Designing a market entry strategy for PEZY its custom wheelchair.

TU Delft | PEZY.

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List of Definitions

Aid Organizations
Group of different organizations executing distribution projects. These organizations are OPDs, Service delivery Organizations and other NGO organizations.

AT (Assistive Technology)
Assistive Technology as the overall combination of assistive devices for people with disabilities, in this paper the focus is on assistive devices in mobility.

Custom-fit
Custom-fit refers to a product being highly personalized. In case of a wheelchair this means having the wheelchair adjusted to your physique including all body measurements.

Customer
Person/Organization who purchases the wheelchair (not necessarily the user).

Do-It-Yourself (DIY)
the practice of completing tasks or projects independently without professional assistance.

Front-End Innovation (FEI)
The process of finding a suitable solution for a problem and validate the product concept.

Fast Moving Consumer Goods (FMCG)
Products that are sold quickly at relatively low cost and are typically replaced or consumed frequently.

IP Rights
Intellectual property rights are the rights given to persons over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time.

Kenyan Shilling (Ksh)
Official currency of Kenya, used for transactions and trade within the country (141 Ksh is equal to 1 euro).

Manufacturer
The ODM organization responsible for the manufacturing of the product, realizing financing through donations and funding (and sometimes also executing the aid projects in developing countries).

Non-Governmental Organization (NGO)
A non-profit organization , typically dedicated to addressing social, environmental, or humanitarian issues through advocacy, direct action, or service provision.

New Product Development (NPD)
The design process after having chosen a concept where the product needs to be developed and engineered.

Original Design Manufacturer (ODM)
A company that designs and manufactures products as per the specifications provided by another company.

Original Equipment Manufacturer (OEM)
A company that produces products to be marketed by another firm under its own brand.

Organization of Persons with Disabilities (OPD)
An organization led by disabled people in helping others with a disability.

People with Disabilities (PWD)
Represents individuals with physical, cognitive, sensory, or other impairments.

Research and Development (R&D)
The methodical exploration and testing aimed at creating new products, services, or processes or enhancing existing ones.

Self-Build
Refers to the ability to build a product from smaller components.

User
Refers to the end-user which is in need of a suited wheelchair due to physical impairment

Executive Summary

PEZY is a design agency with a comprehensive portfolio in product development and wheelchair designs. Their experience and entrepreneurial mindset have led them to explore further possibilities for utilizing their expertise in custom wheelchair designs. PEZY envisions potential new innovations in customized wheelchairs, either by making them highly adaptable or by designing them as simple installable, easy-to-ship packages.

The initial part of the report focuses on mapping out the wheelchair market as a whole, by differentiating between developed and developing countries. Conducting a market entry analysis provides insights into the major interests within these markets and identifies potential opportunities and threats for PEZY. The developed market offers avenues for creating highly adaptable wheelchairs that can accommodate changes in user physique. The developing market demand affordable, durable, and ergonomic wheelchairs, often sought after by aid organizations.

For PEZY, the wheelchair market in developing countries is the most promising segment due to intense competition in saturated developed markets and the opportunity to add value in these regions. Interviews with various market players highlight Kenya as an intriguing example.

The report delves into the Kenyan market, where demographics indicate significant demand for wheelchairs and identify the users and their challenges. The market supply chain is mapped to understand the active players and their roles. The report emphasizes the importance of designing for the end user. However, since individuals cannot purchase wheelchairs independently, other customers are involved. Primarily, government and aid organizations purchase wheelchairs for distribution projects to deliver them to users in challenging areas. Additionally, the competitive landscape reveals close relationships between manufacturers and customers, underscoring the need for PEZY to invest significant time and effort to penetrate the market independently.

This analysis results in a value proposition, introducing the concept of a self-build, custom-fit, affordable wheelchair as a potential solution to address underserved ergonomic demands. To realize this proposition in the market, alliances are necessary to improve PEZY's market position and make market entry more attractive. Four different concept strategies were developed focusing on validating and aligning the product with the market, securing financial support, and collaborating with active market players (wheelchair manufacturers). Together with PEZY, an improved strategy was developed that not only focused on product development but also considered a long-term plan.

The final strategy is explained through a roadmap in three phases. The first phase focuses on developing the wheelchair with feedback from market players. The second phase involves a potential pilot test for product validation. The final phase targets bringing the product to market. After additional market validation, a revised roadmap was developed with PEZY, which further focuses on how to make the product available in the market and identifies the necessary partners for large-scale production.

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Chapter 01

The Project

This chapter provides an introduction of how this master thesis is set-up and what the overall project vision, goal and structure will be in order to realize a suitable result.

1.1 Project Context

The master's thesis project was commissioned by Delft University of Technology. In this project, the design agency PEZY has proposed a project to map the wheelchair industry and ultimately develop a strategy to implement a new wheelchair concept. To provide a better understanding of what the design agency PEZY entails, a detailed explanation of their expertise and experiences is provided below.

PEZY.

INGENIOUS PRODUCT DEVELOPERS

PEZY is a design firm active in a wide spectrum, from health technology and Fast Moving Consumer Goods to consumer & industrial products. With extensive experience as a design agency, they specialize in product design, engineering, circularity, and particularly plastic engineering. This level of expertise results in an above-average financial investment from customers for PEZY's high-quality service. Additionally, PEZY operates a small production facility in Groningen (PEZY, 2024).

PEZY has ventured into the wheelchair business with O4 Wheelchairs, a company specializing in custom-made wheelchairs since 2004. The defining characteristic of custom-made manual wheelchairs is their specific design and manufacture tailored to the user, offering ergonomic benefits. This venture also obtains a small wheelchair manufacturing facility in Varsseveld (O4 Wheelchairs, 2023).

During this project, Henco Pezij (CEO and founder of PEZY), Vincent van Tol (Group Leader and Operation Manager), and Mark van der Schoot (Project Lead) have been actively involved throughout the entire project and have also been consulting on some decision-making processes.

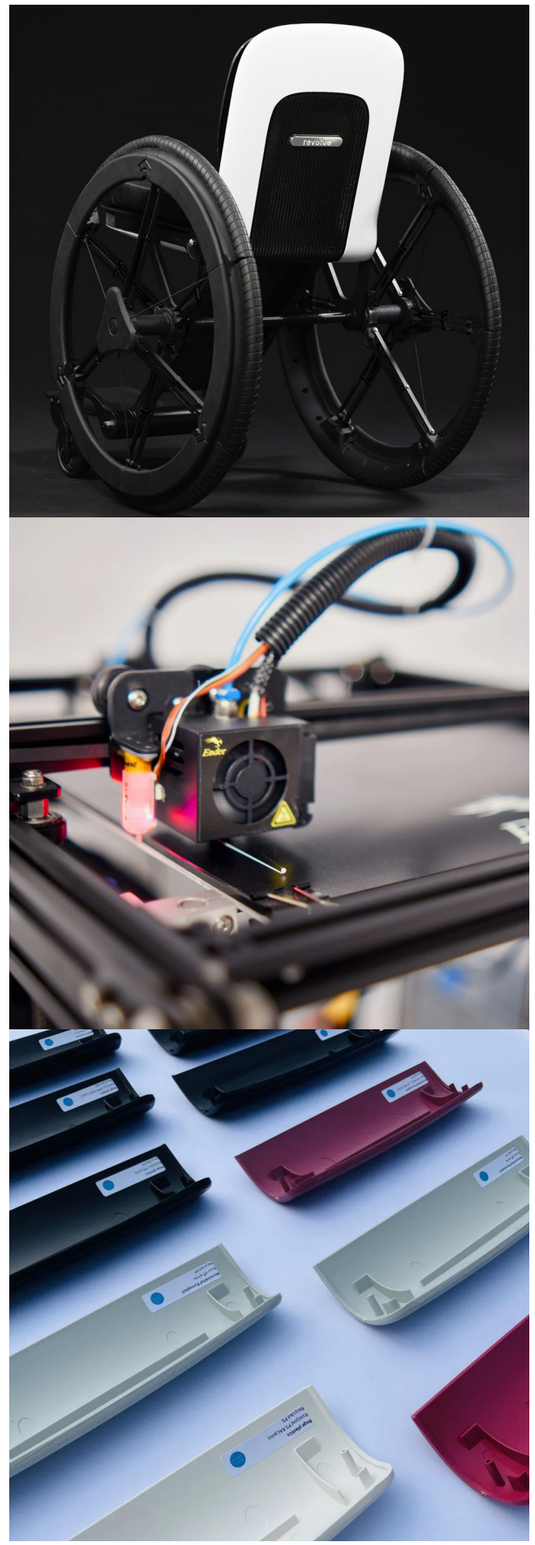


Image 1: PEZY its expertises in design

1.2 Project Assignment

The first meeting with PEZY resulted in various ideas about what a wheelchair could offer. PEZY has outlined two visions on making a difference in the wheelchair industry (Pezij & Van Tol, 2024, p. 97). Both visions emphasize the importance of a wheelchair enabling a person to sit comfortably, with reference to their expertise in custom-fit wheelchairs.

Vision 1
“Adjustability as a need-to-have function”

The first vision is a wheelchair that can be regularly adjusted to the user. Drawing from their experience in the wheelchair industry, they recognize issues with users needing to readjust their wheelchairs for ergonomic seating and comfort. They see potential in high adjustability, like an adjustable wrench.

Image 2: Adjustable Wrench

Vision 2
“The custom-fit Do-It-Yourself (DIY) wheelchair package”

The second vision focuses on simplicity. The second concept is akin to an IKEA chair, a straightforward design that should be easy to assemble. This concept could enable the offering of a “custom-made” wheelchair at a lower cost, allowing PEZY to carve out an interesting position in the industry (Pezij & van Tol, 2024; p.97).

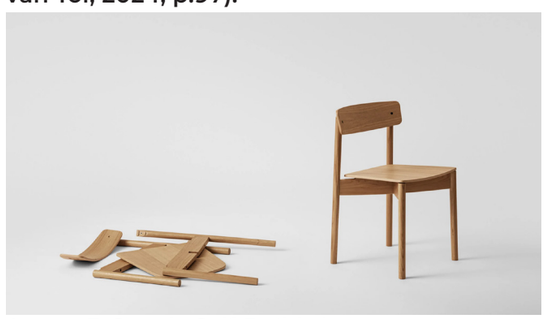


Image 3: Simple Self-Build chair

The Assignment

The vision of PEZY provides interesting insights about what could potentially provide innovation within the wheelchair industry. The assignment of this project is to determine which the vision alongside which market provides the most opportunities for a sustainable business concerning wheelchair innovation.

