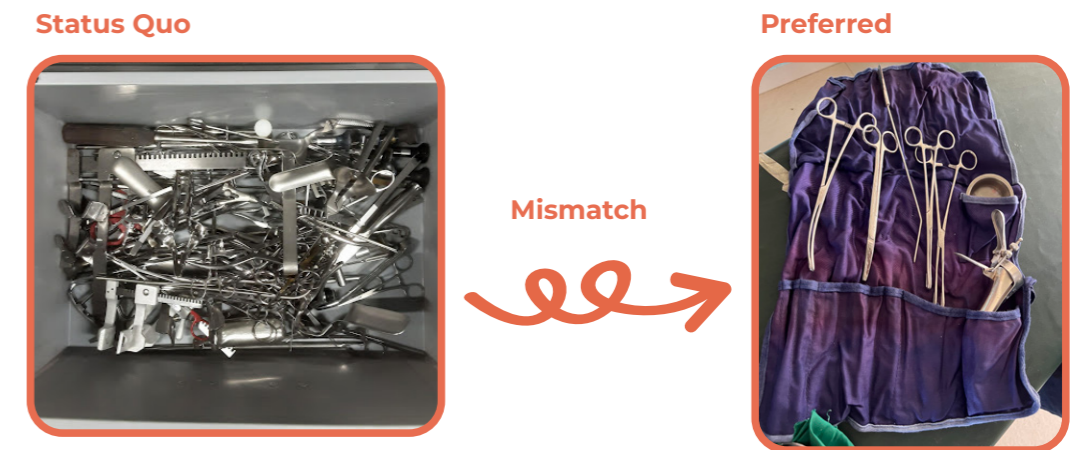


Figure 14. Current mismatch between Unifix Care products and desired product.

Limitations

The field research conducted to uncover the assumptions 1.1, 1.2 and 1.3 was conducted in the beginning of the project resulting in more explorative than in-depth outcomes. This was a good approach at that time, but there lies an opportunity to conduct interviews with more specific questions uncovering in-depth insights.

There is also an opportunity in using another sampling method in future research. The Snowball sampling method could potentially lead to biased participants due to their interrelations. The first participants have a significant influence on the rest of the sample, and individuals who are well-known and sociable are more likely to be recruited than those who are more introverted. These factors can therefore introduce potential sources of bias into the study results.

1.1 Second-life surgical instruments are valued in Kenya

The research made clear that the Kenyan market is interested in using second-life surgical instruments and expired implants, as long as safety and quality can be guaranteed. Other factors that influence the value of products introduced into the market are warranty and price.

1.2 Unifix Care can provide a market conform product

The research provides insights into factors to consider when selecting surgical instruments for the Kenyan market. A validation has been performed for the product categories. The reuse of single-use instruments (SUSI) has been flagged as a potential risk by an instrument specialist from Medic due to the risk of corrosion. It will not comply with current market standards. RSI are market conform, it must be noted that no predetermined parameters were used to assess the instruments. The assessment was done based on the experience of the experts which can be deemed subjective. Further investigation is needed to determine the feasibility of EI in this context. It is important to prioritize safety of use for this product. The next chapter will cover this subject.

1.3 Unifix Care can provide a market conform service

In order for Unifix Care to provide a market conform service, they need to consider several important factors. These include offering a 1-year warranty and guarantee on their products, delivering surgical sets that are composed of instruments relevant to the specific needs of the hospital, and ensuring that their products are easily accessible and available by providing quick delivery upon location.



Conclusion

✗ FAIL due to the inability to resterilize.

✓ PASS if they will be delivered in pre-composed sets.

✓ HALF PASS because more research is necessary to assure the safety of the product after expiry.

2

Safety & regulation

This chapter dives into the safety of Unifix Care's products and investigates their compliance with local regulations. The objective is to establish a thorough comprehension of the regulatory framework in Kenya, determine the extent to which the products align with these regulations, and identify crucial import safety factors for the three product categories. By conducting desk research and two interviews, this study aims to ascertain the significance of the product categories in Kenya and assess their safety for both the eventual patient and medical personnel.

To gain an understanding of the regulations governing second-life surgical instruments in Kenya and to identify the associated safety factors, the chapter begins by discussing two risky assumptions relevant to this topic. Subsequently, it provides an explanation of the research methodology, presents the results, and concludes with an assessment of the compliance of the three product categories with Kenyan regulations. Additionally, the chapter examines the feasibility and appropriate usage guidelines for these products to ensure safety.

Assumptions

2.1 Unifix Care products comply with local regulations

In order to determine the compliance of the three product categories with Kenyan regulations, it is essential to conduct an in-depth exploration of the regulatory landscape in Kenya. This entails identifying the relevant legislation and understanding how it relates to the products offered by Unifix Care. Only after this preliminary investigation can the three categories be subjected to further research to ascertain their compliance or non-compliance with the regulations.

2.2 Unifix Care products are safe to use

According to J. Vroemen (2023) (see Appendix E) a product can be considered safe when the mechanical, ethical, and infectious aspects are all in place. Specifically, the products must not pose any risks to the patients or medical personnel. However, in the light of the scope of this graduation thesis, the investigation will primarily focus on the mechanical and infectious aspects. Due to the complexity of assessing the ethical implications associated with introducing second-life surgical instruments in Kenya, compounded by the limited availability of local expertise in this domain.

Method

To validate the safety of the products and ensure compliance with local regulations, a comprehensive methodology comprising desk research and literature review was employed. In cases where the existing literature was insufficient, expert interviews with xxx were conducted to fill these knowledge gaps. Notably, an Orthopedic trauma surgeon and Prof. Van Engelen (Expert sustainable solutions) who possesses both expertise in the relevant field, was among the experts interviewed.

To gain a comprehensive understanding of the regulations, an examination of various standards is conducted to ascertain their applicability to specific product categories. For the standards the first one is focussed on an international scale, followed by European, Kenyan and eventually second-life instruments standards. Once the alignment between the standards and the respective product categories is established, a conclusive determination can be made regarding compliance with the corresponding regulations or standards.

As mentioned earlier, safety considerations encompass both mechanical and infectious aspects, as explained in the preceding paragraph. Therefore, for each product category, a thorough exploration of these two facets is undertaken to identify the criteria necessary for a successful and safe implementation of second-life surgical instruments.

The data analysis strategy used in this case is the organization and visualization of information using the Miro platform. Miro facilitates the gathering and arrangement of data in a clear and organized manner, enabling the identification of patterns, relationships, and discrepancies among different sources. By leveraging these capabilities, Miro supports the process of drawing conclusions and making informed decisions based on the analyzed data.

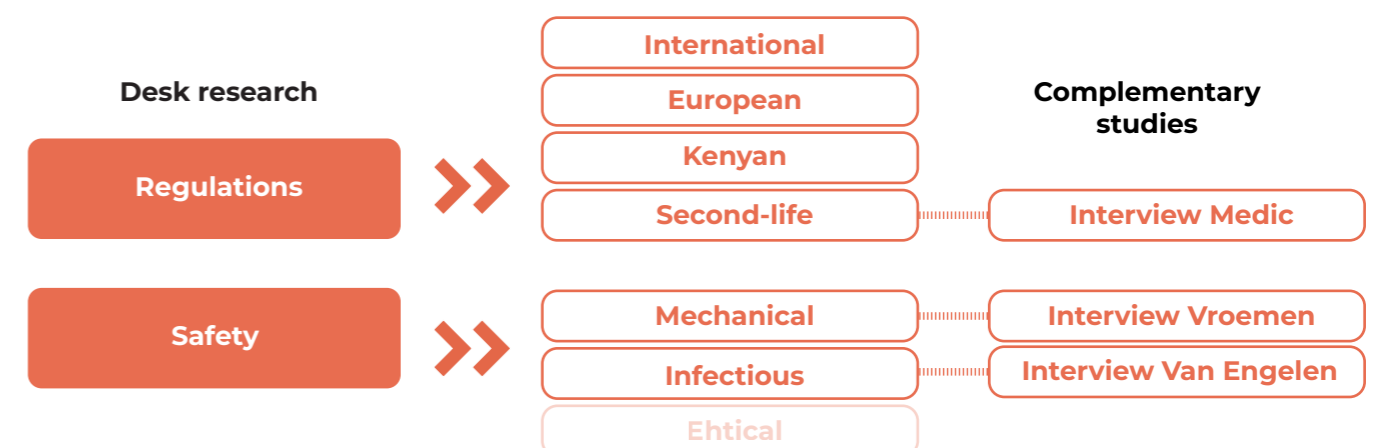


Figure 15. Schematic overview of the data analysis of this chapter

Results

2.1 Unifix Care products comply with local regulations

International standards

Regulatory systems for medical devices vary worldwide, from continent to nation and even within countries (Dusabe, 2020). To reduce the diversity in regulations, various harmonization groups are in place, advocating for a uniform technical document that manufacturers can use to obtain widely accepted approval for the introduction and marketing of medical devices in multiple countries (Lamph, 2012). There is an internationally widely recognised certification setup by the International Organisation for Standardisation (ISO) defined as: “the provision of a written assurance (a certificate) by an independent body that the product, service, or system in question meets specific requirements.” (ISO, 2022).

European standards

Focussing on European scale specifically, a CE marking on a product is standardized. This marking indicates that a product has been evaluated by the manufacturer and an identified body and found to meet safety, health and environmental protection standards required for products marketed in the EU, regardless of where it is manufactured (European Union, 2022).

Kenyan standards

In figure 15 the involved organizations responsible for overseeing medical devices in Kenya are mapped. According to Dusabe (2020), Kenya has established guidelines and implements oversight, compliance, training, reporting and monitoring measures but lacks publicly available specific regulations for medical devices. There is however a Pharmacy and Poisons Board (PPB) that serves as Kenya’s national regulatory body, they require importers to provide conformity certificates for medical device registration and import authorization (Dr. G. Ganda, 2022, see appendix C). Due to inadequate resources, the regulation of medical devices is not a primary focus of Kenyan authorities, therefore they also recognise the European CE marking because this is based on MDD/FDA (McNerney & Peeling, 2015).

It should however be noted that European requirements and international standards do not always align with the needs of low- and middle-income countries (LMICs). Manufacturers must consider the difference in operating environments, such as the heat and humidity of the area, the available human capacity, skills, and cost constraints that can lead to issues such as a lack of funds for maintenance and electricity (Neighbour & Eltringham, 2012).



Figure 15. Stakeholder map of organizations responsible of overseeing medical device regulations in Kenya.

Second-life instruments standards

With the vast amount of experience that the foundation Medic has with reprocessing medical equipment made for Africa, for over 40 years, they were interviewed to determine the standards for second-life instruments. The foundation Medic has been successfully reprocessing medical equipment made for Africa, including Kenya, for over 40 years. Medic takes full responsibility for the products they ship by ensuring that they are accompanied by proper documentation, such as indemnification forms, gift certificates, and lists of contents and specifications. They work with DPA (a transport company) to deliver the equipment and provide assistance to the receiving party as needed. Even though Medic does not need MDR or CE trademark, they still make sure that the products they remanufacture are safe and reliable. Additionally, their ANBI (public benefit organization) status allows for easier distribution as all orders are perceived as donations and not profitable transactions. Medic works with foundations or "tropenartsen" that are in contact with local health institutions to ensure that the equipment is used for its intended purpose. Although Medic's approach may not be sustainable for a start-up like Unifix Care, this example shows that it is possible to import second-life equipment into Kenya with exemption of standards. It is important to note that Medic's liability for a product when something breaks is crucial to their success. By carefully choosing with whom they work, they have avoided any lawsuits in the 40 years of their operations. However, this approach limits the scale of their customer group, it only works on a small scale. Therefore, this approach is not interesting for Unifix Care.

In effect of the three product categories, different scales of regulation have been identified:

The reuse of SUSI is not allowed considering the European standard EN ISO 17664:2017

The reuse of RSI is allowed considering the European standards

The use of EI is not allowed considering the European standard ISO 17664:2021




Standards	Compliance regulations
International standards	-
European standards	 RSI
Kenyan standards	Approve European standards <input type="checkbox"/>
Second-life instruments standards	  SUSI & EI

Figure 16. Product categories assigned to regulatory segments they belong to.

2.2 Unifix Care products are safe to use

SUSI

Infectious aspects

One of the primary concerns associated with the reuse of SUSIs is the risk of cross-infection. Inadequate reprocessing systems may not completely eliminate viable microorganisms, which can result in the transmission of microorganisms to subsequent patients. Additionally, certain devices may present challenges in terms of thorough cleaning and decontamination, leaving behind residues from chemical decontamination agents (MHRA, 2021). Moreover, exposure to endotoxins can be a significant issue if a device retains a high bacterial load after use, which cannot be effectively removed through cleaning alone. Even if the cleaning and sterilization processes effectively eliminate bacteria, they may not neutralize the toxins produced by these bacteria (MHRA, 2021).

Likewise, in low-income countries, the reuse of medical devices is common due to financial constraints. However, manufacturers have a responsibility to design devices that can be adequately cleaned using the available resources to prevent contamination (Neighbour & Eltringham, 2012).

While reusing single-use devices might seem like a potentially safe and cost-effective practice, there is currently insufficient evidence to establish their safety, efficacy, and cost-effectiveness. Legal and ethical concerns must be carefully addressed to ensure patient safety and minimize potential liability (Hailey, 2008).

While the reuse of single-use devices could potentially be safe and cost-effective, there is insufficient evidence to establish its safety, efficacy, and cost-effectiveness. Legal and ethical concerns must be addressed to ensure patient safety and minimize liability (Hailey, 2008).

Mechanical aspects

Reusing single-use surgical equipment can lead to material alteration and mechanical failure (MHRA, 2021). The Medicines and Healthcare products Regulatory Agency does not recommend the reuse of SUSIs due to the potential risks associated with their reuse. However, there have been instances where the reuse of disposable medical equipment, such as pacemakers, has shown positive impact in impoverished countries through successful reuse programs (Timir S. Baman, 2010). Nevertheless, it is crucial to thoroughly evaluate legal and safety considerations when considering the reuse of such medical technology.

Adama R. (2023), a surgical instrument specialist from Medic, emphasizes that SUSIs should not be cleaned and sterilized for reuse. Apart from these instruments not being manufactured for multiple usages, the coatings on disposable instruments can





39 Figure 17. Surgical instrument washing & cleaning stations in the Kenyan context

damage cleaning machines and autoclaves, as the coatings may deteriorate over time. This deterioration can also pose a risk to other instruments being sterilized in the same autoclave.

RSI

Mechanical Aspects

Unifix Care ensures compliance with the current standards in Kenya for their reusable instruments. However, it is crucial to be mindful of potential limitations, such as the possibility of malfunctioning or broken instruments. To maintain the mechanical integrity and performance of these instruments, regular inspection and maintenance procedures are essential. This helps identify any issues that may arise and allows for timely intervention (AHS, 2020).

Common types of damage observed in reusable surgical instruments include staining, loosening of instrument joints, rust, pitting, and malalignment. Breakage, particularly in the form of broken tips, is also a common issue, although damage to the shaft or handle of instruments has been observed as well (The Joint Commission, 2022)

The lifespan of reusable surgical instruments is influenced by various factors, including the frequency of use, proper handling, and adherence to maintenance protocols. Regular monitoring and assessment are necessary to determine the instruments' longevity and effectiveness. By taking these factors into account and implementing appropriate measures, Unifix Care can ensure the safety and reliability of their reusable products.

Infectious Aspects

Ensuring Proper Reprocessing

The reprocessing of reusable surgical instruments involves a series of steps to maintain their cleanliness and safety. These steps include pre-cleaning, sorting, disassembly, soaking, cleaning, rinsing, lubricating, drying, reassembly, inspection, packaging, sterilization, and storage. Each cycle follows these defined processes to minimize the risk of contamination (IPC, 2020).

EI

Mechanical aspects

Implants that are reused can experience failures under repetitive load due to metal fatigue. However, if the implants are not used and are properly stored, they will maintain their strength and properties. This is supported by the experience of Vroemen (2023), who highlights the longevity of metals used in external fixators even under intense use outside the body. The molecular structure of stainless steel, titanium, and vitallium implants remains unchanged during reesterilization, ensuring their mechanical performance.

Importance of Serial Numbers:

The presence of serial numbers on implants is crucial for tracking and identifying specific implants. Each implant is registered with a unique serial number during surgery, allowing for effective resolution of production errors and determining liability. When resterilizing implants, it is important to ensure that the product number is properly contained and recorded.