The assignment is best explained using IDEO’s Desirability, Feasibility & Viability framework (see figure 1), encompassing **desirability** (how much does the product meets the needs and desires of the customer?), **feasibility** (Is the product is technically possible to create?) and **viability** (Is there a sustainable business model for the product?) (O’Donoghue, 2023).

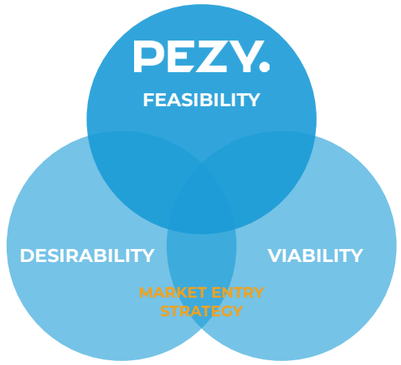


Figure 1: DFV Framework

PEZY Competencies

As these visions are not close to any form of product concept let alone product development the feasibility is difficult to validate within this project. However as PEZY is a design agency renowned for their design expertise, it will be assumed that their competencies validates that these visions of product concepts are indeed feasible.

The Market Entry Strategy

In this project, where PEZY is assumed to guarantee the feasibility of the product, the task will be to further explain the desirability and viability. This involves making well-considered choices over a period of six months to provide PEZY with a clear understanding of which vision best aligns with the user and customer, and which market is most suitable for market entry.

1.3 Project Approach

The task of bringing clarity to the wheelchair industry in terms of desirability and viability requires thorough research. To steer the report in the right direction, multiple methodologies will be employed to provide an overview.

The first step, following the double diamond process shown in figure 2, involves mapping out the market. This will be done through a market entry criteria (further explanation on page 15). This provides a broad perspective on the two researched market segments and their potential for entering with a new wheelchair vision. The SWOT-analysis summarizes the two market segments in terms of opportunities and threats. Following this, in collaboration with PEZY, a decision was made regarding which market offers the most potential and aligns with PEZY’s preferences.

Next, a specific market will be further investigated to better understand its dynamics. This marks the beginning of the second phase, where the market is examined in more detail to identify opportunities for PEZY. Through general market context analysis, user investigation, market supply chain, and competitive landscape methods, opportunities for PEZY are identified.

Considering PEZY’s limitations and understanding the added value of strategic alliances, several strategies were developed. These strategies were evaluated together with PEZY to refine and create an improved, cohesive strategy. This market entry strategy, described in a strategic and technical roadmap, outlines the steps PEZY should follow.

To validate this strategy, online meetings were set up with stakeholders in the areas of funding and collaboration, providing new insights into the strategy. These insights led to a co-creation session with PEZY, resulting in an extensive roadmap, distribution network, and business models to further elaborate on the plan.

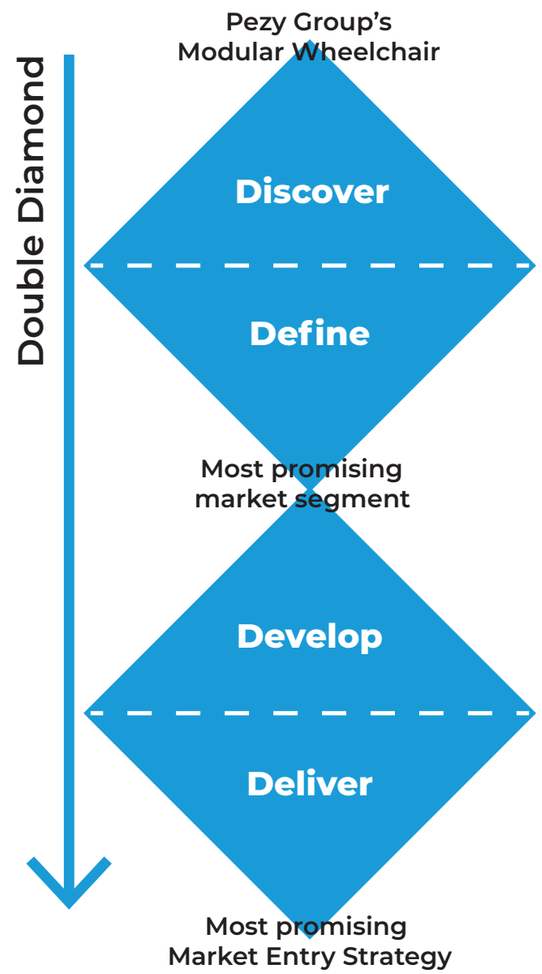
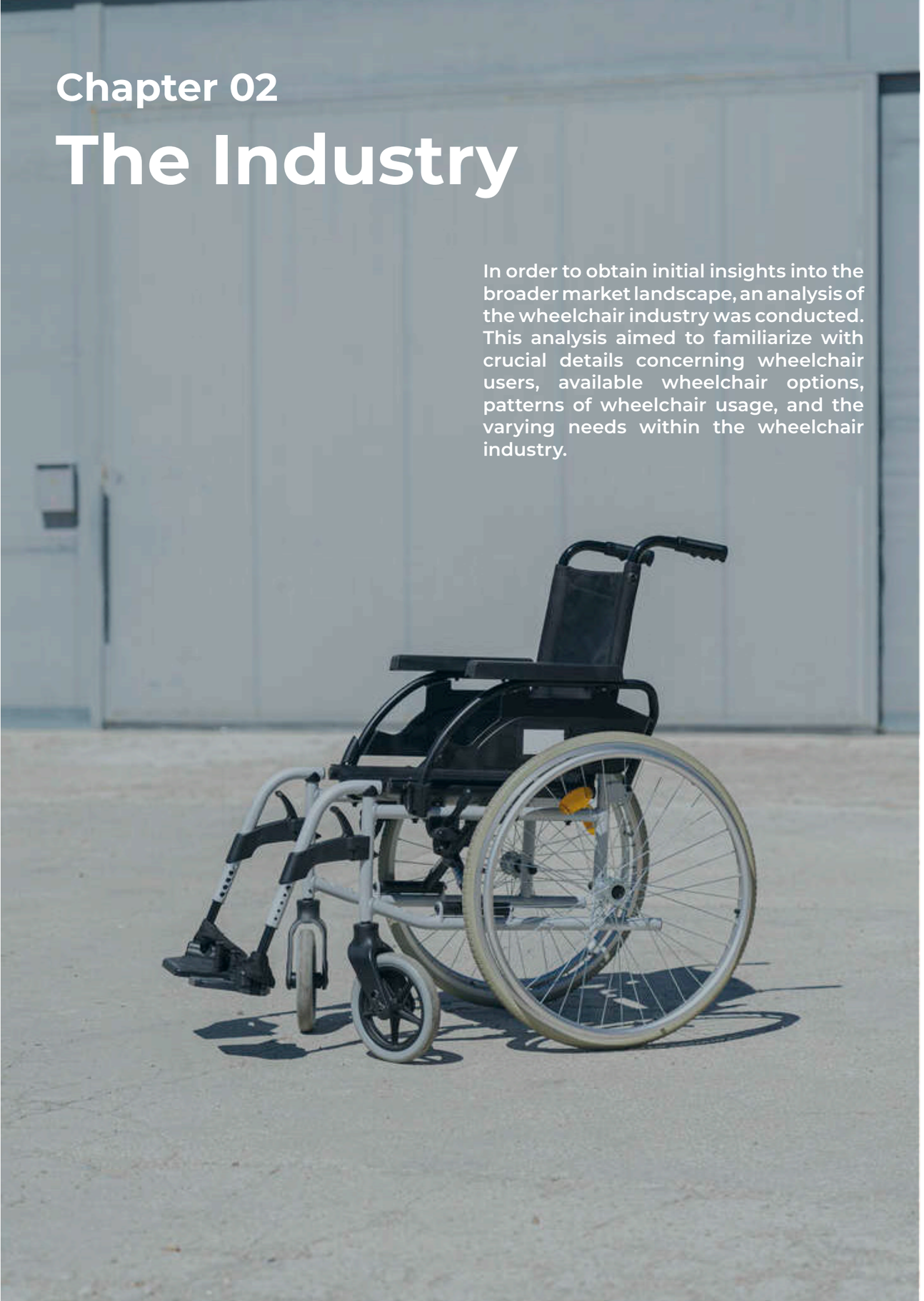


Figure 2: Double Diamond Framework

Chapter 02

The Industry

In order to obtain initial insights into the broader market landscape, an analysis of the wheelchair industry was conducted. This analysis aimed to familiarize with crucial details concerning wheelchair users, available wheelchair options, patterns of wheelchair usage, and the varying needs within the wheelchair industry.



2.1 The Wheelchair Industry Context

Users

Wheelchair users can be classified into two distinct groups: those with permanent disabilities requiring consistent wheelchair use, and individuals with limited mobility who rely on wheelchairs intermittently. The first group encompasses disabled individuals who rely on wheelchairs as their primary means of mobility. This demographic often includes those with orthopeadic, neuromuscular, or amputation-related disabilities (Redmanpowerdev, 2022). The second group consists of individuals with limited mobility, typically the elderly, who face challenges such as unsteadiness while walking, difficulty transitioning in and out of chairs, or susceptibility to falls (HealthinAgeing, n.d.). Wheelchairs serve as aids to enhance mobility for a certain amount of time, with research indicating that older adults who refrain from wheelchair use may experience escalating physical limitations over time (Nie et al., 2023).

Product Categories

The wheelchair market is divided into two primary segments: manual and electric. Manual wheelchairs are in most cases self-propelled wheelchairs with two smaller wheels and 2 larger wheels or 4 smaller wheels where someone besides the user propels the wheelchair. The electric wheelchair is a powered wheelchair which is propelled by a motor. This wheelchair is most often used by users with specific disabilities (Freedom mobility, 2022). In 2022, the manual wheelchair segment showed to be larger than the electric wheelchair segment, capturing approximately 58% of the market share (The Brainy Insight, 2022). This trend persisted into 2023, where the manual product segment maintained its lead, commanding a substantial 62.4% share of the global market (Market.us, 2024).

When considering individuals with spinal cord injuries who require a wheelchair, the choice between manual and electric options is significant. According to data from the National Spinal Cord Injury Statistical Center (2021), during the initial year following a spinal cord injury, 59% of users opt for manual wheelchairs, while the remaining 41% prefer electric models (NSCISC, 2021).

Product Offer

A diverse array of wheelchair types exists, each designed to meet particular user requirements. These categories encompass both manual and electric wheelchairs (Redmanpowerdev, 2022). Certain wheelchair categories even feature options available in both manual and electric configurations, see table 1. Manual wheelchairs, excluding those designed for sports, pediatric use, and all-terrain exploration (due to their non-permanent usage), can be further classified into standard, lightweight, foldable, and rigid models.

Manual Wheelchairs	Electric Wheelchairs
Daily Manual Wheelchairs	Daily electric Wheelchairs
Sports Wheelchairs	Positioning Wheelchairs
Pediatrics Wheelchairs	Pediatrics Wheelchairs
All-terrain Wheelchairs	All-terrain Wheelchairs

Table 1: Manual & Electric Wheelchairs

Product Need

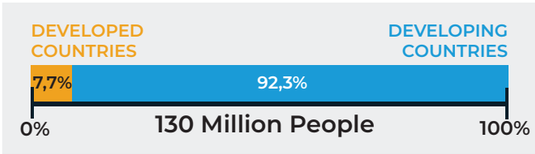


Figure 3: Distribution of product need.

The Wheelchair Foundation derived a global demand for wheelchairs by analyzing wheelchair statistics across different populations. They estimated an average wheelchair need of approximately 1% of the population in developed countries and around 2% of the population in developing countries. This calculation resulted in a total global demand for 130 million wheelchairs shown in figure 3, with 7.7% allocated to developed countries and 92.3% to developing countries (Wheelchair Foundation, 2016).

2.2 Market Segments

Within the first meeting of PEZY, the two distinct wheelchair markets in developed and developing countries was already mentioned to be interesting market segments to look into as PEZY believes that these two markets both held promising opportunities for wheelchair innovation.

The wheelchair industry analysis conducted reveals several interesting insights. Firstly, the majority of wheelchairs in the industry are manual rather than electric. Given PEZY's venture O4 Wheelchairs' extensive experience in manual wheelchair design, the project will focus on manual wheelchairs. Secondly, there is significant demand for wheelchairs in both developed and developing countries. This will guide the definition of the market segments to be investigated.

In alignment with PEZY's proposed market segments, the wheelchair markets of developed and developing countries will be compared. These two markets are analyzed separately using a market entry strategy to better understand the opportunities they present.

Developed Countries

Image 4: User in Developed Country

The developed countries entail the 37 countries who are according to the World Economic Situation and Prospects (WESP, 2014) representing a developed economy. However for the market entry analysis the next chapter will focus on the European market with some specifications in the Dutch market because of the company's headquarters demographic location. This focus allows us to gain insights into developed countries its markets, facilitating potential expansions into other similar markets.

Developing Countries

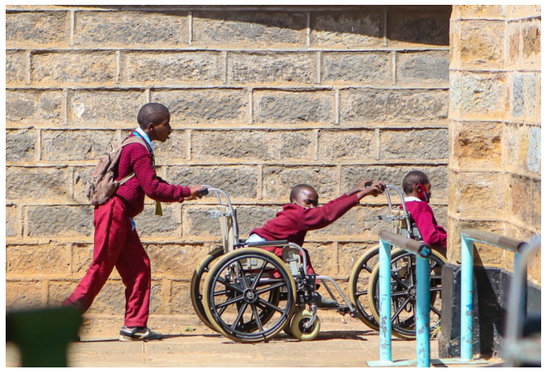


Image 5: User in Developing Country

The developing countries are countries with developing economies with the following geographical regions Africa, East Asia, South Asia, Western Asia, and Latin America and the Caribbean (WESP, 2014). Within this market there is no ordinary manufacturer, retailer and user. The developing countries are mostly getting their wheelchairs from governmental organizations or aid organizations. These stakeholders are the red-line in this market analysis. With interviews from the International Committee of the Red Cross, Free Wheelchair Mission, TAI the Accessible institute and UNICEF the wheelchair market is being explained.

2.3 Market Entry Criteria

To further explore the market segments multiple different criteria's were explored in which Hultink (1997) highlighted the need for specific strategic and tactical launch decisions within a strategic launch strategy. These categories from Hultink also aligns with the method from Wilen (2022) is leading in evaluating both markets, including market environment, competition, demand and distribution channels.

The criteria's shown in figure 4 serve as checkpoints for PEZY to gain comprehensive insights into the industry before determining the most promising market segment.

Market Entry Criteria

Market Environment

To gauge opportunities and risks assess factors:
1. Market size & growth rate
2. Regulatory environment
3. Infrastructure
4. Consumer trends

Competition

Understand your main competitors to develop competitive advantage:
1. Strengths & weaknesses
2. Market positioning of established players.

Demand

Conduct market research to determine market potential:
1. Evaluate the level of demand for the products or services by examining target audience needs.

Distribution Channels

Understand how to reach customers efficiently:
1. Find the distribution channels within the chosen market segment based on your target market and business model.

Figure 4: Market Entry Criteria

Chapter 03

Developed Countries

This market segment is characterized by diverse needs, with a strong emphasis on innovation and user-centered design. This market research delves into consumer preferences, technological advancements, and regulatory standards. This exploration enables PEZY to anticipate market trends and improve mobility solutions tailored to individuals with disabilities.

3.1 Market Environment

Market Size

In the medical technology sector, Europe and US show to be market leaders in terms of market value based on revenue. Europe itself ranks the second largest, with an estimated market value of €160 billion in 2022, comprising 26.4% of the global market share (see figure 5). The United States holds the largest market share at 46.6%. Over the past decade, the European medical device market has shown steady growth, averaging 5.7% per year (MedTech Europe, 2023). Global projections for the medical devices market indicate continued growth, with revenue expected to reach US$511.20 billion in 2024. The annual growth rate (CAGR 2024-2028) is forecasted at 5.70%, with the market volume projected to reach US$638.00 billion by 2028 (Statista, 2024).

Estimated Market Size per Region

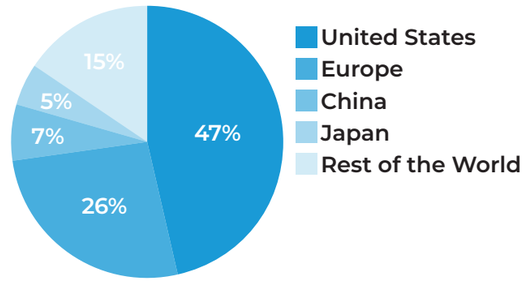


Figure 5: Estimated Market Size

Given the market's size and projected growth, the medical device market in developed countries offer an attractive opportunity for designing new wheelchairs.

Regulatory Environment

Medical Device Regulations (MDR) are European standards set by regulatory authorities to ensure the safety, effectiveness, and quality of medical devices, including wheelchairs, across the European market. The primary goal of MDR is to uphold strict safety and quality standards throughout the medical device lifecycle. Compliance includes clinical testing, performance evaluation, labeling, and providing usage instructions. Manufacturers must also conduct post-market surveillance to monitor wheelchair performance after distribution.

Wheelchairs, categorized as medical devices (category 1), is not able to require a CE-certification. Instead, compliance involves formulating a declaration of conformity, performing ISO 7176 testing for wheelchairs, and a Unique Device Identification to meet MDR requirements. Furthermore, manufacturers are not able to delegate associated responsibilities to another company according to MDR guidelines (De Jong, 2024, p. 92).

PEZY is already familiar with these MDR specifications through their wheelchair venture, O4 Wheelchairs. This requires special attention when a new wheelchair, particularly if it is self-built or highly adjustable.

Infrastructure

The European infrastructure can be described as off good quality, also shown in the Global Competitiveness Report where Dutch Roads are being rated second best of the world and overall 10 out of the 23 countries with the highest road quality are located in Europe (Schwab, 2019). Overall Accessibility for persons with disabilities is a key focus, ensuring equal access to airplanes, trains, buses, and ships. Sellers must provide accessible journey information, and free assistance is available in terminals and onboard vehicles. Transportation cannot be refused based on disability, except for safety reasons (Your Europe, 2024). Efforts continue to improve infrastructure and awareness, aiming for fully inclusive transportation networks that accommodate diverse needs and foster mobility and independence for all.

These insights reveal that the robust infrastructure effectively supports wheelchair users during their daily commutes.

Consumer Trends

Ageing Population

The global population aged 65 years or older is expected to more than double, increasing from 761 million in 2021 to 1.6 billion by 2050. Moreover, the number of individuals aged 80 years or older is growing at an even faster rate (United Nations, 2023).

Changing User conditions

Aside from regular wear and tear, changes in the user's condition greatly affect a wheelchair's lifespan. Weight fluctuations, for instance, can impact its fit. Excess weight may cause rubbing against the tires leading to wounds, while significant weight loss may result in an off-center sitting position, potentially causing pressure injuries. These changes emphasize the need for periodic assessments and adjustments to ensure comfort and safety while using a wheelchair (Numotion, 2020).

Inclusive cities

The European Union collaborates with cities and regions to cultivate a sustainable urban mobility strategy, encouraging efficient public transportation networks and robust connectivity across their respective nations. Furthermore, it strives to enhance urban living standards by advocating for active mobility alternatives like walking and cycling. The EU supports initiatives aimed at ensuring city accessibility for all inhabitants and travellers, including individuals with disabilities and seniors (European Commission, 2021).

These trends indicate a growing demand for wheelchairs, with particular emphasis on the evolving physical conditions of users.

3.2 Competition

Wheelchair Manufacturers

The competition within the European market is being identified by analyzing the current wheelchair manufacturers. To obtain a first glance of the market, the largest wheelchair manufacturers (based on their annual revenue) are analyzed on their manual wheelchair offer and price ranges (see figure 6). These price ranges are only indications of the selling price of the brand as the information is retrieved online from dealers or online retailers (see appendix A).

Competitiveness per category

PEZY aims to compete in the current market by providing a custom wheelchair which is affordable. For this reason, various wheelchairs from the leading brands, along with their respective prices, are presented in figure 7. To illustrate the competitiveness among the different wheelchairs categories, the cheapest option of the three variants are displayed.