Infectious aspects

Research conducted in a university microbiology laboratory demonstrated that the contents of implants remained sterile for 6 to 11 years after their expiration dates. (Worthington, 2015) This suggests that the expiration date is primarily a liability issue and does not necessarily indicate contamination. Sterilization of implants is crucial to maintain their sterility. In case the device is not perfectly sealed or the sterilization has expired, appropriate resterilization methods should be followed, such as steam sterilization at validated parameters. (Guidelines for use of Implants)

Expiry Dates and Packaging:

To ensure the safety of surgical implants, expiry dates are included, indicating that the implant should be used within 5 years of production. In the Netherlands, manufacturers are prohibited from using the implant six months prior to its expiry date. Sterilization can be affected by the packaging, as the outer layer may develop micro-perforations that are not visible to the naked eye, compromising the sterility of the implant. If a perforation is found, the implant should be discarded.

Resterilization and Infection Risks:

There are debates surrounding the reesterilization of old, unused implants to mitigate infection risks. Van Engelen (2023) raises concerns about titanium implants having cavities that may harbor bacteria, which cannot be eliminated through sterilization. However, Vroemen (2023) contradicts this, stating that bacteria are not present if the implant has never been outside its original intact packaging. Even if bacteria are present, high temperatures and pressure during reesterilization can effectively eliminate them, even within cavities. Further consultation with a bacteriologist is recommended for a more scientific perspective.

Based on his extensive practical experience as a trauma and orthopedic surgeon in Africa, Vroemen (2023) firmly believes that the mechanical and infectious safety of an implant remains intact beyond its expiration date. He suggests that reesterilization is a viable option for most implants, even if they have been declared non-sterile after 5 years.




	 SUSI	 RSI	 EI
Infectious	Cross-contamination between patients and medical staff and exposure to endotoxins	None, unless proper reprocessing (cleaning, inspection, sterilization & packing)	Can be reesterilized and repackaged with multilayer plastic packaging. Implants stay sterile for 6 - 11 years after expiration dates. Further research is necessary, too little data.
Mechanical	Decrease in performance and effectiveness. Degradation of material during sterilization, destroying the autoclave and other instruments in the vicinity	High-quality steel. Made for reuse. Proper performance inspection needs to be in place.	Material strength and properties will be maintained after reesterilization.

Figure 18. Safety aspects concluded, divided in mechanical and infectious arguments

2.1 Unifix Care products comply with local regulations

It can be concluded that the question of whether Unifix Care's products comply with local regulations is complex. While there are no specific regulations for medical devices in Kenya, the county did establish some guidelines, oversight measures, uses the PPB as a national regulatory body, and implements the CE marking as a recognized standard. This European standard is unfortunately not aligned with the needs in Kenya but could potentially serve as a starting point for further development to realize a standard that integrates the unique needs of the county. The work of Medic proves, on the other hand, that it is possible to import second-life equipment into Kenya with exemption of standards. However, it is important to note that the reuse of SUSI is not allowed considering the European standard EN ISO 17664:2017, while the reuse of RSI is allowed considering the European standards. Additionally, the use of EI is not allowed considering the European standard ISO 17664:2021.

2.2 Unifix Care products are safe to use

SUSI (Single-Use Surgical Instruments): The reuse of SUSIs raises concerns regarding cross-infection risks and the effectiveness of reprocessing systems. There is insufficient evidence to establish the safety, efficacy, and cost-effectiveness of reusing single-use devices. Legal and ethical considerations should be addressed to ensure patient safety and minimize liability.

RSI (Reusable Surgical Instruments): Unifix Care ensures compliance with current standards for their reusable instruments. Regular inspection and maintenance procedures are crucial to maintain mechanical integrity and performance. Proper reprocessing and adherence to maintenance protocols are essential to minimize contamination risks.

EI (Implants): The mechanical integrity of implants remains intact if they are not used and are properly stored. Sterilization is important to maintain their sterility. Expiry dates are included to indicate the recommended usage timeframe, and resterilization may be possible. The presence of serial numbers is crucial for tracking and resolving production errors. Further consultation with experts is recommended to address concerns about resterilization and infection risks.



Conclusion

✗ FAIL because the safety risks don't outweigh the benefits and no compliance with regulations

✓ PASS due to compliance with local regulations and are safety to reuse.

✗ FAIL due to no compliance with local regulations and insufficient proof to assure the safety of the implant.

3

Supply

The purpose of this chapter is to evaluate the feasibility of Unifix Care as a supplier in Kenya, with a focus on verifying their ability to adequately supply their products to meet local demand, as stated in assumption 3.1. This investigation is of critical importance, as the ability of Unifix Care to contribute value to the Kenyan healthcare market depends on their ability to provide a sufficient supply of products.

To achieve this objective, this chapter will begin with an introduction to the assumption, providing an overview of the validation process and the methods employed. Subsequently, an evaluation of Unifix Care's current supply chain is conducted, examining its capacity to meet the local demand for each product category. (Appendix F The chapter will conclude with a final assessment of the assumption's validity, giving insight into the adequacy of Unifix Care's products.

3.1 The supply of Unifix Care products is adequate

After conducting market research in Kenya, it was found that there is a demand for 250 SUSI sets, 35 RSI sets and implant sets for orthopedic traumatology derived from 5 hospital visits during the field study. Based on this finding, the assumption is made that Unifix Care can provide an adequate supply of products when they can meet this market demand with a yearly supply, which would be equivalent to approximately 750 SUSIs, 700 RSIs and a variety of EIs.

Method

In order to evaluate the adequacy of Unifix Care's supply chain, an internal investigation was conducted to assess the company's inventory. All the three stages of the process were analyzed: general checks, set composition, repackaging. (Appendix F) The investigation involved categorizing all products and examining the number and percentage of applicable instruments, as well as the time required for final product assembly prior to use. By knowing how much percentage is applicable, a calculation can be made that assesses the amount of instruments that can be used compared to the total batch and shows how efficient Unifix Care handles their supply flow. To determine the quantity of products that Unifix Care can deliver, an estimate will be obtained for a one-year supply of RSI and EI as for SUSI it is already defined. Additionally, knowing the necessary time will indicate the amount of labor that Unifix Care will need to invest in for the required supply. This data will be utilized in the financial analysis outlined in chapter 4.

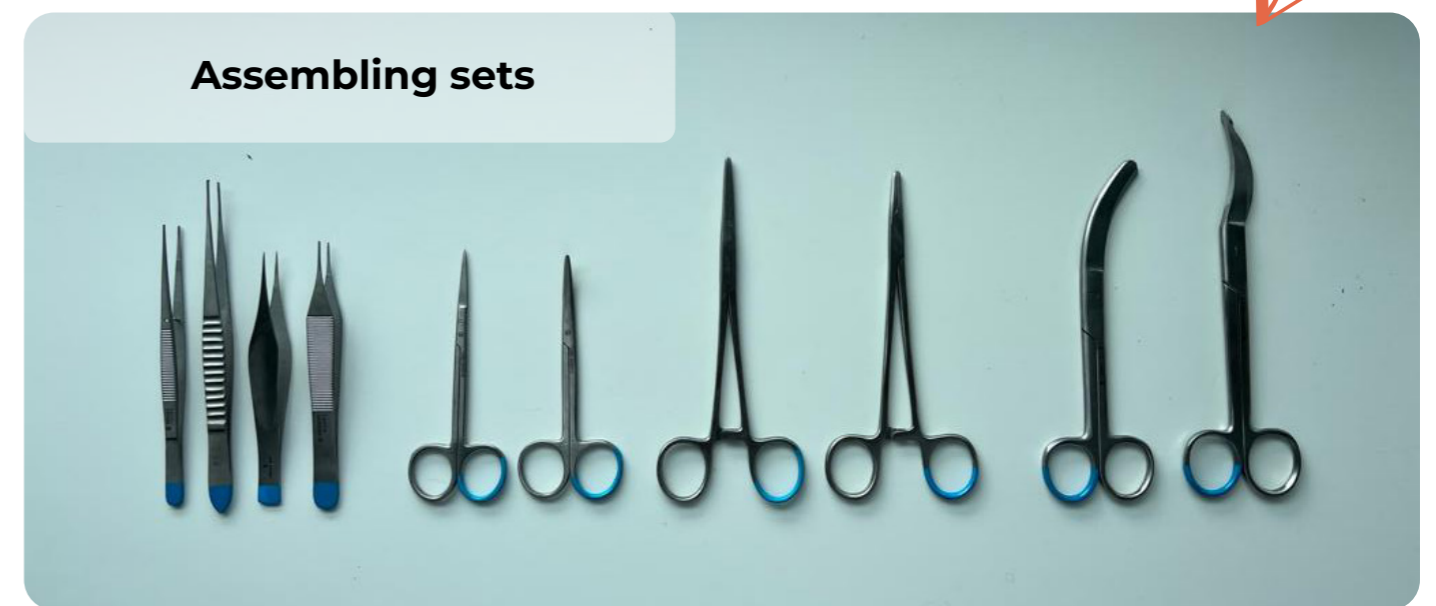
Results

	SUSI	RSI	EI
General checks (min)	200 minutes	260 minutes	-
Composing sets (min)	348 minutes	85 minutes	-
Total time to compose sets (hours)	09:08 hours	05:45 hours	-
Amount of batches (nr. of batches)	4 batches over the course of 1 year	1 batch (December 2022)	1 batch (June 2022)
Total batch size (nr. of instruments)	3700	352	26
Sets composed (nr. of sets)	16 complete sets (Needleholder 25 set) 300 incomplete sets (destitching set)	(4 incomplete sets) General surgical set, Delivery Set, Family Planning Set, Examination	(0 sets) 4 locking screws 4 Closing wedges
% instruments used from total batch	27.02%	18.75%	30.77%

Figure 19. Summary of the analysis results to establish an adequate supply per category

Unifix Care expects an average of 4 batches of RSI in a year. A simple calculation is made to estimate the yearly supply of RSI: 4x 1 batch (4 incomplete sets) = 16 incomplete RSI sets in one year.

The supply of implants has completely ceased. It is uncertain whether additional batches will arrive at Unifix Care.



47 Figure 20. Photos of the performed methods to check if Unifix Care can adequate supply of RSI

Figure 21. Photos of the performed methods to check if Unifix Care can adequate supply of SUSI

3.1 The supply of Unifix Care products is adequate

In conclusion, Unifix Care's ability to provide an adequate supply of SUSI sets in Kenya exceeds the demand of 250 sets, but most of the sets are incomplete and require further attention for completion. While the supply of RSI sets almost meets expectations, only 16 incomplete sets can be provided out of the demanded 25. Unfortunately, Unifix Care cannot provide any EI sets due to the ceased supply of implants, which may impact future decision-making processes. Overall, this chapter aimed to evaluate the feasibility of Unifix Care as a supplier in Kenya, with a focus on verifying their ability to meet local demand. Based on the analysis, Unifix Care can adequately supply SUSI and RSI sets, but not expired implants.



Conclusion



PASS because the supply is adequate



HALF PASS because the supply is almost adequate



FAIL because the supply is not adequate

4

Pricing

This chapter will focus on the viability aspect by validating the assumption 4.1. Viability refers to the ability of a Unifix Care to operate sustainably and profitably in the Kenyan healthcare market. When they can offer their products at a competitive price point while maintaining quality and meeting regulatory requirements, the project will be considered viable.

An analysis of the supply chain is conducted for each product category, which involves comparing the total costs of Unifix Care's used sets, including labor and service costs, to the prices of newly produced products by competitors. This comparison yields a percentage that represents the cost of Unifix Care's used sets in relation to the prices of the competitors' newly produced products.

4.1 Unifix Care products are more affordable than current alternatives

With this assumption, the aim is to assess the viability of Unifix Care's second-life instruments by comparing costs of repurposing the product categories to the current market prices in Kenya. Offering more affordable products than current alternatives could potentially make Unifix Care's products more attractive to consumers, thereby increasing their viability in the market.

Method

To validate this assumption, an analysis of the process of reprocessing SUSIs and RSIs was performed, and the costs incurred were recorded. However, due to a lack of sufficient pricing data for EIs, this product category was not covered in this study, and further research is needed to develop a substantiated viability assessment. In this chapter, a detailed estimate will be provided for the costs of reprocessing each product category, which will be evaluated against competitor's prices on the market to determine if second-life instruments would be a viable option for Unifix Care to compete in the Kenyan market. For a more extensive explanation, view Appendix G.

Results

Single-Use Surgical Instruments

	Stitching set	Parturition set	De stitching set	25x Mayo Hegar Needlefeeder	25x Iris Scissors
Merkala (new price)	11,56 euro	15,15 euro	8,60 euro	138,65 euro	100,85 euro
Unifix Care costs	6,52 euro	8,02 euro	5,52 euro	95,09 euro	104,95 euro
% of new price	56,4%	52,9%	64,2%	68,6%	104,1%

Figure 22. Table of the results of the price analysis of SUSI

Reusable Surgical Instruments

	General surgical set	Delivery Set	Family Planning Set
Harleys Limited Prices	220,4 euro	61,94 euro	87,78 euro
Costs of Extra instruments	112,08 euro	54,72 euro	116,16 euro
Labor + Decontamination	106,34 euro	47,42 euro	81,14 euro
Total Unifix Care costs	218,42 euro	102,14 euro	197,3 euro
% of new price	99,10%	164,90%	224,83%

Figure 23. Table of the results of the price analysis of RSI

4.1 Unifix Care products are more affordable than current alternatives

In conclusion, this chapter has examined the affordability of SUSI and RSI sets in Kenya, and it can be concluded that used SUSI sets are slightly cheaper than new sets, while RSI sets are significantly more expensive than local competitors. It is important to note that certain price elements were not included in the calculations, (Appendix G) which may result in higher actual prices. Based on the findings, the assumption that Unifix Care products are more affordable than current alternatives is approved for SUSI and denied for RSI. It is more cost-effective for Kenyan customers to purchase new RSI sets from Harleys Limited.



Conclusion



PASS because Unifix Care can offer more affordable prices



FAIL because alternatives are more affordable.




INCONCLUSIVE not enough information available to conclude.

5

Conclusion

To finalize the first part of this thesis, the outcomes of the previous chapters are summarized in a matrix to conclude with an answer to the question whether a product category can offer added value in the Kenyan market.

The evaluation of the three product categories will encompass an assessment of their feasibility, desirability, and viability, along with a summary highlighting the most significant risks, obstacles, and opportunities associated with each category. In order to provide a comprehensive overview of the key findings for each category, a matrix has been created to address the various risky assumptions (see Figure XXX). With this matrix, the question whether a product category can offer added value in the Kenyan context, as well as the potential additional challenges it may entail, can be answered. The outcome of this analysis serves as the foundation for the next part of this thesis.



	SUSI	RSI	EI
Product & service	✗	✓	✓
Safety & regulation	✗	✓	✗
Supply	✓	✓	✗
Pricing	✓	✗	✗

Figure 24. Decision-matrix testing the categories to the risky assumptions



Single-Use Surgical Instruments

- **Feasibility:** Risks of destroying cleaning devices and product failure due to lack of quality assessment methods. Compliance with Kenyan regulations inconclusive.
- **Desirability:** Unclear compliance with desired service components. High risk of infection due to lack of quality and safety.
- **Viability:** Insufficient margin to implement second-life SUSIs.



The benefits of selling second-life SUSI do not outweigh the risks.



Reusable Surgical Instruments

- **Feasibility:** RSI can be repurposed with considerations for quality, affordability, safety, and market standards.
- **Desirability:** Compliance with European regulations feasible. Potential to repurpose 18.75% of batch with scalability in sorting optimization.
- **Viability:** RSI sets more costly than new sets. Differentiation required for higher quality or better service in RSI category.



The implementation of RSI in Kenya has the potential to offer additional value when a solution to the financial costs can be provided. Alternatives are more viable.



Expired Implants

- **Feasibility:** Further research needed for distribution and importing challenges. Research necessary for reesterilization and addressing mechanical and infection risks.
- **Desirability:** Challenges in ensuring safety and quality of expired implants. Questions remain about appropriate implant set composition and customer expectations.
- **Viability:** Insufficient data to determine viability of Expired Implants.



Further research is needed to address concerns about reesterilization and adhere to local regulations to ensure safe use. Additionally, an adequate supply of implants must be established as it is currently non-existent.

Answering the research question

Does the redistribution of surplus surgical instruments from Western countries offer value in Kenya?

Unifix Care initially identified three potential product categories, namely single-use surgical instruments, reusable surgical instruments, and expired implants, which were surplus in Western countries. However, the research findings have determined that none of these categories are viable for successfully adding value to the Kenyan healthcare market. The reasons include factors such as inadequate supply, high risks, or lack of feasibility. Consequently, Unifix Care has made the strategic decision to discontinue its pursuit of second-life instruments and instead pivot its value proposition.