Figure 7: Competitive Pricing

Largest Manufacturers (Annual Revenue)	Their Brand(s)	Price (euros)
Ottobock 1.3 Billion	Ottobock	1370 - 1528
	RGK	4897
Sunrise Medical 820 Million	Sopur	2500 - 3591
	Zippie	2753
Invacare 705 Million	Quickie	2108 - 2819
	Breezy	851
Permobil 461 Million	Invacare	409 - 749
	TiLite	3096 - 3408
Etac 400 Million	Progeo	3617 - 3981
	Panthera	8178
Küshall 53 Million	Etac	-
	Ki Mobility	1982 - 2017
Vermeiren Group 52 Million	Küshall	2366 - 2967
	Vermeiren	600 - 2168
Meyra 16 Million	Meyra	295 - 1900

Figure 6: Largest Manufacturers & Brands

Adjustability and Custom-fit

When examining the wheelchairs, a noticeable correlation emerged between custom-fitted models and their corresponding price ranges. The accompanying graph (figure 8) illustrates the connection between wheelchair customization and the capacity for personalized adjustments to suit the user's preferences. Notably, the graph reveals that standard-sized wheelchairs offer greater adjustability post-installation when compared to their custom-fitted counterparts. This insight presents intriguing possibilities, particularly considering that users' physiques may evolve over time, underscoring the importance of adjustability.

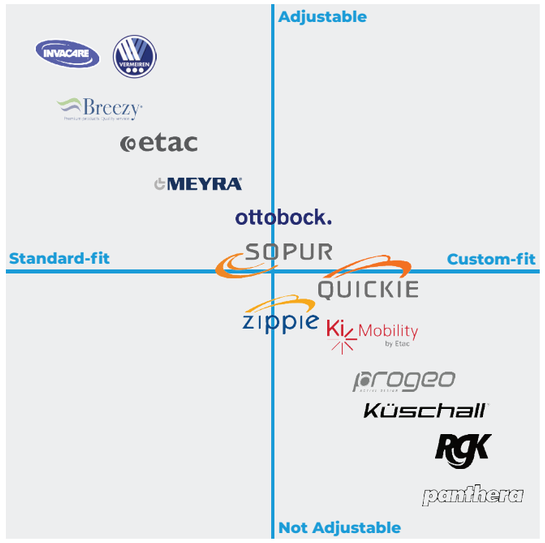


Figure 8: Adjustability vs Custom-Fit graph

3.3 Demand & Distribution Channels

3.3.1 Demand

In the 37 developed countries it is estimated that 1% or 10,000,000 people require a wheelchair. In developed countries more than 95% of people who require a wheelchair have access to one. This shows that in developed countries only 500,000 people need a wheelchair but do not have access to one (5% of 10 million) (Wheelchair Foundation, 2016).

In 2022, 27% of the EU population over the age of 16 had some form of disability. According to Eurostat estimates, that equals to 101 million people or one in four people adults in the EU (European Council, 2022). In case of the Netherlands and wheelchair user around 150,000 individuals use the wheelchair almost permanently, which is 0,9% of its population (De Klerk et al., 2012).

These insights highlight the demand for wheelchairs in developed countries and the significant proportion of users who are equipped with one.

3.3.2 Distribution Channels

Wheelchair distribution channels across Europe vary based on each country's healthcare system and policies. Here's an overview of how wheelchairs are obtained in different European countries (see figure 9).

United Kingdom

In the UK, individuals can obtain wheelchairs through the National Health Service. Depending on their circumstances, individuals may need to contribute to the costs. Recently, a personal wheelchair budget scheme has been introduced to assist people with wheelchair costs, managed through the Integrated Care Board (NHS, 2022).

Germany

In Germany, personal health insurance supports individuals in purchasing wheelchairs. A doctor's certificate is required to demonstrate the need for a wheelchair, after which individuals can get one from medical supply stores (Hebing, 2023).

France

President Emmanuel Macron announced improvements in disability rights in France, stating that wheelchairs will be fully reimbursed from 2024. Health Insurance covers the cost of wheelchairs prescribed by General Practitioners or specialists (Bauer-Babef & Mandilara, 2023; LiNote, 2023).

Spain

In Spain, obtaining a wheelchair requires a prescription from a specialist doctor affiliated with social security. Social Security covers the payment of the wheelchair (SID, 2021).

Italy

The Italian State provides wheelchairs free of charge to people with disabilities or those in conditions of physical necessity. The National Health System allows individuals to request wheelchairs free of charge at ASL offices (DisabiliNews Redazione et al., 2022).

Netherlands

In the Netherlands, the distribution of wheelchairs is largely driven by the Wet Maatschappelijke Ondersteuning (WMO), which aims to enable every Dutch citizen to participate in society. If someone needs a wheelchair, the local municipality arranges for a medical device supplier to provide one or provides partial funding to finance wheelchair (Ministerie van Algemene Zaken, 2024).

These example countries reflect the diversity of healthcare systems and policies across Europe, increasing the complexity of market entry for PEZY.

Healthcare Systems in EU	
United Kingdom	**Germany**
National Health Service.	Personal health insurance.
France	**Spain**
Personal health insurance.	Social security.
Italy	**Netherlands**
National health system.	Local municipality.

Figure 9: Healthcare system per country

Chapter 04

Developing Countries

In developing countries, access to appropriate wheelchairs is challenging due to affordability constraints and limited infrastructure. Market research examines socioeconomic factors and innovative models of wheelchair provision to improve accessibility and address the unique needs of diverse populations, promoting inclusivity and empowerment for individuals with disabilities.

Interviews with market players like: UNICEF, the International Committee of the Red Cros and manufacturers internationally and locally provided useful insights about this market.

4.1 Market Environment

Market Size

The medical device market size of all countries excluding US, Europe, China and Japan is only 15% (see figure 10), however it represents 5.4 billion people (Medtech Europe, 2023). In most African countries people cannot count on their government to provide a wheelchair. Health insurers are rare, non-existent or show a poor performance. There is a lack of both funds and wheelchairs (Tanzania Wheelchairs, 2023). Alongside this, people in developing countries are rarely able to purchase wheelchairs as well as they expect them to be free (Mwarandu, 2024; p.104). This shows that it is challenging to sell wheelchairs in these regions to users because aid organizations donate wheelchairs for free.

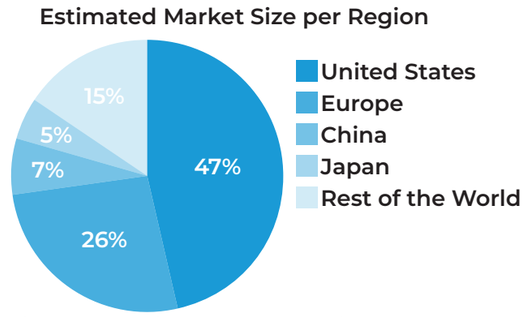


Figure 10: Estimated Market Size

The NGO industry widely provides support to these developing countries. The accessibility to wheelchairs in these countries are majorly provided through aid organisation. These NGO's globally have an estimated market size around 300 billion USD (Business Research Insights, 2024 ; The Business Research Company, 2024). This shows financial support in providing healthcare, and other forms of support in these countries. In which 19% of NGOs are active in the healthcare sector. (The Global Journal, 2013).

The medical device market isn't compelling in developing countries due to its limited market share. However, active NGOs in developing markets offer intriguing opportunities because of their high engagement in these countries, particularly through developing projects. They also serve as the largest distributors of wheelchairs in these regions (Mwarandu, 2024; p.104).

Regulatory Environment

The International Committee of the Red Cross maintains stringent standards regarding the type of wheelchairs distributed in developing countries, emphasizing compliance with European Medical Device Regulations. This commitment underscores the organization's dedication to ensuring that individuals in need receive high-quality, safe, and reliable mobility aids (Cooreman, 2024; p.86).

Similarly, the Free Wheelchair Mission adheres to regulatory requirements in the United States, including the ISO7176 testing standard. To meet these obligations, the organization provides training to its partners involved in wheelchair assembly. Partners undergo receive instruction on wheelchair assembly techniques through videos and two-dimensional assembly manuals being provided with each chair (Herr, 2024; p.98).

This demonstrates that even new wheelchairs must comply with Medical Device Regulations, as customers like the ICRC and UNICEF prioritize high-quality standards.

Infrastructure

The challenges in infrastructure encountered in developing countries greatly affect individuals with disabilities, thereby offering insights into wheelchair demands for PEZY.

In regions where development projects are undertaken, the absence of proper infrastructure poses a major hurdle. The ICRC emphasizes the necessity for robust wheelchairs with mountain bike-like wheels to navigate rugged terrain effectively. Moreover, the lack of accessible public transportation means that individuals reliant on wheelchairs must often resort to taxis for longer journeys, as buses are inaccessible. However, even taxis present challenges, as some wheelchairs may not fit into these vehicles due to their size and design (Cooreman, 2024; p.86). Mwarandu (2024) also further elaborates that they make the wheelchair better suitable for this environment by using bicycle wheels.

Free Wheelchair Mission sheds light on the complexities of designing wheelchairs suitable for use in rural areas with inadequate infrastructure. These areas often lack paved roads, leaving individuals to use dirt roads, muddy paths, and uneven terrain. The Gen3 wheelchair represents a significant improvement, featuring a foldable design tailored for navigating narrow passageways and enabling easy transportation in vehicles (Herr, 2024; p.98).

Consumer Trends

Ageing Population

The World Social Report emphasizes the regional disparities in the pace of aging. Notably, Northern Africa, Western Asia, and sub-Saharan Africa are projected to experience the fastest growth in the number of older individuals over the next three decades. This stands in contrast to the current scenario where Europe and Northern America combined hold the highest share of older persons (United Nations, 2023).

Poverty & Disabilities

The research conducted by Elwan (1999), highlights a relationship between poverty and disability. Poverty not only increases the likelihood of disability but is also intensified by disabling conditions. Poor households, lacking essential resources like food and healthcare, face higher disability risks. In developing nations, preventable impairments are a major cause of disability, expected to rise due to population growth and environmental risks. This situation poses challenges, with poverty risks and disability management differing greatly between developed and developing countries (Elwan, 1999). The systematic review of Banks et al. (2018) even further elaborates the correlation with statistically significant results between poverty and disability.

These trends only demonstrate that the demand for wheelchairs in these environments will continue to increase.