In close collaboration with the Unifix Care team and their supervisory board, a thorough exploration was conducted to determine the current priorities for further research. The research did confirm a strong demand for high-quality surgical instruments in sub-Saharan Africa, underscoring the critical necessity of these products. This presents a challenge: develop a solution that could effectively address this need. It has therefore been decided to proceed with the following design challenge for this thesis: to develop an expansion approach that empowers Unifix Care to realize its vision by providing guidance for their decision-making process. This design challenge will form the focal point of the thesis, guiding the investigation and analysis in order to provide strategic recommendations for Unifix Care's future endeavors.

NO

- » **Different direction needed**
- » **Unifix Care lacks a clear strategy**
- » **Assist in defining a strategy to avoid useless spending of time & resources**
- » **Move smart!**



PART 2

How can Unifix Care make more effective decisions while maintaining its “just do it” mentality?

Develop an expansion approach that enables Unifix Care to actualize its vision by guiding their decision-making process.

Introduction

What will be discussed in this part?

Research question:

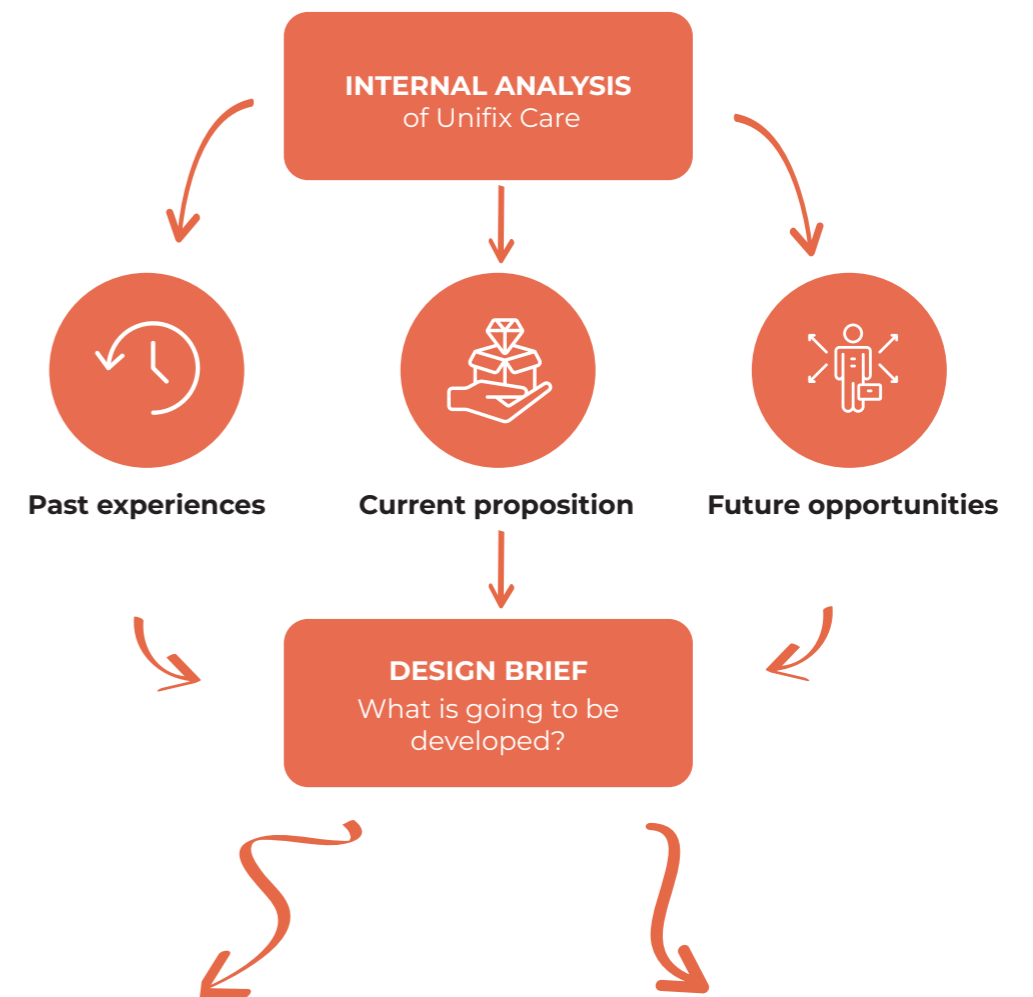
How can Unifix Care make more effective decisions while maintaining its “just do it” mentality?

An internal analysis is performed to answer the research question. The following design statement is formulated in the Design Brief:

Develop an expansion approach (1) that enables Unifix Care to actualize its vision (2) by guiding their decision-making process (3)

The design statement is elaborated in three chapters:

1. How will Unifix Care expand? - An expansion approach is presented based on the Lean Start-up method
2. What to do first? - A strategy is presented using a strategic framework and opportunity landscapes
3. How to decide? - Decision support model is delivered to establish effective decision-making



1. Expansion approach | How will Unifix Care expand?

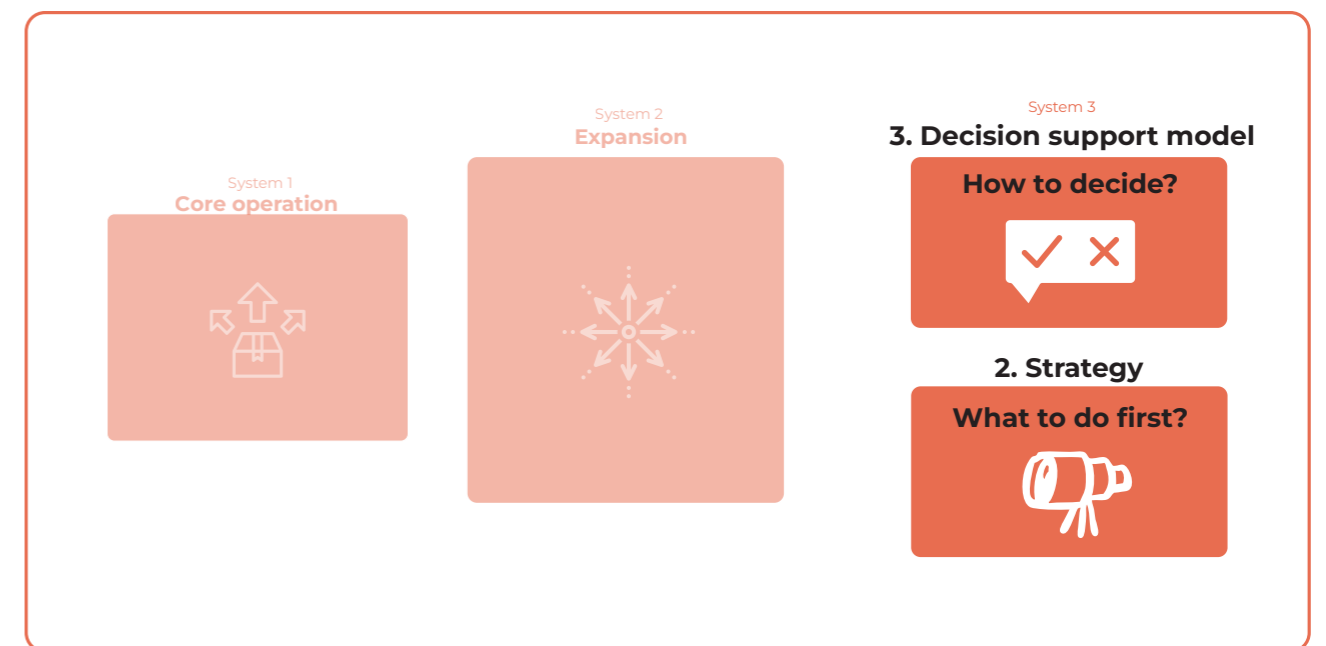


Figure 25. Schematic overview of the structure of PART 2.

6

Internal analysis

What have we learned?

In PART 1, it became apparent that Unifix Care needs to make adjustments to its proposition. However, Unifix Care currently lacks a strategy to determine what to do next, ultimately running into the same problem, invalidating the proposition and eventually spending unnecessary time and resources. Thus, the objective of this chapter is to validate the existence of this problem within Unifix Care and to propose a solution to address it effectively. To achieve this, an understanding of Unifix Care as a company will be developed. This understanding includes a chronological exploration of their journey, an evaluation of their current value proposition, and an assessment of the significance of strategic business expansion. Through this thorough analysis, valuable insights into areas for improvement within Unifix Care will be gained, laying the groundwork for the subsequent formulation of the design brief. The chapter concludes with the presentation of the design brief, which distinctly outlines the goal of this graduation thesis.

Approach

To gain an understanding of Unifix Care's journey and extract insights from their experiences, an internal analysis was undertaken. The main findings of the paragraphs can be translated into the Design Brief. This analysis encompasses three key paragraphs.

Past Experiences: To delve into the company's history, exploratory interviews were conducted with the two founders. These interviews provided information that was utilized to construct a timeline, enabling an overview of the company's evolution over time. See figure 27.

Current Proposition: The same exploratory interviews were leveraged to understand the present state of Unifix Care. By gathering insights directly from the founders, a clear picture of the company's current standing was obtained.

Future Opportunities: To identify potential avenues for growth, a thorough examination of prevailing trends in the African healthcare landscape was conducted. Additionally, extensive literature research was undertaken to explore how entrepreneurs navigate and seize opportunities. Special attention was given to understanding the decision-making process employed by Unifix Care presently and in the future. To better understand how this works, an expert interview was conducted.

Results

Past experiences

Throughout the course of the journey, it became apparent that Unifix Care faced a deficiency in their ability to conduct effective market analysis. In retrospect, it became clear that certain propositions could have been more easily refuted with the available information. This realization underscored the significance of cultivating a thorough understanding of opportunities prior to allocating valuable time and resources.

Unifix Care	Desired Unifix Care	Corporate (Philips f.e.)
"Just do it"	"Just do it" mentality + predicting element	Prove and predict everything

Figure 26. Type of decision-making strategies applied by businesses. Hultink (2023)

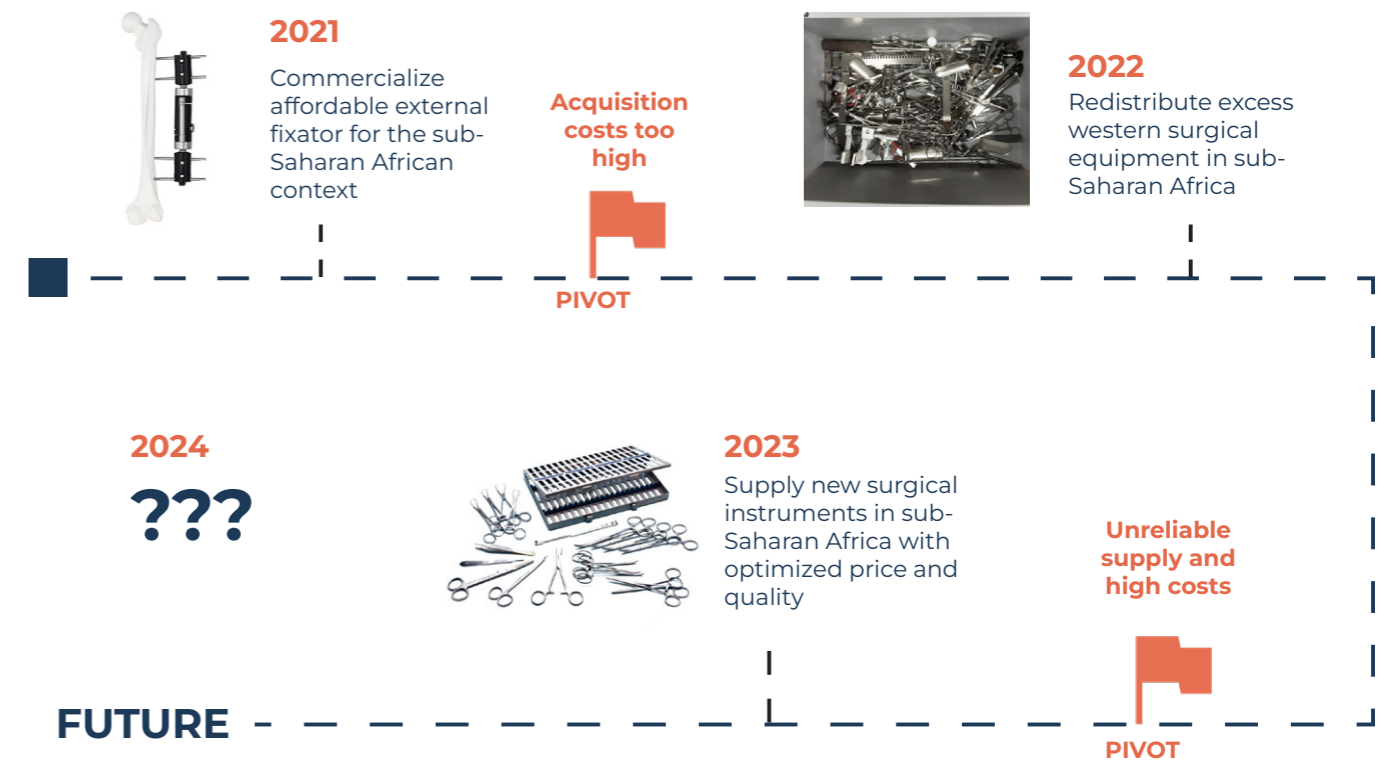


Figure 27. Unifix Care Journey into making quality surgical instruments accessible for all

Current proposition

Each year 17 million preventable deaths happen due to the lack of basic surgical care, one of the three main reasons is the absence of adequate surgical equipment (Meara et al., 2015, p. 576). This causes several major challenges for hospitals, as illustrated in figure XXX.



Due to the absence of instruments, hospital personnel apply a make do approach such as creating self built systems like leg supports for broken legs.

A lack of financial resources results in facilities using rusty surgical instruments, causing high risks of infections leading to higher rates of death during surgery (Oosting et al., 2019, p.271).

Worst case, facilities are not able to perform treatment because there are not enough instruments in place to take care of the urgent care of patients, making them wait, suffer and sometimes even die.

Figure 28. Major challenges for hospitals

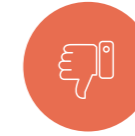
“People don’t buy products or services. They buy getting a job done better, faster or cheaper.” – Clayton Christensen (Harvard Business School)

STATUS QUO



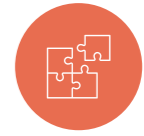
Costly Inefficiencies

Analog quotation and stock management in combination with unnecessary intermediaries between manufacturer and hospital lead to unnecessary high costs.



Poor Quality

Lack of knowledge about products, no quality inspection in place, no product traceability resulting in poor quality instruments circulating in the market that quickly deteriorate, increasing long-term costs and safety risks.



Incomplete Supply

Inefficient communication, mismatch between inventory and demands resulting in incomplete and irregular supply of surgical instruments sets.



Short & simple supply chain

Reducing intermediaries and automating ordering process



Real quality control

Quality control & data-driven product and supplier selection by comparing offers from over 30+ high-end manufacturers



Customer-centric service

Co-creation of set composition, demand-driven manufacturing and clear communication

UNIFIX CARE



Figure 29. Founder team interview findings: Unifix Care does three things differently.



Unifix Care offering

Unifix Care offers affordable, quality surgical instruments that meet specific criteria:

- Affordability: Instruments priced 30% to 50% lower than competitors.
- Quality: CE marking and transparent product data.
- Reliability: Consistent quality and stable inventory management.

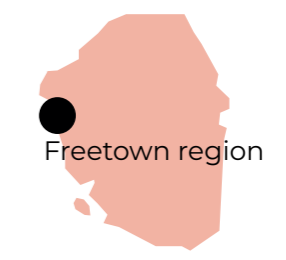
Unifix Care provides one product in a variety of: abdominal sets, general sets, circumcision sets, delivery sets and more. They recently launched their first program in Sierra Leone.

Surgical instrument sets

Example of the set:



Delivered to Sierra Leone



“There is so much a start-up CAN do, but it’s much more difficult to determine what a start-up SHOULD do”
- David Cohen - CEO
 Techstars

Future opportunities

Expanding the opportunity portfolio is necessary for Unifix Care to reach a wider market, adapt to industry changes, and leverage its expertise. Expanding your opportunity portfolio refers to actively seeking and pursuing a broader range of potential opportunities to increase the potential for growth, success, and innovation. While focusing on current activities is crucial for providing high-quality healthcare equipment, exploring new opportunities allows the company to diversify, stay competitive, and seize unexpected growth prospects. By embracing new opportunities alongside their core focus, Unifix Care can make a greater impact in making quality healthcare equipment accessible to all. Unifix Care is encountering various opportunities, prompting the need to determine whether they should invest their time and resources in pursuing them. The question arises: How can Unifix Care assess the viability of these opportunities? Figure 30 highlights tangible examples of real opportunities that Unifix Care has the potential to pursue.