4.2 Competition

Wheelchair Manufacturers (NGOs)

These market players are active in developing countries which are all headquartered in developed countries. However, their manufacturing facilities are often situated in developing countries in Asia where production costs are lower. This results in a reduced production price per wheelchair. For instance, Free Wheelchair Mission exemplifies this approach by leveraging economies of scale, offering wheelchairs at a cost of 90 euros (Free Wheelchair Mission, 2023). In contrast, other wheelchair manufacturers produce significantly fewer units, with a combined annual output of 72 thousand wheelchairs among five companies. Notably, this table excludes conventional wheelchair manufacturers that distribute their products to developing regions, as these wheelchairs may not be specifically tailored to endure the challenging environments found in rural areas of developing countries.

The Wheelchairs which are manufactured are designs most often existing multiple years without new innovations. Free Wheelchair mission for examples manufactures their wheelchairs design from 2013. Not having much finance for Research and Development of their wheelchair as they are mostly focusing on the optimal donation to project ratio (Søndergård, 2024; p.112 & Herr, 2024; p.98). Table 2 presents the average yearly production including the average price per wheelchair.

Company	Production	Price
Free Wheelchair Mission	61.732 (2023)	90 euros
Motivation	6.500 (2022)	290 euros
Whirlwind wheelchair int.	2.000	165 euros
The Accessible Institute	50	350 euros
Wheelchairs of Hope	Unknown	110 euros
Beeline	Unknown	350 euros
Participant	Unknown	Unknown

Table 2: Manufacturers in Developing Countries

Wheelchair categories

This graph displays the established market participants along with their wheelchair offerings. Figure 11 indicates that each category has limited options available. Additionally, it can be noted that customer have the most diverse selection of all-terrain wheelchairs in this market.

Figure 11: Wheelchair offer per category

4.3 Demand & Distribution Channels

Demand

Developing countries, housing around 6.1 billion people, struggle to meet the mobility needs of their populations, particularly for those with physical disabilities. Research suggests that about 2% of individuals in these regions require wheelchairs, yet only about 10% have access to them, this would result in a shortage of roughly 110 million wheelchairs (Wheelchair Foundation, 2016). The World Health Organization report however expects a global need of 80 million wheelchairs, with a significant amount required in developing countries (World Health Organization, 2023 & Herr, 2024; p.98).

The specific amount of wheelchair needs is however difficult to come by as there not much knowledge about disability in developing countries. However what these sources have in common is that both figures highlight the urgent demand for wheelchairs, especially in developing areas with limited healthcare resources and infrastructure.

The Free Wheelchair Mission indicates that their partners face overwhelming demand surpassing their supply capacity. Consequently, partners or NGOs must select users based on maximizing wheelchair use, making it challenging to explain why others cannot receive one. This underscores the significant demand for wheelchairs in these regions. Some people with disabilities attribute their condition to the lack of modern medical resources, resorting to drastic measures like amputation due to the unavailability of insulin and monitoring devices in cases of diabetes (Herr, 2024; p.98).

The ICRC forecasts a rise in mobility impairments, currently addressing only 2% of affected individuals, totalling around 200,000 people annually. However, Cooreman emphasizes that this figure barely scratches the surface of the issue. Furthermore, providing wheelchairs alone isn't enough; individuals also need education and support to address their needs comprehensively (Cooreman, 2024; p.86).

'Design the wheelchair like a Kalashnikovs: simple and functional.' (Cooreman, 2024)

Distribution Channels

Wheelchairs distribution to developing countries is a complex process. Wheelchair manufacturers finance their production through donations, sales, or both, while aid organizations and governments handle the distribution (see figure 12).

Figure 12: Production and Distribution

First, some wheelchair manufacturers, such as Free Wheelchair Mission, receive funding and donations for production of their own wheelchair design and shipment to developing regions. Aid organizations then acquire these wheelchairs at no cost and handle further distribution. Besides financial support, these manufacturers have little involvement in the actual production and distribution processes (Herr, 2024; p.98).

Second, some wheelchair manufacturers, such as Motivation, receive donations and fundings while also selling their wheelchairs (Childs, 2024; p.128). Although Motivation has its own designs, it also has minimal involvement in the production. These wheelchairs are shipped to desired harbors, and the final distribution is managed by aid organizations such as UNICEF and the ICRC (Søndergård, 2024; p.112).

Third, NGOs like The Accessible Institute work with local manufacturers to secure funding, ensuring the production of wheelchairs. This is particularly important in rural areas where locals may not afford to purchase wheelchairs independently (Mwarandu, 2024; p.104).

Lastly, governments, such as Kenya's, provide financial support to local manufacturers to facilitate wheelchair production. This governmental financing is crucial for enabling local production (Kamau, 2024; p.121).

This once again shows that there are various possibilities for producing and distributing wheelchairs in developing countries.

Chapter 05

Market Segmentation

This chapter will begin by outlining the most useful findings through a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis for both market segments. In defining the most suitable market segment, the opportunities within each segment are assessed. Together with PEZY, the most promising market segment, offering the most compelling opportunities, is selected for further investigation in developing a market entry strategy.

5.1 SWOT-Analysis

Developed Countries

The SWOT-analysis shown in figure 13 shows key insights about the wheelchair market in developed countries. Explaining that PEZY exhibits several strengths in the wheelchair market. Their expertise in high-end wheelchair design positions them as leaders in crafting innovative and sophisticated solutions. Furthermore, their proactive interest in exploring new developments within the industry reflects a forward-thinking approach. Additionally, their extensive knowledge of production optimization enhances operational efficiency.

However, PEZY faces significant weaknesses. The high expenses related to their designers could hinder cost competitiveness. Additionally, their small production facility of O4 Wheelchairs, coupled with the absence of any manufacturing collaboration, puts them in a difficult position for market penetration.

In the wheelchair market, PEZY can leverage evolving user needs for adaptable solutions and the affordability-customization correlation. Opportunities lie in the expansive European medical device market and the anticipated population increase, fostering expansion and innovation. Furthermore, the well-established infrastructure for wheelchair users facilitates market penetration. These factors collectively present promising avenues for PEZY's growth and success in the competitive wheelchair market.

Amidst opportunities, threats arise in the wheelchair market. Significant competition challenges companies like PEZY. Government or health insurance-provided free wheelchairs affect market competitiveness. Compliance with Medical Device Regulation (MDR), especially modularity, demands attention and resources. Diverse healthcare systems across Europe introduce complexities and barriers. Navigating these threats is crucial for companies aiming to succeed in the wheelchair market.

The confrontation matrix (Muilwijk, 2020), found in appendix C, highlights the prominence of opportunity 1 and threat 1 within this market segment. Additionally, the combination of custom wheelchairs' high cost and PEZY's expertise in product optimization presents further opportunities.

	Strengths	Weakness
PEZY	1. Expertise in custom wheelchair design 2. Interests in wheelchair developments. 3. Production optimalisation knowledge.	1. Pezy Groups design efforts are costly. 2. No manufacturing facility for large scale or collaboration leads.
	Opportunities	**Threads**
MARKET	1. Changing user's physical conditions demands adjustability. 2. Custom wheelchairs are expensive. 3. Large medical device market in Europe. 4. European population is expected to increase. 5. Infrastructure well-adjusted to wheelchair users.	1. Large Wheelchair competition. 2. Current wheelchairs are offered for free by either government or health insurance. 3. MDR demands extra attention in case of modularity. 4. Different healthcare systems and policies across Europe.

Figure 13: SWOT-Analysis Developed Countries

Developing Countries

The second SWOT analysis for developing countries, in figure 14, explains PEZY's strengths in the wheelchair market. Their leadership in high-end wheelchair design and innovation, proactive approach to industry developments, and expertise in production process optimization enhance operational efficiency. Moreover, their understanding of limited financial resources within the market demonstrates industry insight.

However, PEZY also faces notable weaknesses. The high expenses associated with their designers pose a challenge, potentially affecting cost competitiveness. Additionally, their neglectable wheelchair production facility and no prospecting leads for collaborations in this market makes it more complex. Furthermore, the absence of international partnerships with the interested market segment limits opportunities for expansion and market penetration.

In the wheelchair market, numerous opportunities arise from unmet needs and the expected growth in the disabled population, fostering a space for innovative solutions. The scarcity of available wheelchairs and innovations offers companies a clear opening to address this gap. Additionally, the sizable NGO market, with about one-fifth active in healthcare, provides specific avenues for collaboration and support. Potential partnerships with organizations like Free Wheelchair Mission, producing 60,000 units annually, offer promising opportunities for market expansion and impact.

Amidst opportunities, several threats loom. Local expectations for free wheelchair provision hinder self-sustained local manufacturers, disrupting market dynamics. Inadequate infrastructure adjustments for wheelchair accessibility pose challenges for product utilization in developing countries. Ensuring compliance with regulations like the Medical Device Regulation demands precise attention and resource allocation. Limited financial resources for NGOs impede innovation and product advancement. Overcoming these threats is vital for sustained success in the wheelchair market.

An additional confrontation matrix, found in appendix C, further emphasizes opportunities 1 and 3, along with threat 4, as the most prominent within this market segment.

	Strengths	Weakness
PEZY	1. Expertise in custom wheelchair design. 2. Interests in wheelchair developments. 3. Productoptimalisation knowledge. 4. Aware of the limited market financials.	1. Pezy Groups design efforts are costly. 2. No manufacturing facility for large scale or collaboration leads. 3. No international partnerships within the market.
	Opportunities	**Threads**
MARKET	1. A large number of wheelchair needs is unmet. 2. The amount of disabled people is expected to increase. 3. Limited wheelchair offer & developments 4. Large NGO market largely active in health 5. Collaboration lead: Free Wheelchair Mission	1. Locals expect wheelchairs to be for free. 2. Infrastructure not well adjusted to wheelchairs. 3. MDR demands extra attention in case of modularity. 4. NGOs have limited financial resources for R&D

Figure 14: SWOT-Analysis Developing Countries

5.2 Most Suitable Market Segment

5.2.1 Chances within the market

Developed Countries

The firsthand list of requirements for the European market and pain points in this industry shows that there are still chances in enabling users with cheaper and self-adjustable wheelchairs. Alongside with the production facility of O4 wheelchairs enough modular wheelchair implementation projects are possible for the European market.

Developing Countries

The developing countries shows perspective as there is a large demand for wheelchairs which is still unmet, formulating a wheelchair which fits the market in terms of customizability and affordability could positively influence the whole wheelchair market in developing countries. Following this opportunity demands a clear vision on how PEZY want to achieve this and if it can be viable.