Sell hernia meshes
 expand product catalog



A Sierra Leonean doctor expressed interest in placing a substantial order for a large quantity of Hernia meshes, indicating a growing market for Unifix Care.

Open local office in Nairobi
 geographical expansion



An organization based in Nairobi, Kenya proposed a partnership to establish a joint office for the purpose of selling surgical instruments.

Start leasing instruments
 offer extra service



A Kenyan organization expressed their intention to initiate a leasing service specifically for surgical instrument sets.

Figure 30. Specific opportunities presented to Unifix Care

“Start-ups don’t starve, they drown”
- Eric Ries

Figure 4. The Drowned Frog Trajectory

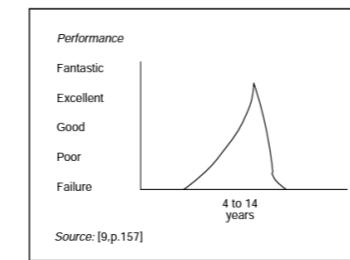


Figure 31. The drowning frog trajectory

Considering the real opportunities Unifix Care faces and our understanding of their responses, it is essential to learn from literature and a professor of new product marketing about how entrepreneurs generally handle such opportunities. By studying these sources, we can identify common mistakes that entrepreneurs often make, which Unifix Care should strive to avoid, ensuring their success in seizing and capitalizing on the encountered opportunities.

General view of entrepreneurs and opportunities: How do they handle opportunities?

Social entrepreneurs are highly motivated by identified opportunities, pursuing their vision and finding satisfaction in realizing their ideas (Martin and Osberg, 2007). Despite not perceiving themselves as risk-takers, entrepreneurs tend to view business situations positively (Palich and Ray Bagby, 1995, p. 426). However, this optimistic outlook often leads companies to allocate excessive time and resources to all available opportunities.

Both startups and established companies face resource limitations, such as funding and manpower. Overwhelm from numerous ideas frequently leads to the downfall of entrepreneurs. To avoid this, critical decision-making is crucial. It involves focusing on one opportunity and setting aside others, even if they seem beneficial. This approach prevents drowning in too many ideas and optimizes the pursuit of desired outcomes.

Unifix Care must avoid the fate of the “drowning frog” analogy. Ambitious entrepreneurs can lose focus and fail to establish stability. This syndrome affects young companies and established organizations in rapid growth initiatives (Richardson et al., 1994, p. 16). Examples include Next, Air Europe, Polly Peck, and Maxwell.

Interview findings Hultink - How to grow? How to go from 1 product to 1000 products?

Unifix Care must define a clear strategy to guide their expansion decisions. They should proactively position their product in the market to avoid unwanted outcomes. Creating a portfolio of products and expansion initiatives aligned with their strategy is important. It is crucial to avoid taking on too many projects simultaneously, as it can hinder progress. Expansion projects should be chosen based on the company’s strategy. Maintaining a balanced portfolio that includes both high-risk and low-risk projects, as well as projects with varying timeframes, is recommended. Radical innovations may require more time and effort but can lead to greater profits and impact.

For full interview findings visit: Appendix I

Design brief

CONCLUSION INTERNAL ANALYSIS

Develop an expansion approach¹
that enables Unifix Care to actualize its vision²
by guiding their decision-making process³

Past experiences

Unifix Care lacks expertise in effectively analyzing markets and needs a more strategic approach. Because of the lack of time and resources, making efficient choices is of utmost importance. A wrong decision can have huge impact on the company. Therefore Unifix Care aims to strike a balance between its existing "just do it" mentality and incorporating elements of prediction and proof to optimize decision-making processes.

Current position

Unifix Care, a startup with one product and one customer, aims to maximize its impact in line with its vision of making quality healthcare equipment accessible to all. Their goal is to help as many people as possible gain access to affordable medical equipment, contributing to the betterment of healthcare globally. This aspiration represents a significant movement from their current proposition to their vision that the company needs to make to create this positive change. How are they going to make this movement and where to start?

Future opportunities

Multiple business expansion opportunities arise for Unifix Care and this offers insights into the prospective evolution of the market. To navigate these opportunities effectively, Unifix Care needs to establish a clear understanding of decision-making processes for current and future endeavours. The research suggests that entrepreneurs should prioritize one opportunity and set aside others to avoid losing focus and hindering progress. Unifix Care not only requires a well-defined expansion approach but also guidance in prioritizing opportunities to maintain focus.



»» How to expand?¹

»» What to do first?²

»» How to make decisions?³

Design an expansion approach

Developing an expansion approach is crucial for Unifix Care's expansion. It is essential to establish a structured system that determines how the company will expand. A well-defined strategy shapes the organization's perception and utilization of its core value proposition, ensuring its uniqueness. Moreover, an effective strategy aligns the company's operations with its future vision and enables the identification and pursuit of new opportunities. Reymen, I Berend, H (2017)

To realize the vision of Unifix Care

This project primarily emphasizes the strategy level, while also addressing the company's vision. To make well-informed decisions that align with the vision, it is crucial to explore and comprehend all potential products and services. Currently, Unifix Care lacks awareness of the full range of offerings they can provide, withholding them to decide what to opportunity to take on first.

To guide the decision-making process

Unifix Care needs a strategic framework for effective decision-making, determining which products to invest in and when, given limited funds. It is crucial to maximize overall success by carefully managing the portfolio of product development projects over different time periods. (Kester et al., p. 2) To support this decision-making process, a tool or system should be developed for the Unifix Care team.

7

How to expand?

Expansion approach

The objective of this chapter is to identify a successful strategic approach that can be effectively applied to Unifix Care. Given the company's current lack of structure, this study aims to fill that gap by seeking a proven strategic approach.

The study delves into existing strategies from management literature, using the recommendations of current founders from the YESdelft! start-up incubator as a foundation for Unifix Care's expansion. It is important to note that some of the literature lacks scientific rigor in supporting their claims, and success is not guaranteed. However, these resources can still provide valuable guidance and structure, which Unifix Care currently lacks.

The approach utilized in this study involves a combination of quantitative research, interviews with start-ups, conducting a SWOT analysis with company founders, and an evaluation of relevant literature. These methodologies are employed to explore different strategies and provide insights into finding the most suitable approach for Unifix Care.

Approach

Determining the Optimal Expansion Strategy for Unifix Care

To determine the most suitable expansion strategy for Unifix Care, the following approach was employed:

1. Exploration of existing strategies through quantitative study at YESdelft! start-ups and desk research. Interviews conducted with 13 start-ups and 1 start-up incubator coach to explore the most popular strategy literature. Research question: What literature helped your company determine the strategy?
2. In order to determine the most suitable approach for Unifix Care, a SWOT analysis is carried out with the participation of the company founders. The key findings from the analysis are then distilled into strategy requirements. Subsequently, these strategy requirements can be tested against the most prominent management literature to identify the most suitable fit for Unifix Care's situation.
3. Evaluation of twelve frequently mentioned books among start-up founders, testing their compatibility with Unifix Care's strategic requirements using a decision matrix that matches Unifix Care's requirements enabling to determine the optimal strategic fit.

Visit Appendix J for elaboration of the studies.

Results

Most recommended books



Figure 32. Most recommended books by start-up founders of YESdelft!



Strategy requirements derived from the SWOT analysis of Unifix Care

1. Need to facilitate agile learning and adaptation to varying contexts.
2. Need to promote experimentation, utilizing high-quality knowledge and resources, to achieve impactful outcomes.
3. The strategy should prioritize impact and collaboration with aligned organizations to create a better world.
4. The strategy needs to aim to bypass political influence and foster close collaboration with customers to bridge cultural gaps.



Best match for Unifix Care

The book that aligns best with these selected strategies is "Lean Startup." It is worth noting that the inclusion of this book is based on its comprehensive analysis of successful start-up working methods, which serves as an exemplary reference for Unifix Care.



Figure 33. Strategy requirements derived from the SWOT analysis of Unifix Care

Figure 34. The Lean Start-up method book cover

Conclusion

How to expand?

In conclusion, the application of the Lean startup method is presented as Unifix Care's approach to expansion. For a detailed explanation, please refer to Appendix XXX.

Unifix Care's operational framework comprises two primary systems: the core operation and the expansion system. The core operation represents the existing value proposition of the company, generating revenue through the delivery of Surgical instrument sets to Sierra Leone. The core operation serves as the primary source of income for Unifix Care.

In contrast, the expansion system incorporates the principles of the lean startup methodology. It operates as a self-contained system where new opportunities undergo validation and testing through the build-measure-learn loop to transform into potential propositions. When opportunities exhibit high potential, they are assimilated into the expansion system, and the company invests its time and resources to validate or invalidate these propositions. If the potential propositions align with predetermined criteria, they are implemented into the core operation. Alternatively, if they fail to meet the requirements, they are either discarded or stored in the opportunity portfolio for future exploration.

Determining the potential of opportunities is a crucial aspect. Validating an opportunity within the build-measure-learn loop requires significant time and resources. Therefore, having an additional system that can efficiently assess the worthiness of investing time and resources in an opportunity would be ideal. Chapter 9 will offer a solution to address this need.

While we now have a proven approach for startups applied to Unifix Care, it is important to note that an approach alone does not constitute a strategy. A strategy is essential to provide direction on prioritizing opportunities. Hence, the upcoming chapter will introduce a method to develop a strategy specifically for Unifix Care. This method will assist in determining the initial course of action and prioritize opportunities accordingly.

»» The expansion approach

An application of the the Lean start-up method

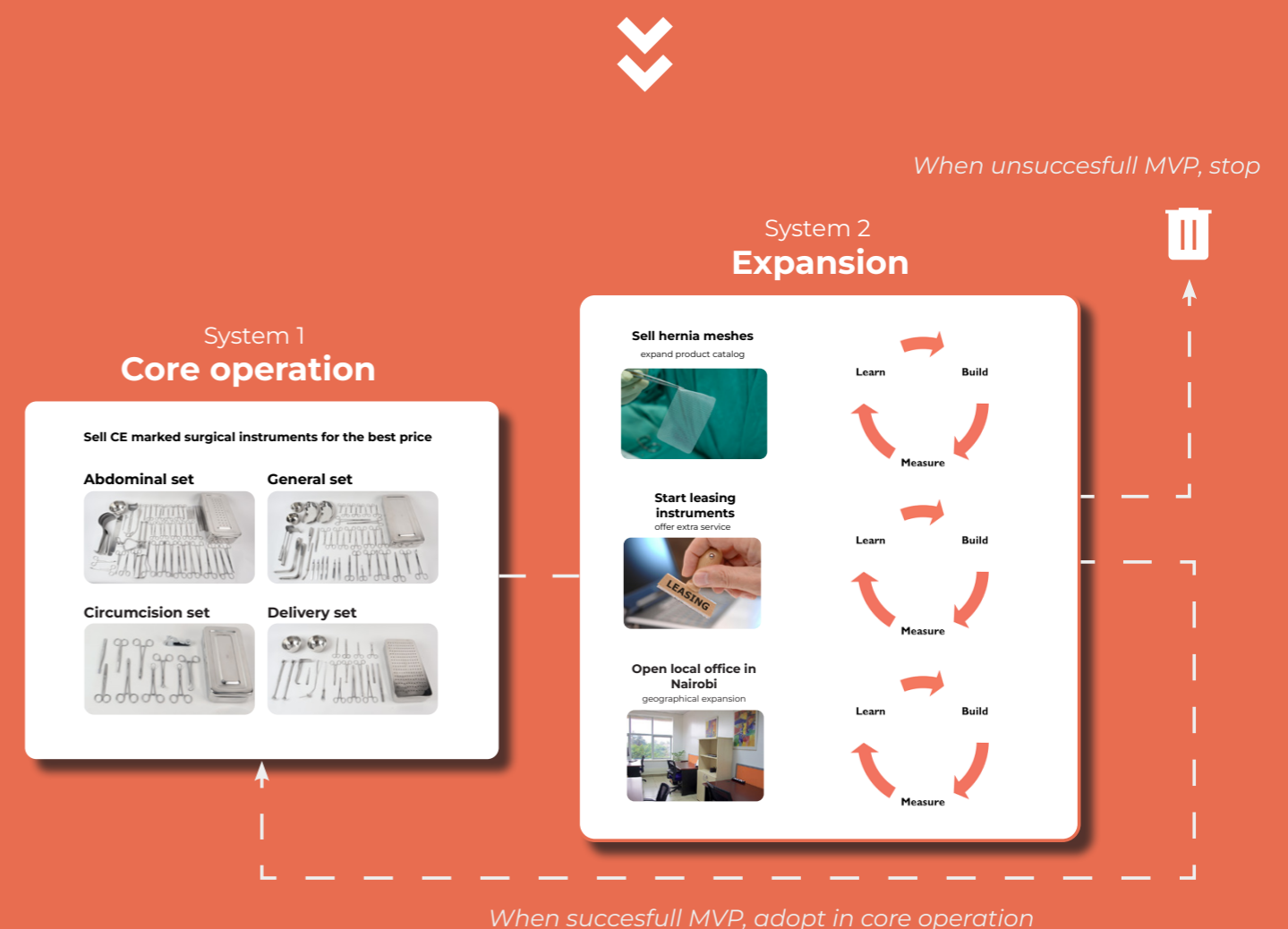


Figure 35. The Lean Start-up method applied on Unifix Care

8

What to do first?

Strategy

A strategy is essential for guiding the initial steps and preventing aimless actions. Without a strategy, Unifix Care would be navigating blindly. By formulating a strategy, Unifix Care can achieve internal alignment and remain focused on their vision and goals within the dynamic and rapidly changing startup environment. The objective of this chapter is to break down Unifix Care's vision in order to gain a deeper understanding of the expansion possibilities. Once a clear understanding is established, the framework presented in this chapter enables Unifix Care to connect the dots and determine the prioritized actions.

Approach

To investigate the potential avenues for Unifix Care's expansion, three categories were defined through brainstorming sessions with the founder team, followed by the translation of opportunities into parameters. These parameters (Figure 36) provide internal understanding on possible paths of expansion. Based on these categories opportunity landscapes were created to visually represent potential expansion opportunities within each expansion category. Different approaches were employed for the three specific categories:

Visit the opportunity landscapes in Appendix M

Product Catalog: Collaborative development of a catalog with a medical student from VU Amsterdam to explore medical equipment possibilities. The catalog uses blue and orange blocks to represent equipment functions and sub-categories, respectively, while white boxes depict specific products relevant to Unifix Care.

Target Area: Creation of opportunity landscapes through desk research, focusing on Sierra Leone and Kenya. These landscapes map out the specific contexts of healthcare environments, including organizations, districts, counties, and associations. Blue blocks indicate the area scope, orange blocks represent categories, and white boxes highlight targeted hospitals and counties. International expansion options are limited to three.

Value Chain: Utilization of Michael E. Porter's Value Chain model to define elements and their interrelationships in a chronological axis. The model demonstrates the transition from a product-oriented company to a full-service company, with increasing service orientation represented from left to right. Blue and white blocks derived from Porter's model represent elements and sub-elements within the value chain, enabling expansion through backward or forward integration or horizontal integration within existing links.

The mapping of expansion possibilities within the identified categories provides Unifix Care with a comprehensive overview of potential steps towards their vision. This understanding of the complexity inherent in their startup ambition can guide their prioritization and sequencing of actions. See Figure 39. However, the decision of when to pursue expansion into a new opportunity lies with the startup itself, as the opportunity landscapes do not provide specific recommendations. The subsequent paragraph explores the transformation of opportunity landscapes into a framework for defining the strategy.

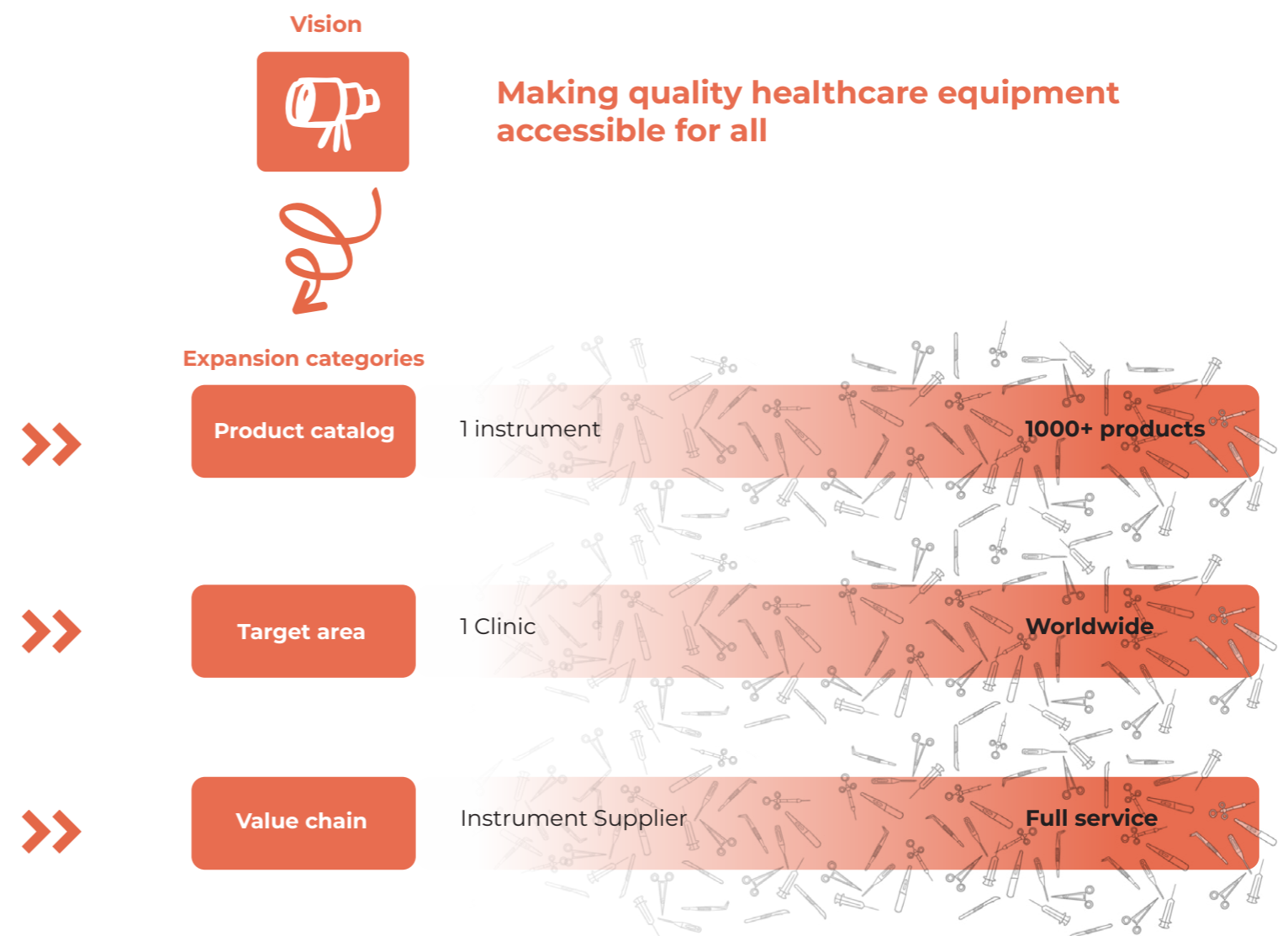


Figure 36. The three expansion categories depicted as parameters.

Strategic framework

From opportunistic to strategic - based on interview with Dr. Kester.

Having developed opportunity landscapes as valuable tools for Unifix Care's expansion journey towards their goal of making quality healthcare equipment accessible to all, it is crucial to note that these landscapes alone do not constitute a strategy.. A method is necessary to determine the prioritization and sequencing of actions. In the following step, we will outline the necessary measures for Unifix Care to translate the opportunity landscapes into a strategic framework, enabling them to decide what to prioritize, what to address later, and what to avoid. To accomplish this, we will employ a method developed by Kester (2023), a Ph.D. expert in strategic portfolio management that allows for prioritizing opportunities. While this method is not yet published, it has been successfully applied numerous times to establish effective strategies for companies.

“A goal is not a strategy, a goal is a result of your strategy” - Dr. Kester (2023)

Understanding the desired expansion direction leads to different decision-making. It is important to recognize that the various categories of expansion are interconnected and should be developed simultaneously since they are interdependent. For instance, expanding the product catalog, which translates to selling more products, leads to the ability to serve a larger client base, a target area expansion. These two categories of expansion go hand in hand, as one cannot expand without the other. Kester (2023) describes this as a dynamic movement. Unifix Care's vision of making quality healthcare equipment accessible for all aims to achieve maximum impact. To identify the necessary steps to reach this vision, several considerations must be made including an understanding of this dynamic movement.

Will Unifix Care focus on thoroughly developing a single product in multiple areas, or will they sell multiple products and dominate a particular area? Identifying the most feasible opportunity for Unifix Care to pursue at the present moment is key, and the easiest option should be addressed first. Kester (2023) proposes to use a strategic opportunity framework that will assist Unifix Care in determining their initial steps. Furthermore, it is essential for the strategy to always align with the desires of the customers.

Effectiveness in decision-making is achieved by:

- Gaining a comprehensive overview of all activities
- Establishing a clear focus
- Remaining agile to exploit emerging opportunities.

Portfolio success is determined by:

- Alignment with the strategy
- Balanced execution without overextending capabilities
- Delivering maximum impact in terms of performance.

Figure 37. Requirements for strategy derived from interview with Dr. Kester (2023)

To create a framework that helps Unifix Care prioritize their actions, we will focus on two key requirements. As stated by Kester (2023), the successful development of a strategy is influenced by more than 50% by:

1. **Having a comprehensive overview of all activities**
2. **Establishing a clear focus**

To achieve this, we need to take the steps described on the next page.

Manual

Step 1: Connect the opportunities

Incorporating Sequentiality

Recognizing the interconnected nature of opportunities:

- Complementary: Identifying opportunities that complement each other.
- Dependant: Identifying opportunities that are interdependent and require simultaneous development.
- Stand alone: Identifying stand-alone opportunities that can be pursued independently.

Consider the Timeframe:

Prioritizing the most important opportunities essential for the current successful operation of the business:

- Fundament: Selecting opportunities that represent future ambitions.
- Transition: Identifying opportunities that bridge the gap between fundamental opportunities and long-term ambitions.
- Ambition: Mark the opportunities that are big ambitions that are not possible to achieve on the short term.

Customer needs

Anticipating and addressing both current and future customer needs:

- Today: Present-day focus: Providing the most frequently used medical equipment at the best possible price.
- Tomorrow: Future focus: Ensuring reliable quality.
- Future: Future-oriented focus: Facilitating easy acquisition of new equipment (e.g., leasing options).

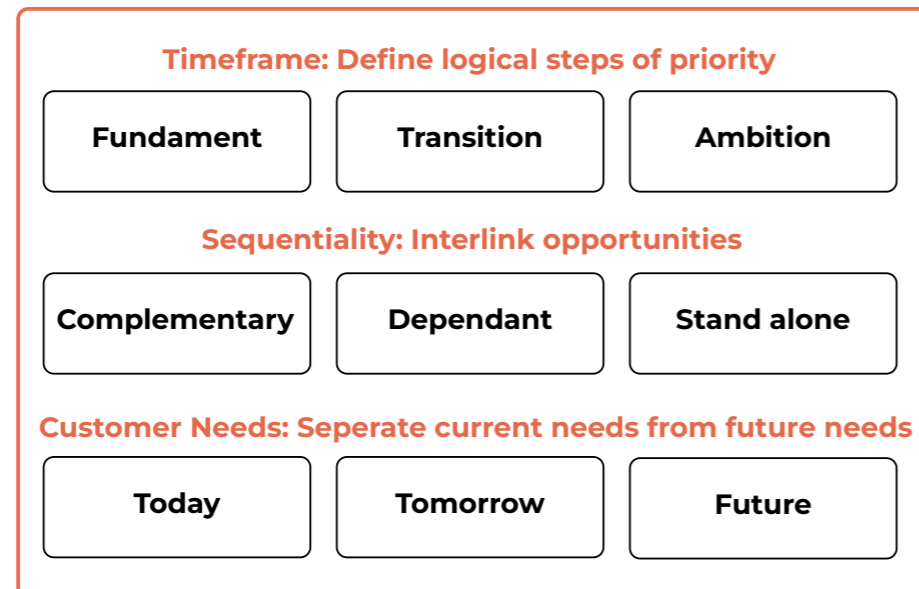


Figure 38. Illustrates a schematic overview of dividing opportunities.

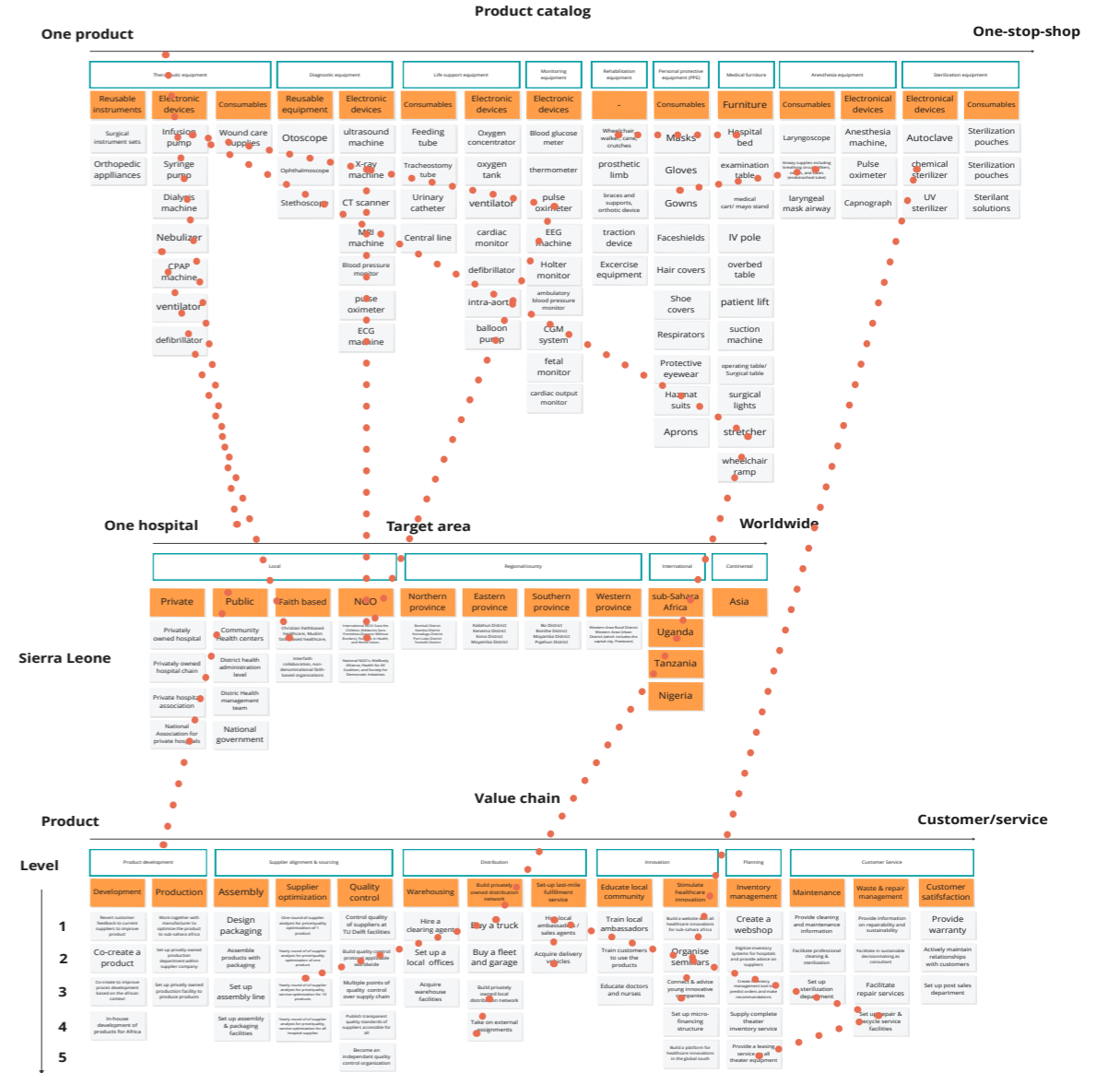


Figure 39. Opportunity landscapes are interconnected.

Step 2: Defining the basis

Assign all the opportunities from the opportunity landscapes to the sections:

- Defining the basis (what to do first)
- Defining organizational development
- Defining future-oriented product services.

Cluster Opportunities

Grouping opportunities based on time horizons (fundamental, transitional, and ambitious) and customer needs

Identifying Strategic Themes

Clusters of opportunities addressing the same customer needs.

For example: How can we supply medical equipment that is most frequently used at the best possible price?

Select a top 3

Select the top three opportunities with clear priorities that represent win-win situations in the 'Build basis' section. This will determine what opportunities to pursue first.

Figure 40. Overview of the strategic opportunity framework. It shows how to apply the opportunity landscapes into the framework to establish the basis for a strategy and decide what to do first.

Opportunity landscapes

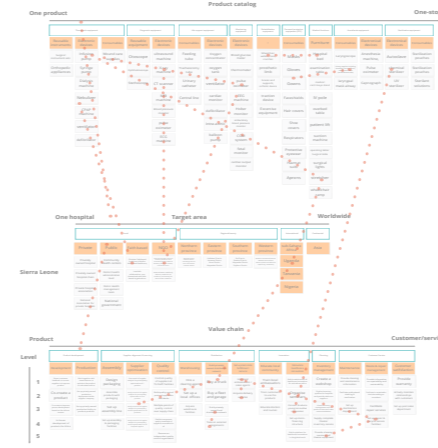
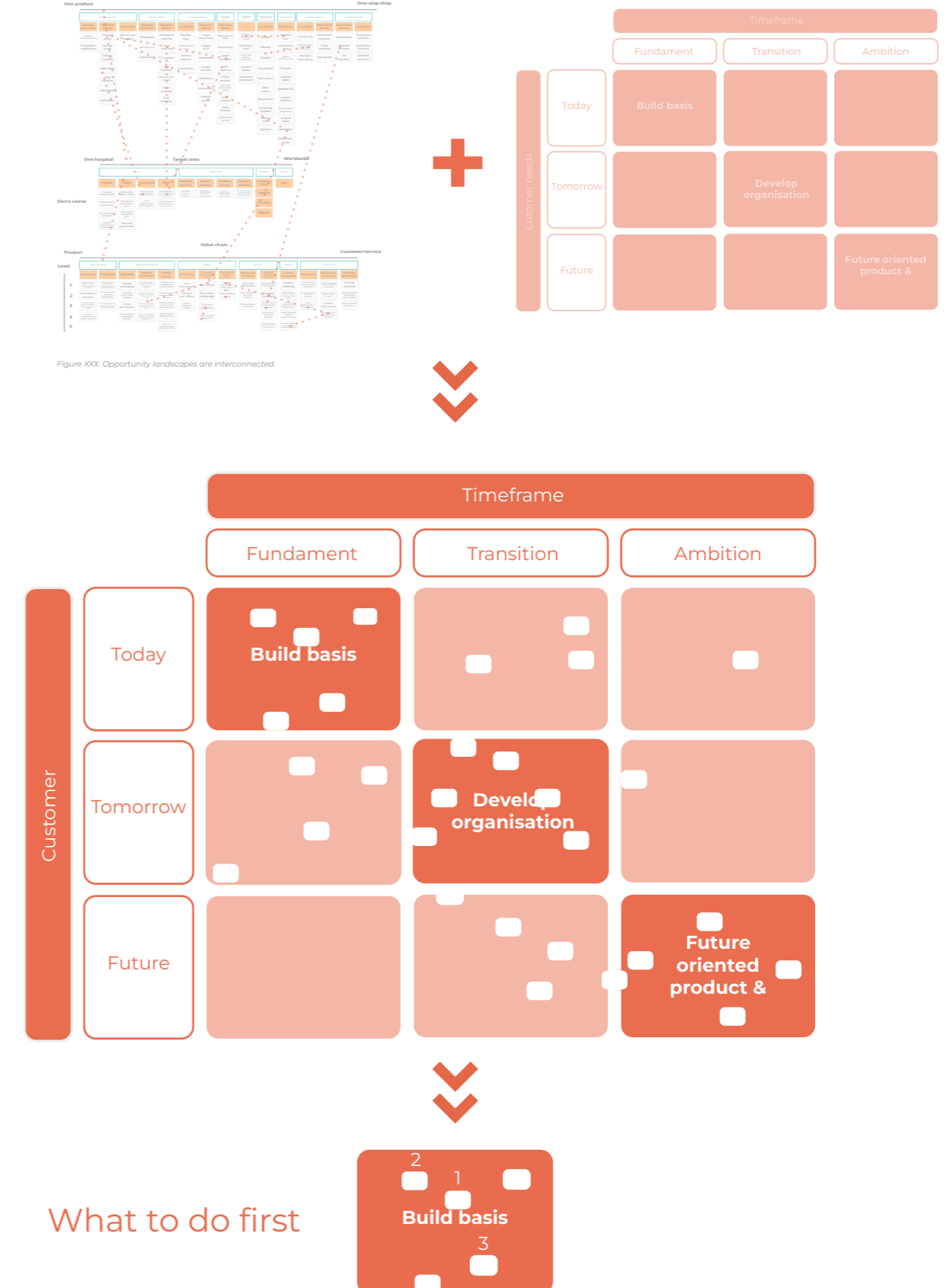


Figure XXX. Opportunity landscapes are interconnected.