5.2.2 Selected Market Segment

To explain the most promising market segment for PEZY, figure 15 shows two axes to display the most important considerations. One indicating the size of the problem addressable by PEZY's wheelchair developments (Impact), and the other representing the difficulty of potential market entry (Market Viability).

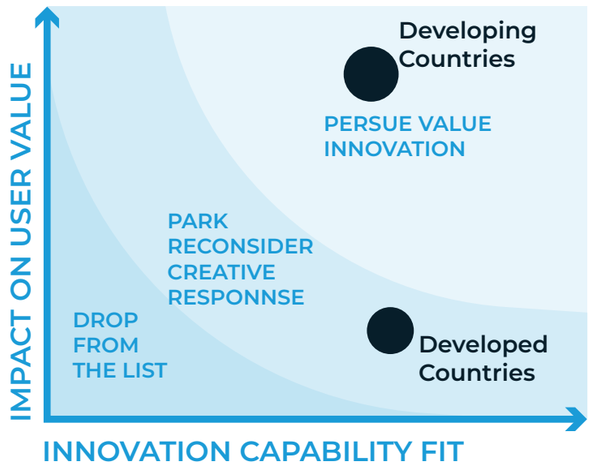


Figure 15: Graph Impact - Innovation fit

In developing countries, where there is a significant unmet need for wheelchairs, the problem size is substantial, with moderate competition due to limited active NGOs in production and distribution, presenting a feasible market entry challenge. However, in developed countries, the wheelchair industry is saturated, with only a small fraction (5%) of the population lacking access to wheelchairs. Despite the diverse range of wheelchair options available, the market is highly competitive, primarily due to long-term contracts between large manufacturers and dealers, posing significant hurdles to market entry.

The most important considerations implicate that developing countries are the most promising market segment for PEZY. In addition to that PEZY finds that concentrating in developing countries holds the greatest promise for making a meaningful impact. As these regions presents the most compelling opportunities due to the large amount of unmet needs and untapped market potential. Moreover, Henco Pezij sees this research endeavour as a stepping stone toward fostering more innovative developments within this market segment.

As the developing country market segment is chosen, further specification is needed. Pointed out by several stakeholders during interviews, Kenya exhibits clear shortages in wheelchair availability. As a result, Kenya is chosen as a promising developing country that hold possible opportunities for PEZY.

Chapter 06

The Kenyan Market

Kenya serves as the focal point of the market research, hosting numerous interesting aid organizations and both local and international manufacturers, some of which are exploring local production. Previous market research established an initial network of market players in Kenya, providing the best opportunity to gain in-depth information about a developing country.

This study explores how individuals in Kenya obtain wheelchairs, investigates the market supply chain, identifies potential stakeholders for PEZY, and examines existing wheelchairs in the market along with their driving factors.

6.1 The Context of Kenya

To map the wheelchair market in Kenya and comprehend its overall dynamics, initial research was conducted into the context of Kenya. This involved examining general demographic statistics of the Kenyan population, the specifics around disabled people, the overall assistive tech environment, and the structure of healthcare in Kenya.

6.1.1 Demographics

Density & Rural/Urban Areas

Kenya has a total population of 56 million (Worldometer, 2024) which is divided over the map shown in figure 16. In this figure the legend (Macharia et al., 2021) shows that the highest density of the population is south-west of Kenya. These highly dense areas show most of the urban population of Kenya which represents around 31% of the whole population. The other 69% is the rural population living outside of these cities (Macharia et a., 2021).

Poverty

The research of the World Bank (2023), see figure 16, shows the poverty distribution in Kenya. The different regions are indicated with a percentage of people living below the national poverty line. This poverty line is specified between urban and rural population. Where the poverty line for urban population is at 7.193 Kenyan shilling (51 euro) per month and for rural population this is 3.947 Kenyan shilling (28 euros) per month (KNBS, 2021). In 2014, 43% of the total population 47 million people was living below the poverty line (Pyatakova, 2023).

Religion

The research of the Kenya National Bureau of Statistics (KNBS) in 2019 reveals that the majority (85.5%) of the population identifies as Christian, with Protestants comprising 33.4%, Catholics 20.6%, Evangelical Christians 20.4%, African Instituted Churches 7%, and other Christian denominations 4.1% (see figure 17). Muslims account for 10.9% of the population, while 1.8% belong to other religions, 1.6% claim no religious affiliation, and 0.2% either don't know or did not answer (KNBS, 2019).

Within Christianity disabilities have multiple interpretations of what a disabled person is. In the old testament disability is a sin from god, whereas in the new testament disabilities are simply the creation of God where he made us each unique and gave us our own gifts and abilities (Templeton, 2021). In practice Mwarandu and Nzuki (2024) mentioned that in distribution projects there are only some villages in which this religious stigma is still around.

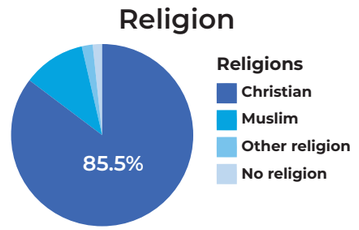


Figure 17: Religion in Kenya

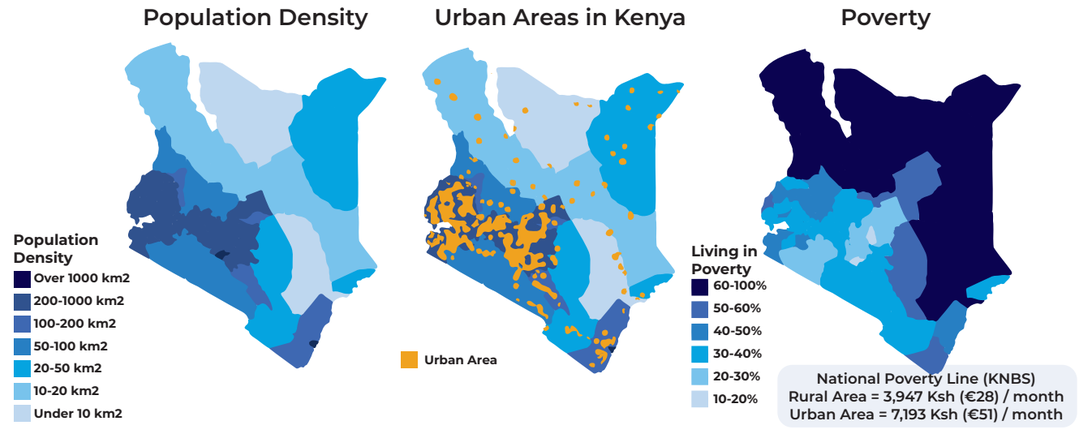


Figure 16: Kenyan Demographics

6.1.2 People with Disabilities

According to the Kenya Demographic and Health Survey of 2022 the amount of females having a disability in terms of walking or climbing stairs is in urban areas 5,6% and in rural areas 11.1% (KNBS & ICF, 2023). For males this percentage was 3,4% in Urban areas and 6,7% in rural areas (avg. 4,5% Urban Area and avg. 8,9% in Rural Area). Translating these percentages to the overall population and assuming equal amount of males and females in Kenya, figure 18 shows that there are 4,22 million Kenyans physically impaired.

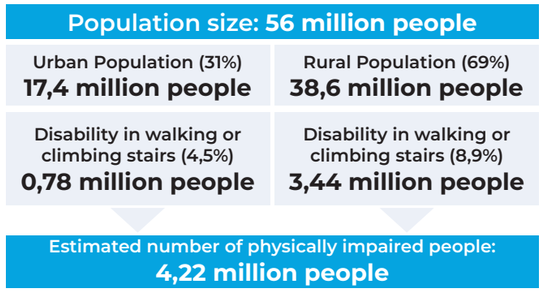


Figure 18: People with Disabilities

6.1.3 Healthcare System

Health insurance coverage in Kenya, as reported by KNBS and Inner City Fund (ICF) in 2023, showed that approximately one in four Kenyans has some form of health insurance. Urban areas exhibit higher insurance coverage rates (39% females, 41% males) compared to rural areas (20% females, 19% males), see figure 19. Health insurance coverage in Kenya rises with increasing wealth, from a mere 5% among the lowest wealth quintile to 56% (females) and 60% (males) among the wealthiest quintile, underscoring the influence of financial status on access to healthcare.

A recent report by the Global Initiative for Economic, Social and Cultural Rights highlights the challenges of accessing healthcare in Kenya, particularly for those in urban settlements. Despite the public health system theoretically providing coverage, it is underfunded and lacks resources, pushing people towards expensive private providers or informal alternatives. The National Health Insurance (NHI) fails to cover all medical expenses, leaving many vulnerable individuals unable to afford healthcare (Peoples Dispatch, 2022).

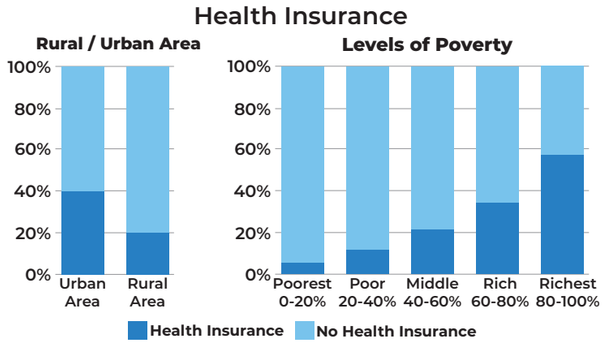


Figure 19: Health Insurance

6.1.4 Assistive Tech Environment

Qualitative findings suggest that People with Disabilities (PWD) receive material and monetary support primarily from faith-based organizations and local NGOs. Notably, organizations like Association for the Physically Disabled Kenya (APDK), African Medical & Research Foundation (AMREF), and Kenya Society for the Mentally Handicapped (KSMH) are frequently mentioned across different regions in Kenya for their contributions to improving the lives of PWDs by providing assistive devices such as wheelchairs (NCAPD & KNBS, 2008).

Accessing wheelchairs proves to be challenging, especially considering their cost. A standard wheelchair generally costs around Kenyan shilling 20,000 (approximately 140 euros), while more advanced models can exceed Kenyan shilling 100,000 (roughly 700 euros) (Mito, 2023). Consequently, families resort to manually lifting disabled individuals and placing them on chairs or the ground, leading to immobility as they rely heavily on assistance. This dependence on others renders people with disabilities unable to move freely. Recognizing this issue, the National Assembly Budget Committee (NABC) advocates for reforms within the National Health Insurance Fund (NHIF) to cover the expenses of assistive devices like wheelchairs for patients (Cure, 2020).