Strategic opportunity framework



The strategy

AN APPLICATION OF THE STRATEGIC OPPORTUNITY FRAMEWORK
BY DR. KESTER

Conclusion

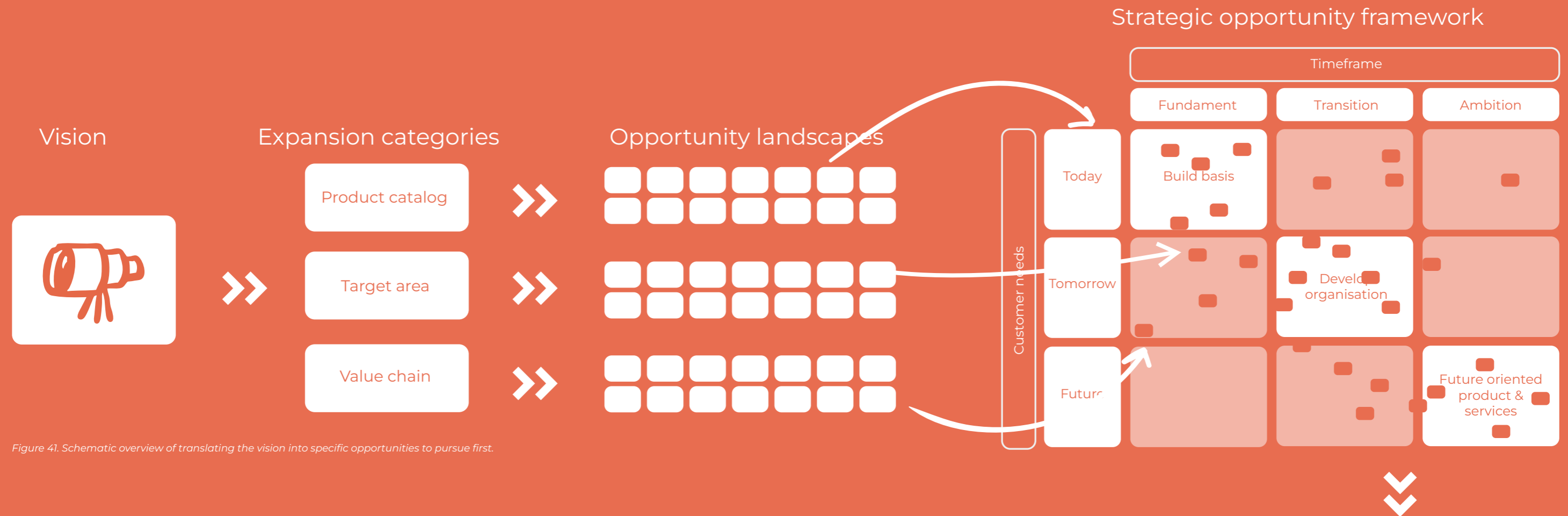


Figure 41. Schematic overview of translating the vision into specific opportunities to pursue first.

What to do first?

An initial design of the strategic framework is designed for Unifix Care to establish a strategy. This framework enables the creation of a clear prioritization of expansion opportunities that can be pursued by the company.

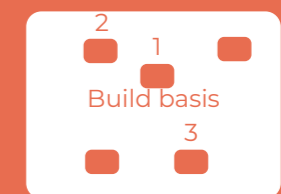
Efficient decision-making is crucial for start-ups, particularly for Unifix Care, given their limited time and resources. To determine the appropriate initial steps, it is essential

to understand the desired expansion. The expansion possibilities for Unifix Care were categorized into three main themes: product catalog expansion, target area expansion, and value chain expansion.

Subsequently, these expansion possibilities were transformed into opportunity landscapes, providing a comprehensive overview of potential concrete steps towards Unifix Care's vision. To establish prioritization, these opportunity landscapes need to be

translated into a strategic opportunity framework. This framework empowers Unifix Care to prioritize actions, determine task sequencing, and identify which opportunities to pursue or avoid. However, it is important to note that this framework has not yet been tested, and further user testing is necessary to validate its usefulness.

In the following sections, we will introduce a model that guides effective decision-making.



What to do first

9

How to make decisions?

Decision Support Model

Having identified the potential avenues for expansion, the question now arises: how can Unifix Care make informed decisions to realize this expansion? This chapter delves into the development of a Decision Support Model (DSM) that addresses the need for evidence-based inputs, project-based workstyles, and a user-friendly framework to enhance decision-making processes at Unifix Care. Firstly, the manual for utilizing the Decision Support Matrix (DSM) is introduced. This is followed by a visual depiction of the approach and methods employed to construct this model. In the results section, the integration of the DSM within the expansion approach developed in Chapter 7 is discussed. The DSM serves as an ideal tool for Unifix Care to make effective decisions, allowing the team to efficiently assess and pursue opportunities by utilizing the model. For a comprehensive view of the DSM, please refer to the accompanying document titled "Decision Support Model" provided with this thesis.

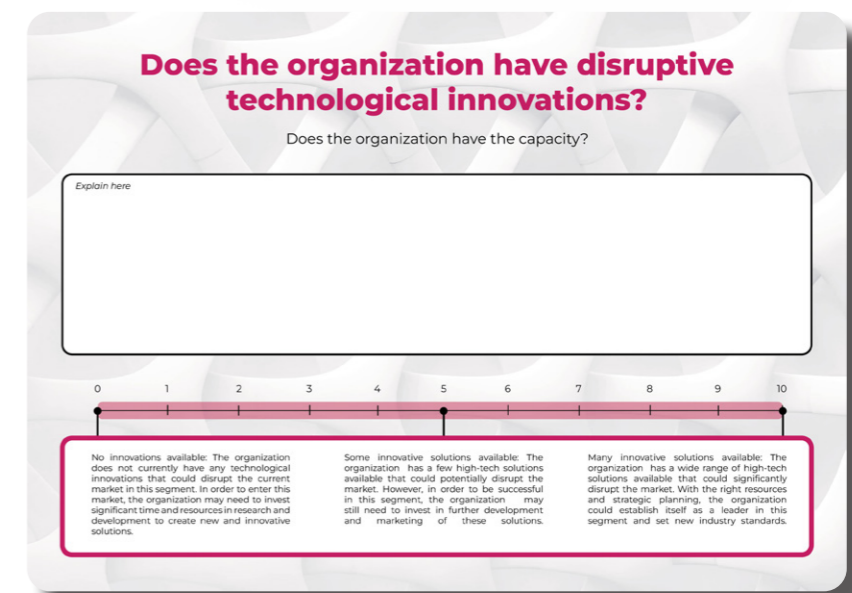
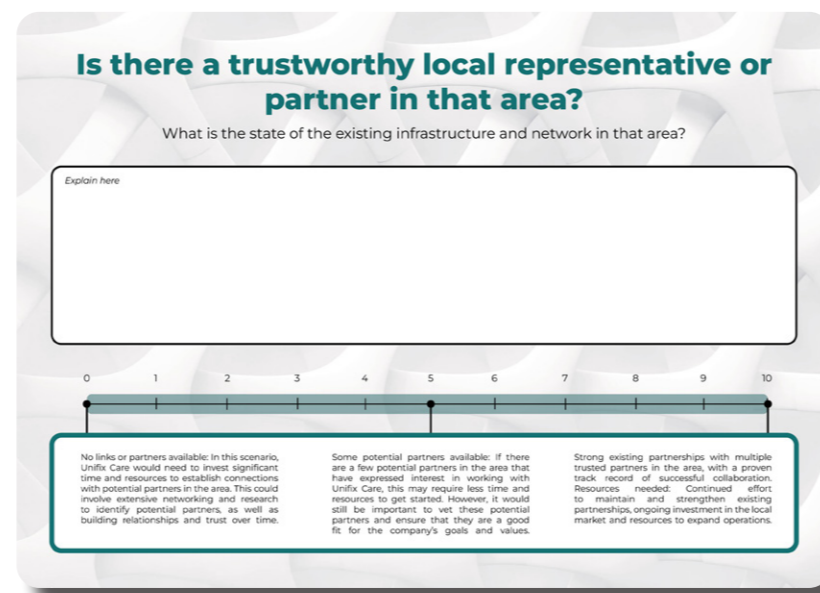
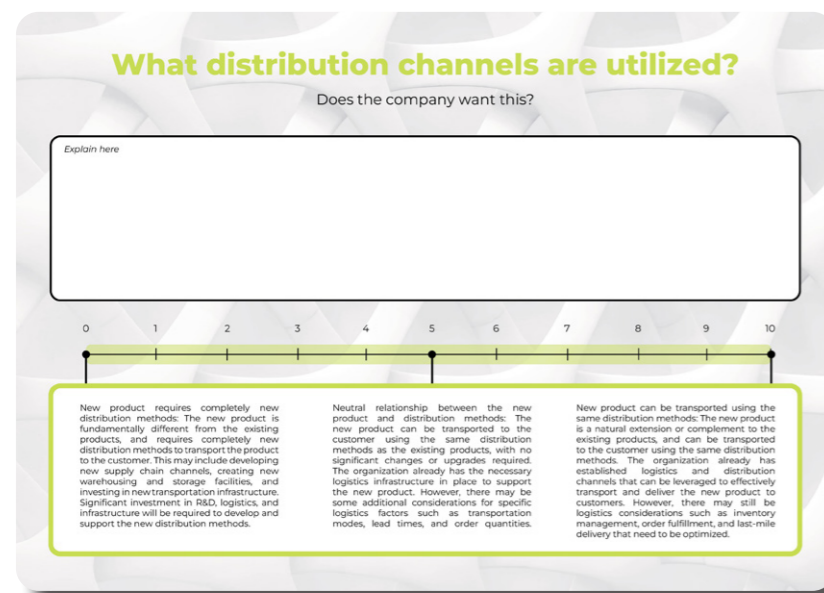
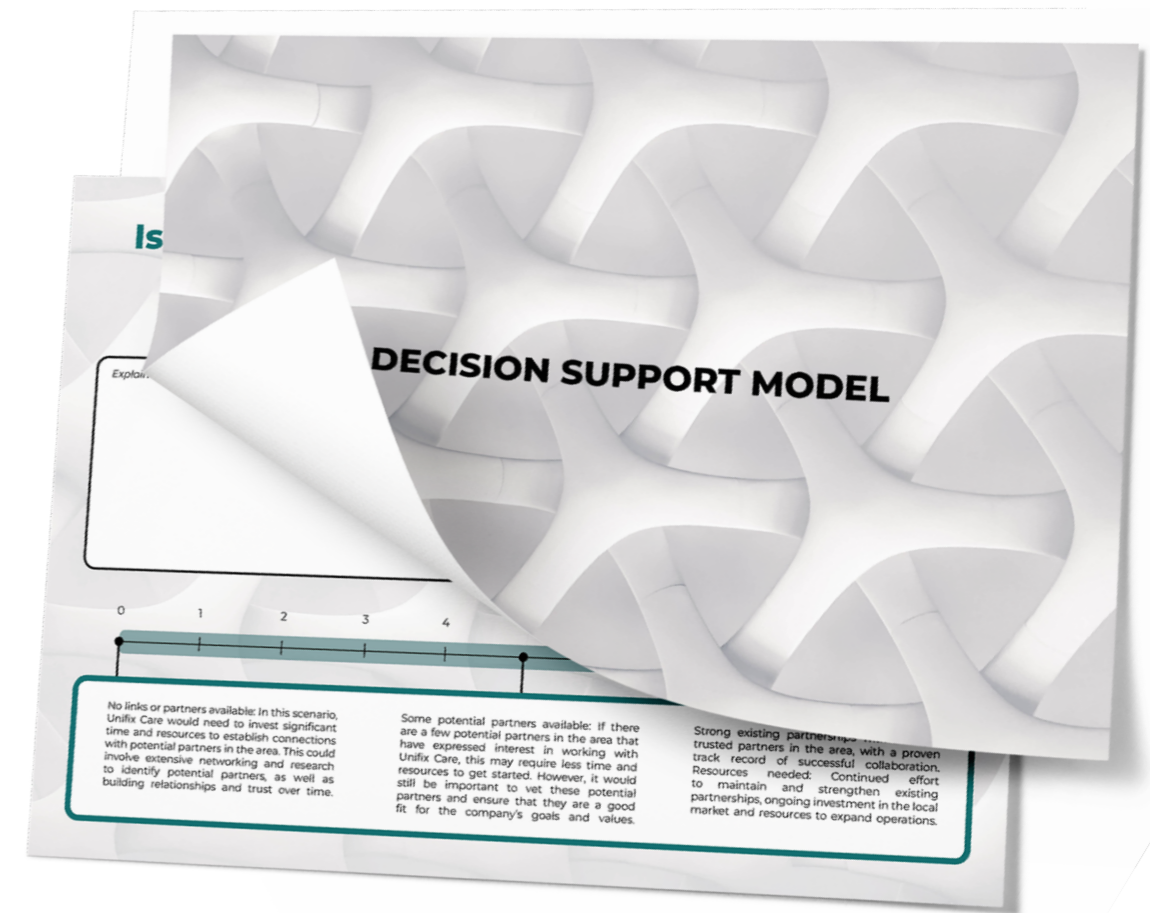


Figure 42. Showcases examples of a page from each category within the Decision Support Model (DSM).

Manual to use the DSM

1. Choose

Identify the expansion category to which the opportunity belongs.

Product catalog expansion

Target area expansion

Value chain expansion

2. Understand

Evaluate the opportunity by answering the questions associated with the expansion category. In the Decision Support Model (DSM), each page contains a specific question that needs to be scored. All the questions for each category are provided below. Assign a score on a scale of 1 to 10, considering how positively the opportunity addresses each question. Keep in mind that a level of uncertainty is accounted for, as complete knowledge may not be available during this stage of decision-making.

1. Is the expansion aligned with the strategy?
2. Can the organization generate sustainable revenue with this product?
3. Can the organization generate the desired impact with this product?
4. Do we have a partner capable of providing this product?
5. What distribution channels are utilized?
6. How does the product's positioning compare to the current catalog?
7. How does the product integrate with current technology and systems?
8. How easy is it to acquire knowledge about the product?
9. Is the target group similar?
10. Is the organization in compliance with regulations?

1. Is the area expansion aligned with the strategy?
2. Can the organization generate sustainable revenue in this area?
3. Can the organization generate the desired impact with this product?
4. Is there a trustworthy local representative or partner in that area?
5. What is the current status quo the area?
6. What are the potential opportunities in this area?
7. Is it feasible to distribute in that area?

1. Is the expansion aligned with the strategy?
2. Can the organization generate sustainable revenue with this expansion?
3. Can the organization generate the desired impact with this expansion?
4. How does the integration with current products, technology, and systems take place?
5. Does the organization have disruptive technological innovations?
6. Is there a demand for improvement that could lead to potential opportunities?
7. Does the organization possess in-house expertise?
8. Is this market similar to the existing market you are operating in?

Figure 43. An overview of all the questions that the DSM contains for an overall analysis of the opportunity

3. Decide

Visualize the data by plotting it into a radar chart, which provides a comprehensive overview of how the opportunity scores on all the questions. Connect the plotted points for each data point to create a line or shape within the chart. To interpret the chart effectively, analyze the pattern differences between the variables. This analysis allows you to identify areas that require focus and determine if the overall opportunity justifies allocating time and resources.

It is important to note that the model itself does not recommend whether an opportunity is strong enough or has sufficient potential. The determination of an opportunity's strength lies with the users of the model. The model serves as a guide in the decision-making process, with users adding their own value scale.

Assess the strengths and weaknesses of each data point within the chart. Pay attention to areas where a data point performs well or falls short in relation to the other variables. This information can assist in making a decision regarding whether to pursue the opportunity or not.

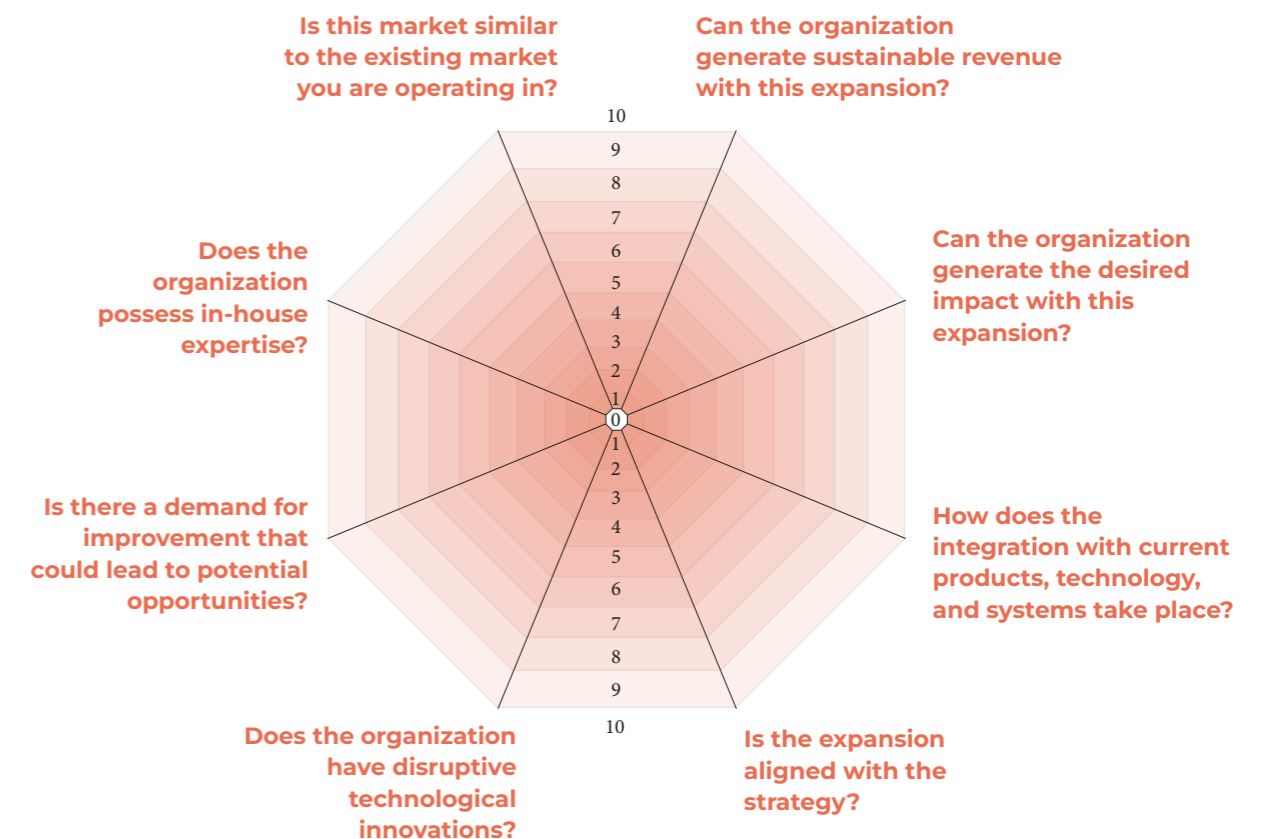


Figure 44. showcases an example of the Radar chart representing the value chain category.

Approach

For a more detailed explanation, visit Appendix XXX

1. Define Foundation & Focus Visit Appendix M for a more elaborate explanation

Desk research + Analysis Sommalife & Unifix Care

Design thinking approach

- Guiding light is the user first
- Purpose/goals are to optimize the user experience
- Evidence is provided through qualitative research (stories)
- Workstyle is project-based**
- Mode of thinking is deductive, inductive, abductive
- Failure is to be welcomed as learning
- Constraints are to improve tractability

Liedtka, J., & Ogilvie, T. (2011). Designing for growth: A design thinking tool kit for managers. Columbia Business School Pub., Columbia University Press.

Effective decision-making in general

- Decision-making processes have produced a complete understanding of all of the projects in the portfolio, and that the projects in the portfolio are aligned with the firm's strategy.**
- They can make decisions quickly when needed. Should keep the firm's efforts focused on only those short-term actions
- Decision making is done efficiently**
- The decision making process is user-friendly** (Cooper et al., 1999)
- Be realistic in capturing key facets to make decisions**

Kester, L., Griffin, A., Hultink, E. J., & Lauche, K. Toward a General Model of Portfolio Decision-Making.

Balance of inputs

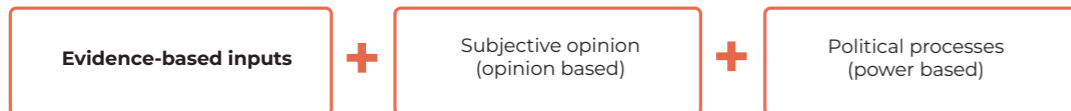


Figure 45. Defining effective decision-making and the focus points for Unifix Care

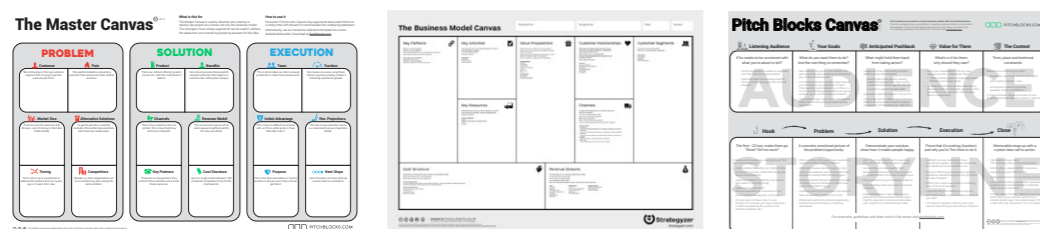
(Kester, L., Griffin, A., Hultink, E. J., & Lauche, K.).

2. Define strategic questionnaire

Selecting most important elements for decision-making

Visit Appendix N for a more elaborate explanation

Strategy / business canvas



Capturing key facets (factors) to make decisions

Product catalog

Target area

Value chain

Figure 46. Definition of the strategic questionnaire, all the questions that include the DSM

3. Build the rubric Visit Appendix O for a more elaborate explanation

Brainwriting with founders Unifix Care themed: Consequences of decisions

Is there a trustworthy local representative or partner in that area?

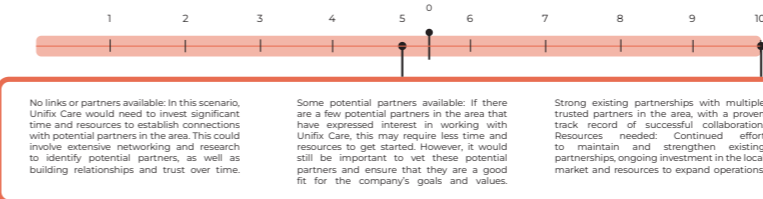
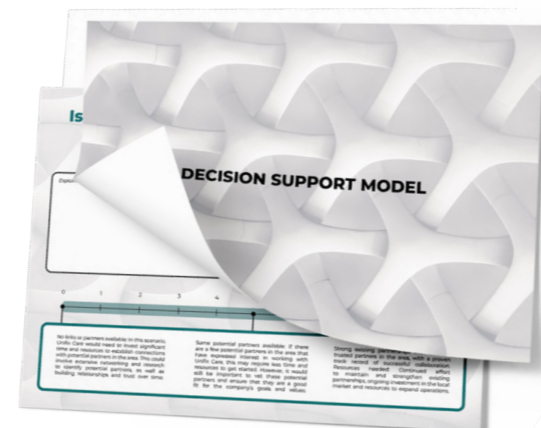


Figure 47. Definition of the rubric and approach how it is designed



4. Identifying flaws

User testing with start-up in different segments

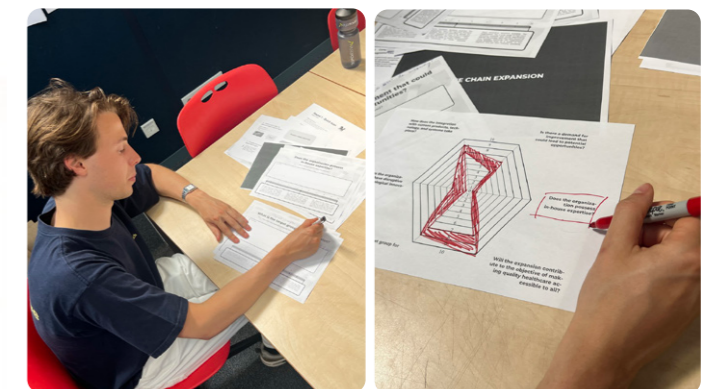
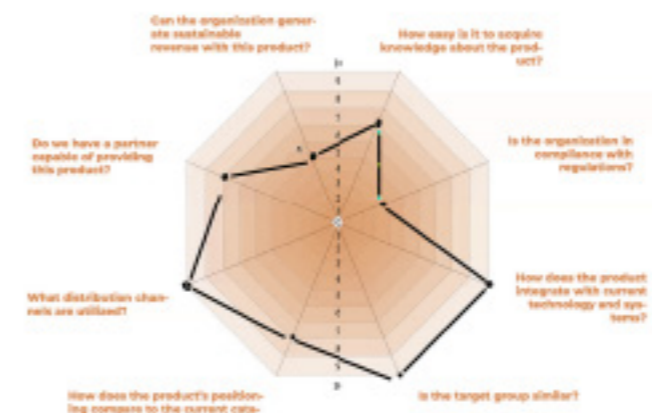


Figure 48. Iteration of the DSM with user testing

Results

The Decision Support Model (DSM) serves as a tool for Unifix Care, enhancing the effectiveness of its decision-making process. By utilizing the DSM, the company can swiftly evaluate whether specific opportunities warrant the allocation of time and resources. The structured framework offered by the DSM simplifies complex decisions, enabling more informed choices from a range of options. Furthermore, the DSM facilitates consensus-building among team members with divergent perspectives, fostering collective decision-making that aligns with the company's strategic objectives. Additionally, the DSM serves as a repository of past decisions, facilitating knowledge sharing and preventing redundant assessments of the same opportunities. Overall, the DSM empowers Unifix Care to optimize its decision-making, ensuring efficient resource allocation and enabling informed choices.

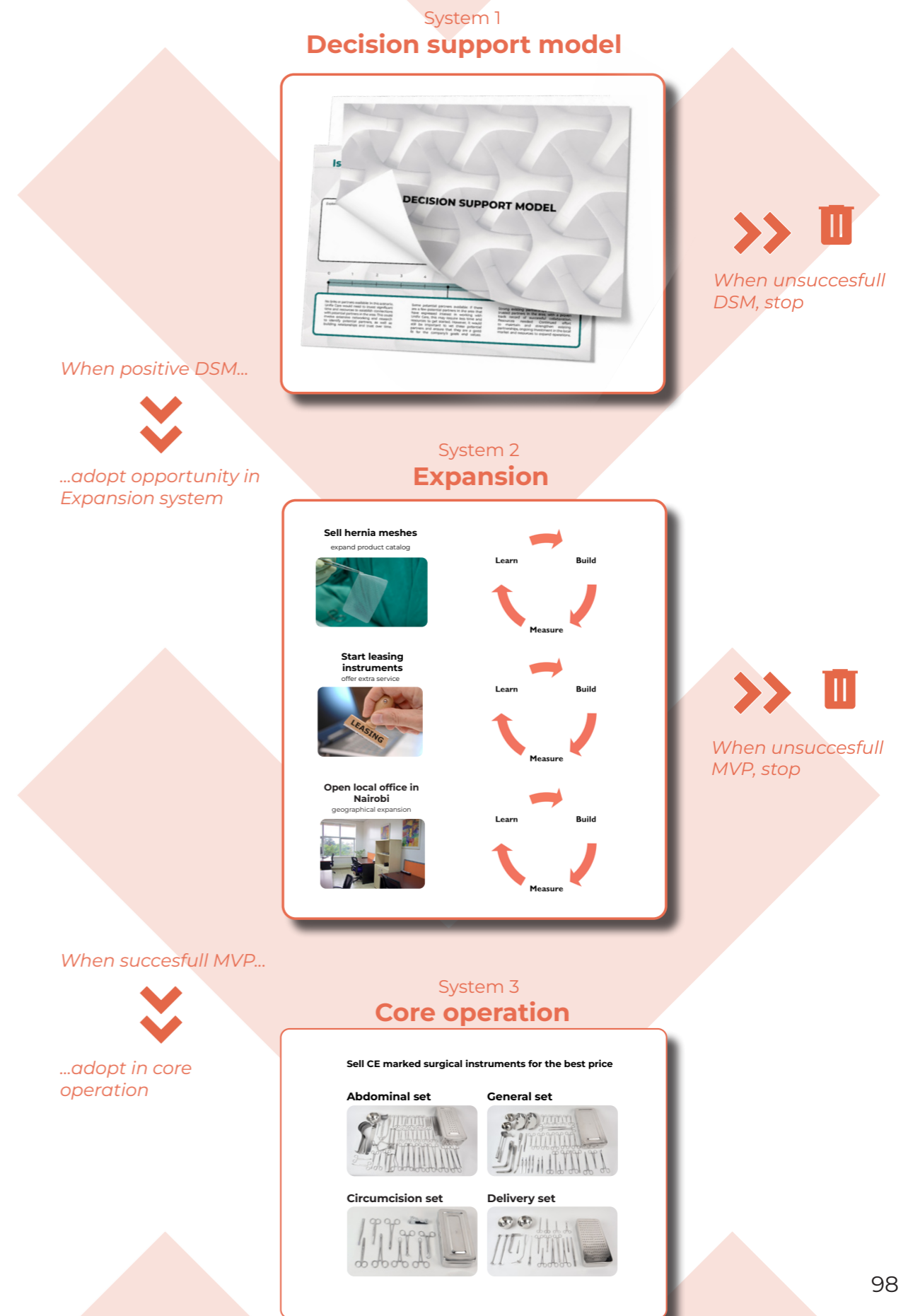


Figure 49. Application of the DSM in the expansion approach of Unifix Care.

WHY

The Decision Support Model (DSM) serves several essential purposes within Unifix Care. Firstly, it guides the decision-making process regarding whether to invest in a particular opportunity. By providing a structured framework, the DSM simplifies complex decisions and ensures that key facets within the expansion categories are taken into account. This, in turn, increases the efficiency and effectiveness of decision-making.

Furthermore, the DSM fosters consensus among participants with differing values and opinions. By utilizing the model, the team can align their perspectives and make collective decisions that align with the company's strategy. Additionally, the DSM creates a database of choices, enabling easy retrieval of past opportunities and the reasons behind declining them. This promotes knowledge sharing within the team, preventing redundant assessments of the same opportunity and facilitating informed decision-making.

WHEN

The decision support model (DSM) is used at different stages of the decision-making process within Unifix Care. The DSM is employed to assess the initial potential of an opportunity. This quickscan is based on existing knowledge, despite the presence of uncertainties. The outcome helps identify the most relevant and risky factors that require further investigation when deciding to spend time and resources.

If the assessment yields a positive outcome and the team determines to allocate additional time and resources to the opportunity, the Decision Support Matrix (DSM) can be utilized once again. At this stage, the team can opt to conduct in-depth research, reducing uncertainty and obtaining more specific answers to key questions. It is feasible to revisit the DSM to observe if different results emerge once uncertainties have been addressed and accounted for.

If the assessment continues to yield a positive outcome, the team can proceed with developing a Minimum Viable Product (MVP) following the principles of the Lean Startup method. For a more comprehensive explanation, please refer to Appendix XXX. This signifies that the opportunity has been integrated into the Build-Measure-Learn loop, as discussed in Chapter 1.3.

WHO

The DSM is designed to be utilized by various individuals within the company, particularly the founders in the case of Unifix Care. However, it is not limited to them alone. Other employees can also benefit from using the DSM, as it enables the whole team to be involved in the decision-making process. By incorporating multiple perspectives, the DSM promotes a comprehensive and inclusive approach to decision-making.