6.2 Mobility Disabled Users

User

Disabled individuals in low-income communities often find themselves heavily reliant on their surroundings for mobility. Many are forced to crawl or depend on others to carry them (Mwarandu, 2024; p.104). The combination of low income and inadequate healthcare exacerbates the number of disabled people, as described by Herr. Herr highlighted that simple, treatable conditions, such as diabetes, can lead to severe disabilities like limb amputations when left unmanaged (Herr, 2024; p.98).

For these disabled people, a narrative is created by non-governmental organizations (NGOs) that "a wheelchair is free." (Mwarandu, 2024; p.104). Consequently, wheelchairs are not purchased but rather provided as donations. Additionally, due to financial constraints, many disabled individuals are unable to afford a wheelchair on their own and thus look to these aid projects from either municipalities or NGOs (Kamau, 2024; p.121 & Mwarandu, 2024; p.104).

Accessibility

In most cases, recipients must travel to specific distribution points located in urban areas where local hospitals or rehabilitation centers are situated, see figure 20. These locations are often difficult to access for people living in rural areas who already struggle with long distances and limited transportation options. Financial constraints further hinder their ability to reach these distribution points (Nzuki, 2024; p.136). Some projects attempt to address this by transporting wheelchairs to outreach clinics in rural areas, allowing people to receive assistance closer to their homes (Nzuki, 2024; p.136). However, even with these efforts, receiving a wheelchair is not guaranteed due to shortages (Morgan, 2024; p.145). Therefore, individuals must meet specific criteria to ensure the wheelchair is a suitable fit. As Keith Herr (2024) described regarding such distribution projects, "The toughest thing is saying no to a person because in some cases the person is just not the right user for this basic wheelchair." Suggesting a significant demand for wheelchairs in these areas (Herr, 2024; p.98).

Challenges in Usage

After distribution, aid organizations often note that users may not fully understand how to operate their wheelchairs properly. Large, all-terrain wheelchairs are frequently left outside 24/7 because they do not fit inside homes (Childs, 2024; p.128 & Cooreman, 2024; p.86). This means that users are without their wheelchairs indoors and can only use them outside. The wheelchairs endure significant wear and tear due to rough, unpaved roads. Foldable wheelchairs present an interesting solution for transport vehicles, offering a more convenient option for both storage and mobility (Herr, 2024; p.98). Additional requirements for wheelchairs designed for developing countries can be found in Appendix D.

Conclusion

The insights presented highlight the diverse challenges faced by disabled individuals in low-income communities. Government and humanitarian projects play a crucial role in distributing these wheelchairs, which demands further investigation.

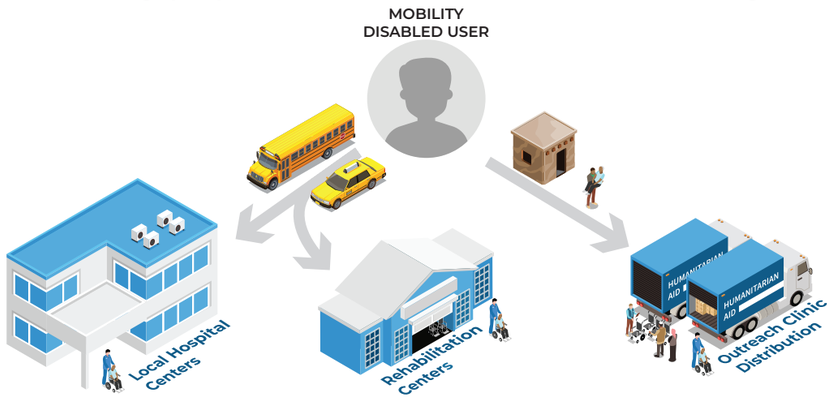


Figure 20: Transportation to wheelchair distribution locations

6.3 Market Supply Chain

For investigating the market supply chain, the traditional supply chain model by Lambert et al. (1998) was applied to map the Kenyan market.

Customer

Important to explain is that the end-user and customer are two different stakeholders. In this context, the end-user does not purchase the wheelchairs themselves but relies on provision by aid organizations. As a result, the end-user is not included in the supply chain, as shown in figures 21 and 22. The customer is purchaser of the design and distributor of the wheelchair. These distribution projects are carried out by the Kenyan government or aid organizations, which purchase wheelchairs and arrange transportation from the harbor or local factories to the desired locations, such as local hospitals, rehabilitation centers, or in-field distribution sites (Nzuki, 2024; p.136 and Cooreman, 2024; p.86). Providing these wheelchairs to people who cannot afford them themselves (Smith et al., 2024).

Original Design Manufacturer (ODM)

The owners of the wheelchair designs are all the wheelchair manufacturers, including Free Wheelchair Mission, Motivation, LDS Church, and APDK. These manufacturers own the wheelchair designs and closely collaborate with Original Equipment Manufacturers for production. These ODMs have a customer network to whom they provide wheelchairs. They secure donations and funding for wheelchair production and sometimes establish their own wheelchair distribution projects (Childs, 2024; p.128 & Herr, 2024; p.98).

Original Equipment Manufacturer (OEM)

The Original Equipment Manufacturer produces the wheelchair based on the design provided by the ODM. The local manufacturers such as APDK are in control of the design as well as executing production. Making them ODM and OEM, only needing to purchase components. Motivation and LDS Church have also set-up local production in Kenya being ODM as well as OEM. However Motivation and LDS Church normally produce just as the other international ODMs their wheelchairs in collaboration with OEMs in Asia (Søndergård, 2024; p.112). While local production benefits the Kenyan economy, the material and labor costs are not as favorable for wheelchair production, in part due to competition for skilled technicians (Mwarandu, 2024; p.104). According to Mwarandu, it is cheaper for local producers to have production take place in Asia. These complexities are less pronounced in Asian countries, but this requires higher transport costs and introduces more uncertainty with delivery (Childs, 2024; p.128). This emphasizes once again that currently production in Kenya, which would benefit its local economy, is not competitive enough compared to production in Asia which is more cost-efficient (Mwarandu, 2024; p.104).

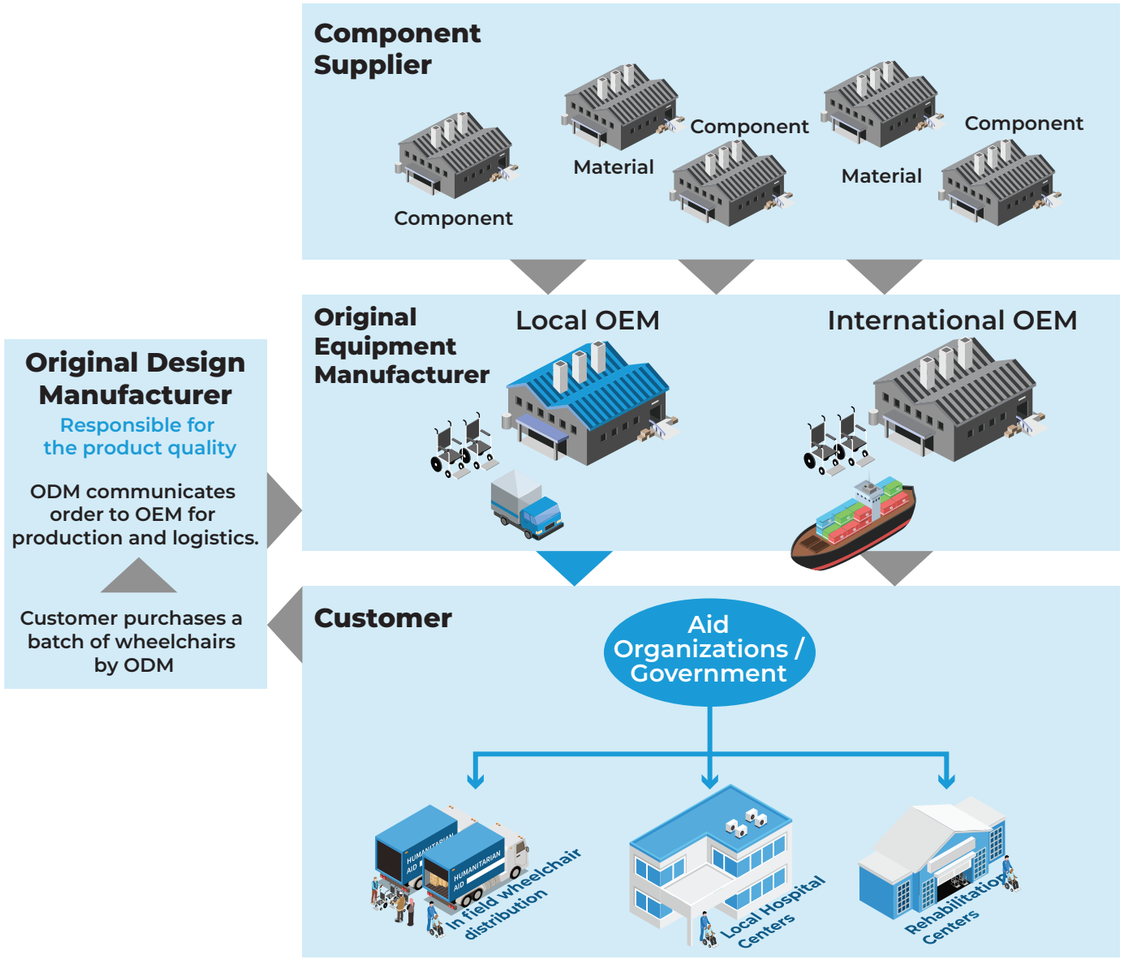


Figure 21: Market Supply Chain

Customer	Original Design Manufacturer	Original Equipment Manufacturer	Component Supplier
Organizations purchasing the wheelchairs	Responsible for designing the wheelchair and sells them for projects.	Manufactures the wheelchair based on the design provided by ODM.	Provides parts components used in the manufacturing of a product.
Kenyan Aid Organizations	ODM's active in Kenya	Local OEM	Unknown component suppliers of wheels and other components
		International OEM UNKNOWN (Located in Asia)	

Figure 22: Supply Chain Companies

Component Supplier

The component supplier provides parts such as wheels and handles. The ODM interacts only with the OEM, which simply purchases components from different specific component suppliers. There is little information about who in Asia is responsible for the components and resources. In Kenya, wheelchairs are made from mild steel due to financial reasons, but this material is heavy, which hinders the wheelchair's ease of use (Nzuki, 2024; p.136).