WHERE

The DSM can be used both in the office with the printed version and online on platforms such as Miro. The choice of medium depends on the preferred mode of collaboration and accessibility for the team members. Whether in-person or virtual, the DSM serves as a reliable tool for decision-making, ensuring consistency and providing a shared reference point for the team.

HOW

Round 1: Respond to the model's questions by making estimations based on current knowledge, acknowledging the high uncertainty factor and associated risks. Identify the factors that are both relevant and risky, which will be the main focus of the subsequent market deepdive in Round 2.

Round 2: Following the market deepdive, revisit the model's questions and provide answers based on the most relevant and risky factors uncovered. If the outcomes of this round are positive, the team proceeds to Round 3, where they will invest on building a Minimum Viable Product (MVP).

See Figure 49 how the DSM is applied in the expansion approach of Unifix Care.

Decision support model

Effective decision-making

Conclusion

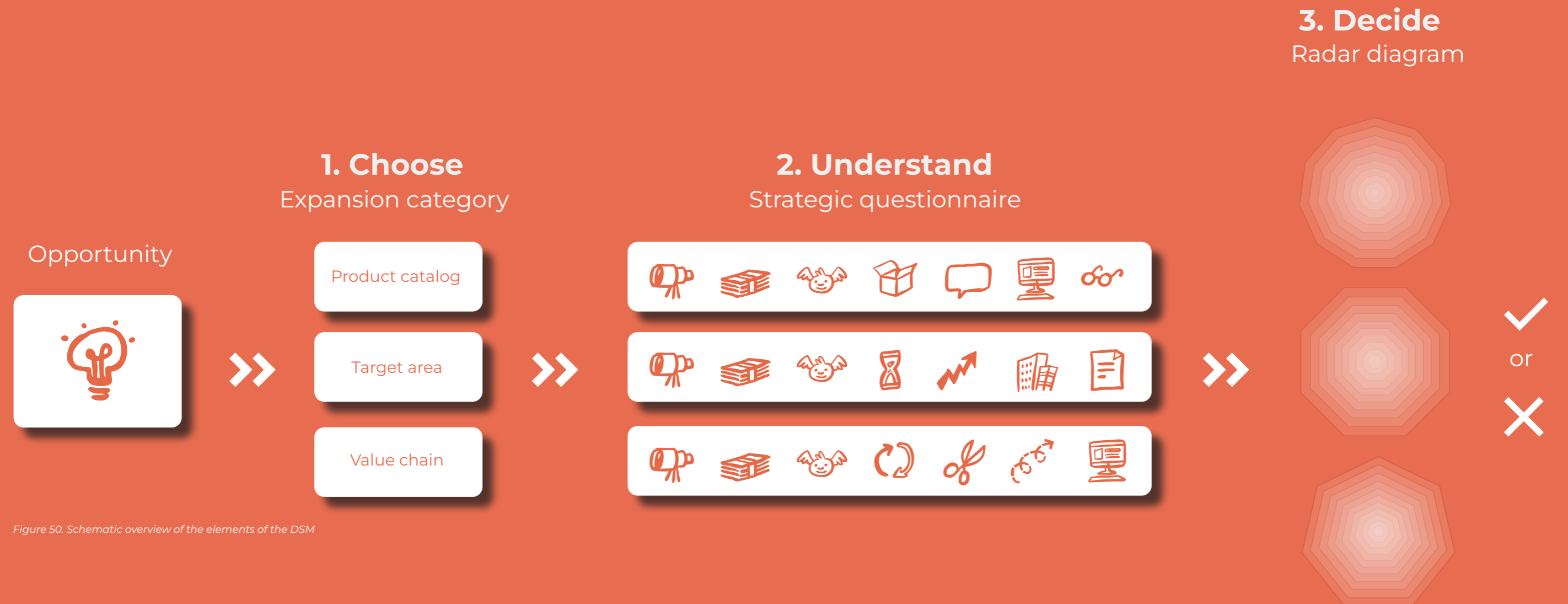


Figure 50. Schematic overview of the elements of the DSM

How to make decisions?

A model is developed that aids start-ups in effective decision-making. This comprehensive model considers all crucial factors necessary for making decisions effectively. It incorporates the strategy, which can be determined using the method outlined in chapter 8.

The Decision Support Model (DSM) serves as a valuable tool for Unifix Care, providing guidance in their decision-making processes. By utilizing this model, the company can navigate the complexities of expansion and make well-informed decisions. The DSM allows for strategic resource allocation, fosters collaboration among

team members with different values and interest, and enhances their understanding of available opportunities. Implementing this model brings Unifix Care closer to avoiding incorrect decisions and the wasteful expenditure of time and resources.

The interest from other SMEs in adopting this model demonstrates its potential to assist companies in maintaining focus during the decision-making process. Therefore, it can benefit not only Unifix Care but also other organizations facing similar challenges.

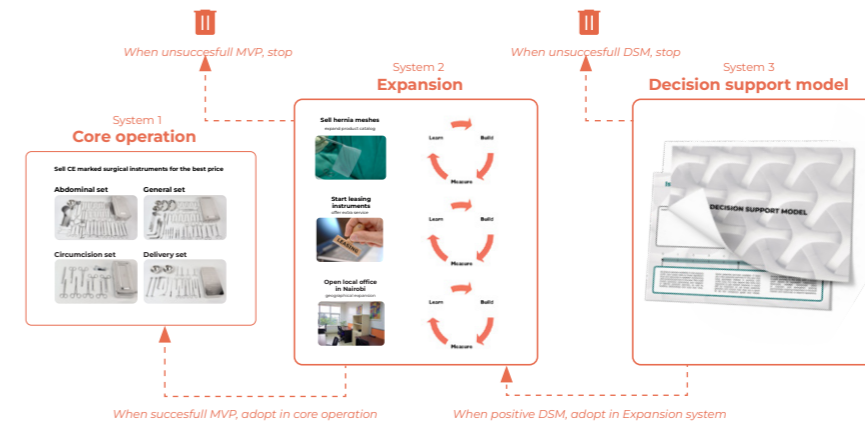
CONCLUDING

Unifix Care

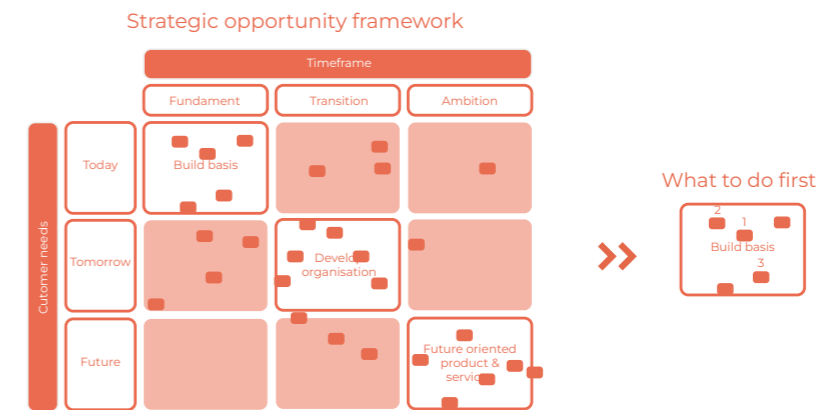
ANSWER THE DESIGN BRIEF



Develop an expansion approach ¹



that enables Unifix Care to actualize its vision ²



by guiding their decision-making process ³

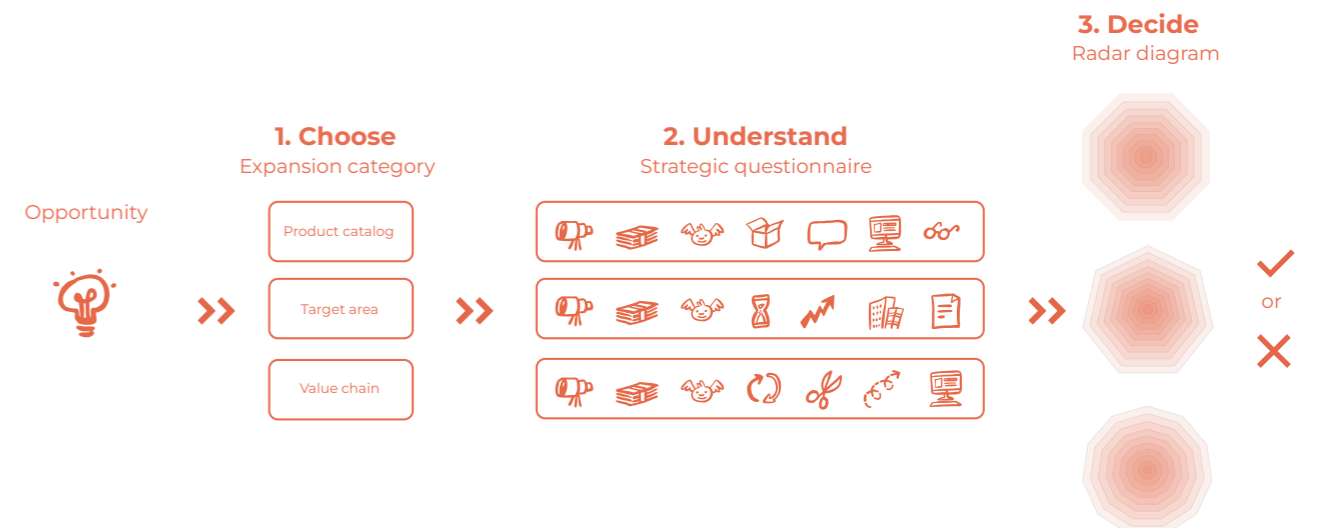


Figure 51. Schematic overview of the expansion approach, the strategy to realize the vision and the DSM.

Conclusion

In conclusion, Unifix Care recognizes the need for a strategic approach and efficient decision-making to drive its expansion. The company aims to strike a balance between its existing "just do it" mentality and incorporating elements of prediction and proof. The research highlights the importance of establishing a clear strategy, prioritizing opportunities, and avoiding ineffective use of time and resources.

To address these challenges, a strategic framework has been developed to guide Unifix Care in determining its initial steps and prioritizing expansion opportunities. The framework categorizes expansion possibilities into themes and transforms them into opportunity landscapes, providing a comprehensive overview of potential steps towards the company's vision. User testing is required to validate the usefulness of this framework.

Furthermore, a model called the Decision Support Model (DSM) has been introduced to aid in effective decision-making. This model encompasses crucial factors necessary for informed decision-making and resource allocation. By utilizing the DSM, Unifix Care can navigate the complexities of expansion and avoid incorrect decisions.

Overall, this research provides Unifix Care with a foundation for developing an expansion strategy and making efficient decisions. The findings and frameworks presented in this thesis can not only benefit Unifix Care but also other small and medium-sized enterprises facing similar challenges.

Recommendations

Part 1

Collaborative pursuit of the proposition across multiple organizations is advised

Unifix Care decided to abandon their initial proposition of repositioning excess SLSI from Dutch hospitals. This decision stemmed from the realization that the proposition did not align with the needs of a social enterprise. However, the problem of excess SLSI remains, and the demand for these instruments in Kenya persists. Consequently, my recommendation is for an organization, such as Medic, to collaboratively gather quality SLSI, partner with Van Straten Medical for cleaning, and establish a distribution program in conjunction with interested hospitals identified in this research. Donating the instruments would facilitate smoother transport by alleviating stringent regulations. Partnering with a financially supportive organization, such as an NGO, is crucial. This two-fold solution ensures the sustainable disposal of unwanted instruments while meeting the needs of the Kenyan society, resulting in significant value creation. Therefore, I suggest pursuing this proposition in a different form through another organization.

Part 2

Establish the strategy

The first priority for Unifix Care is to develop a decision strategy. While I have provided a method to define this strategy, the team may require additional expertise to navigate the process effectively. As such, I recommend my involvement to facilitate the process and address any queries that may arise. Iteration sessions will be essential to refine the method.

Validate current proposition with DSM

Next, Unifix Care should validate their current value proposition using the DSM to ensure comprehensive coverage and confirm positive outcomes. The DSM can also be utilized for exploring new opportunities. However, a detailed manual is necessary to guide users in utilizing the DSM independently, as I observed the need for guidance during the filling process.

Test DSM with larger organizations

Furthermore, given the expressed interest from other companies, it is crucial to conduct further user testing of the DSM. Testing with larger organizations can help determine if the content and structure of the DSM are applicable to their needs.

Discussion

Reflection on the DSM & Strategic framework

The strategic questionnaire may not encompass all crucial aspects for effective decision-making across company types, as certain factors may carry more weight than others. Enhancing the value of each aspect in the decision-making process is possible. Further user testing is required to refine the model and improve its effectiveness. Currently, the model is designed to quickly validate the feasibility of emerging opportunities, prioritizing speed and efficiency. While making the model more elaborate is an option, it may sacrifice quick usability. This trade-off should be considered, as simplicity was chosen as a priority.

The strategic framework is still in its early stages of development, and the defined steps are not yet sufficiently detailed to be effectively implemented. Through testing and evaluation, it will become evident which information is missing in order to create a comprehensive and user-friendly manual for its application.

Relevance for Unifix Care

This thesis has steered the course of Unifix Care after the field research. Many new insights were gathered that were very useful for Unifix Care to determine whether to continue the proposition of SLSI. Thus I am confident to say this thesis has been very relevant for the development of Unifix Care and where they are now. Next to that, the second part of this thesis includes a thorough analysis followed and included with two methods to aid Unifix Care strategic decision-making and fostering growth. The methods are not yet matured and need go through many more use cycles. Even so, it will be relevant for Unifix Care to use.

Relevance for the field of design

As an entrepreneur and designer, the ambiguity surrounding goals and processes can make it challenging to determine relevant information and necessary steps. Several start-up companies have expressed interest in using the DSM to enhance decision-making and structure. This tool holds value not only for Unifix Care but for other companies as well. Sarasvathy et al. (2008) suggest that the uncertainties in early-stage entrepreneurship align with the design problem, highlighting the similarities between design and entrepreneurship. The findings of this thesis are relevant not only for entrepreneurs but also for the design field, as they share

Reflection

Throughout this thesis, I embarked on a journey of self-discovery, uncovering my strengths and areas where I require assistance. As a student in Industrial Design Engineering, project-based work has been a constant, but this was the first time I had to undertake a substantial project independently. Such an experience exposes one's vulnerabilities, leading to challenging but enlightening lessons. Fortunately, I can confidently state that I now possess a much deeper understanding of myself and how to manage my shortcomings.

One crucial realization is my inclination towards collaborative work. I thrive when engaging in discussions and explorations with others. I find that through dialogue and shared exploration, my thoughts become clearer. On the other hand, isolating myself tends to induce overthinking and a chaotic thought process. To combat this, I adopted a practice of having at least one daily meeting with another individual, allowing me to share my thoughts and maintain a structured and focused mindset towards achieving the ultimate goal.

During this thesis, I discovered a particular strength in the diverging phase of the double diamond design process. This phase involves gathering information, engaging in conversations with people, and immersing myself in the context of the project. I thoroughly enjoy the ideation process, brainstorming sessions, and envisioning various potential solutions. However, when it comes to making decisions and narrowing down the multitude of possibilities to a single course of action, I tend to slow down. This is where I could benefit from assistance. Formulating comprehensive conclusions and deriving concrete answers from the gathered data and ideas require support and guidance.

This thesis has not only allowed me to expand my knowledge in the field but also provided valuable insights into my own capabilities. By acknowledging my preference for collaborative work and recognizing my proficiency in diverging activities, I can now seek assistance in the converging phase, where decision-making and synthesis of findings are critical.

REVISITING THE INITIAL PROJECT BRIEF

My personal ambitions for this project include:

- Seeing Unifix Care's equipment used to save lives in hospitals in Kenya in 10 years



During the field research, I took the initiative to personally deliver donated surgical instruments to several hospitals. There is a high probability that these instruments are currently being utilized by medical professionals.



- Moving the company forward by validating risky assumptions
This research led to Unifix Care shifting their proposition



- Discovering Kenyan culture and experiencing international entrepreneurship
During a 4-week field visit in Kenya also joining the international LSH trade mission organized by the Dutch Government



My learning goals include:

- Setting up and conducting a complex multidisciplinary research project independently

Learned a lot about myself, more on that here.



- Using Notion as a primary platform for documentation
Mostly used Miro, Google docs and Indesign



- Finding a balance between my studies and involvement in the company

Difficult but manageable as long as good communication is established between team members and supervisors. More on the complexity of this project in chapter Project Context (p. 15)



- Discovering what I am capable of achieving with my current knowledge

I discovered that by always having a curious mindset, you can be capable of many things.



- Learning about Kenyan business practices.

I would not be able to describe how much I've learned in this paragraph.

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