Conclusion

The market supply chain of the Kenyan wheelchair market shows that the end-user is not the customer. This means that, in addition to tailoring the product to fit the user as well as possible, it is also important to understand the demands and wishes of the actual customers. This will enable PEZY to align the wheelchair more effectively with the market needs.

6.4 Competitive Landscape

The competitive landscape of the wheelchair market in developing countries extends beyond Kenya alone. The active wheelchair ODMs (Appendix B) with specialized designs for rural areas not only provide wheelchairs to aid organizations in Kenya but are part of a vast network encompassing numerous aid organizations distributing wheelchairs worldwide. This entails a broader competitive landscape where these companies and wheelchairs can be compared. The Porter's Five Forces model (1998) is employed to illustrate the competitive landscape.

Thread of New Entrants

Establishing oneself as a new wheelchair manufacturer presents financial hurdles in an already financially challenging market. As stated in the initial market research, the medical device market is substantially smaller in terms of revenue compared to developed countries. Making it less favorable for new companies to enter this market segment. Manufacturers in this market have limited income and rely partly on donations and fundings (Mwarandu, 2024; p.104, Free Wheelchair Mission, 2023 & Motivation, 2023). This means that a broad support base is necessary to generate enough donations to establish and sustain an organization. Additionally, as there are no to limited private customers (Nzuki, 2024; p.136 & Cure, 2020) the number of customers is limited to organizations within this market. Wheelchairs are purchased in large quantities for distribution projects, and many customers have long-standing relationships with manufacturers (Cooreman, 2024; p.86 & Childs, 2024; p.128). This requires high competitiveness to change the status quo. Lastly, establishing a wheelchair company requires significant financial resources. Designing, testing, and bringing to market a complex product like a wheelchair takes time and incurs substantial investment efforts, being a risky business with the uncertainty of the future market (Stirling, 2008). Including all the product tests a wheelchair must undergo to obtain specific certification (Vervoorn & Nieuwendijk, 2024; p.85). So due to the fact that the market is financially challenging, the high costs of establishing a wheelchair company and the limited amount of (available) customers, the threat of new market entrants is not very high.

Thread of Substitute Products

First of all, in order for a product to become a substitute, it needs to offer better quality than current wheelchairs or at a lower cost (Porter, 1998). Investigating the current offer gives insights in potential opportunities for PEZY, where several categories can be identified: basic, folding, active, children's, postural support and all-terrain wheelchairs specifically made for developing countries (see Appendix B). An interesting insights is that wheelchairs have had limited real innovations over the last couple of years, where for example the designs of Motivation and Free Wheelchair Mission are more than a decennia old (Childs, 2024; p.128 & Free Wheelchair Mission, 2023). Furthermore in terms of quality, none of these wheelchairs

Figure 23: Competitive Pricing per category

offer custom-made options, as they contain standardized sizes that enables affordability. In terms of providing a new wheelchair at lower costs the competitive pricing per wheelchair category is shown in figure 23. With Free Wheelchair Mission providing high cost-efficiency, however it compromises optimal ergonomic seating (Sprigle, 2023).

Bargaining Power of Customer

The bargaining power of customers is influenced by multiple factors. First of all, there is a limited amount of choice due to the small number of wheelchair ODMs to choose from, especially when looking for a specific wheelchair category (Appendix B). For example, Cooreman explaining that wheelchairs with a high backrest are expensive, but as there are no alternatives they settle for the more expensive ones for their projects. However, the main emphasis for both the ICRC and UNICEF in selecting suitable wheelchairs for distribution projects is that the wheelchair meets European Medical Device Regulations, specifically the ISO7176 Certification (Cooreman, 2024; p.86 & Søndergård, 2024; p.112). This shows limited bargaining power where customer simply relies on the supplier.

Bargaining Power of Supplier

In terms of bargaining power, a supplier (ODM) would normally benefit from a relatively small number of market players (Cook, 2024). In this instance that is not the case. This can be explained by the involvement of donors and funding organizations as ODMs are dependent on their support in terms of funding or technical assistance. This results in these ODMs carrying out their work effectively (Uddin & Bellal, 2019). In this case ODMs supply cost-efficient wheelchairs while maintaining a high program-expense ratio (Herr, 2024; p.98 & Free Wheelchair Mission, 2023).

Competitive Landscape

Overall, entering this market requires considerable time and effort, as there is little money to be made and tight customer-supplier relationships that make it challenging to compete. Even having limited to no wheelchair innovations in the last decennia, indicates that within this market the competition amongst manufacturers is limited. However, the threat of substitution exists in both product enhancement and price improvement, which also immediately provides opportunities for PEZY to enter the market with their wheelchair.

Chances for Pezy

For PEZY, this means that if they are willing to enter this market, they must have the financial means to afford a wheelchair development process (Chen et al., 2019). Additionally, it's crucial to capitalize on the existing market by seeking for a customer base and, most importantly, be more innovative than competitor its efforts in wheelchair designs (Hultink, 1997). If entering the market independently entails too much risk, alliances could be interesting alternatives to still exert influence on the market with newly developed wheelchairs (Magni & Pezzi, 2019).

Chapter 07

Value Proposition

PEZY.

INGENIOUS PRODUCT DEVELOPERS

The value proposition clarifies the opportunities which arose in the market research and further advances with PEZY's value proposition to address market needs.

7.1 Market Opportunities

Market Environment

The market environment of developing countries, see figure 24, was chosen for being able to make a huge impact due to the lack of wheelchairs. Having a moderate competitive landscape also provides opportunities in implementing competitive strategies for PEZY to realize this impact. However the market has a complex business model as there is limited business and most of them are long term relationships between customer and manufacturer. Investigating how to better provide the customer with their needs compared to the manufacturer can create a competitive position within the market.

Wheelchair Offer

Analysis reveals that manufacturers prioritize cost efficiency in their production processes. Some aim to minimize costs, such as Free Wheelchair Mission, while others like Motivation focus on offering durable products, with wheelchairs lasting over 15 years (Childs, 2024; p.128). Functional usability, including efficiency and transportation compatibility, is also a key consideration. Manufacturers tailor their offerings to address specific user demands, often providing standard sizing with the option for minor adjustments to suit individual needs.

Wheelchair Demand

For aid organizations and governments, affordability is important due to budget constraints in healthcare aid projects. Additionally, certification for wheelchair qualification is crucial, ensuring that the product is well-designed and durable. Adequate fit in a wheelchair is emphasized by aid organizations, as an ill-fitting wheelchair could result in even more discomfort for the user or even injury (Søndergård, 2024; p.112 & Cooreman, 2024; p.86).

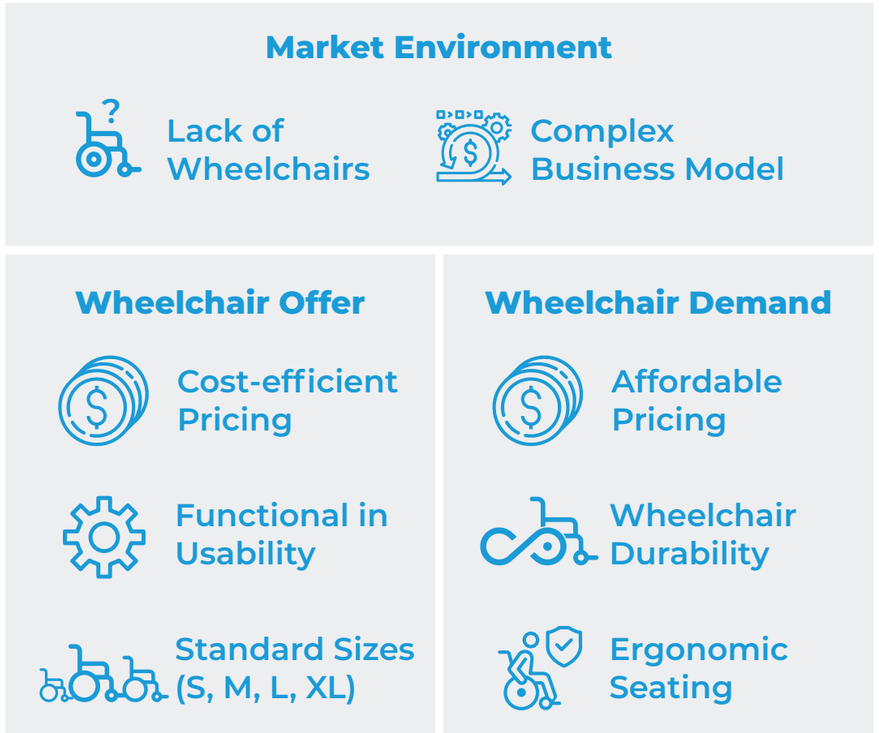


Figure 24: Market Opportunities

7.2 PEZY Value Proposition

The market opportunities alongside the knowledge & experience of PEZY in wheelchair design presents an interesting value proposition (see figure 25):

“Self-build, custom-fit and affordable wheelchair that redefines mobility aids”

This innovative design offers a unique blend of personalization and cost efficiency, setting it apart from traditional wheelchairs.

Self-Build
Imagine assembling your own wheelchair, just like building furniture from IKEA. This concept idea contains of multiple different parts which can be transported easily in small packages. At location, the concept allows for easy installation, putting the power in the user’s hands to customize and adjust the wheelchair to their preferences.

Custom-Fit
One size does not fit all, especially when it comes to mobility devices. With this wheelchair, the frame and seating can be tailored to specific user dimensions, ensuring optimal comfort and ergonomic support. By adjusting the measurements of for example tubes and components, PEZY can create a truly personalized experience for each user.

Affordable
Accessibility should not be hindered with a hefty price tag. By simplifying the design and utilizing repeatable parts, we’ve crafted a wheelchair that is not only functional but also budget-friendly in terms of production and shipment. This affordability makes mobility more accessible to those who need it most.

Incorporating these key features, our self-build, custom-fit, affordable wheelchair concept offers a groundbreaking solution to enhance independence and comfort for users worldwide.

Figure 25: Value Proposition

7.2.1 Value Proposition Storyline

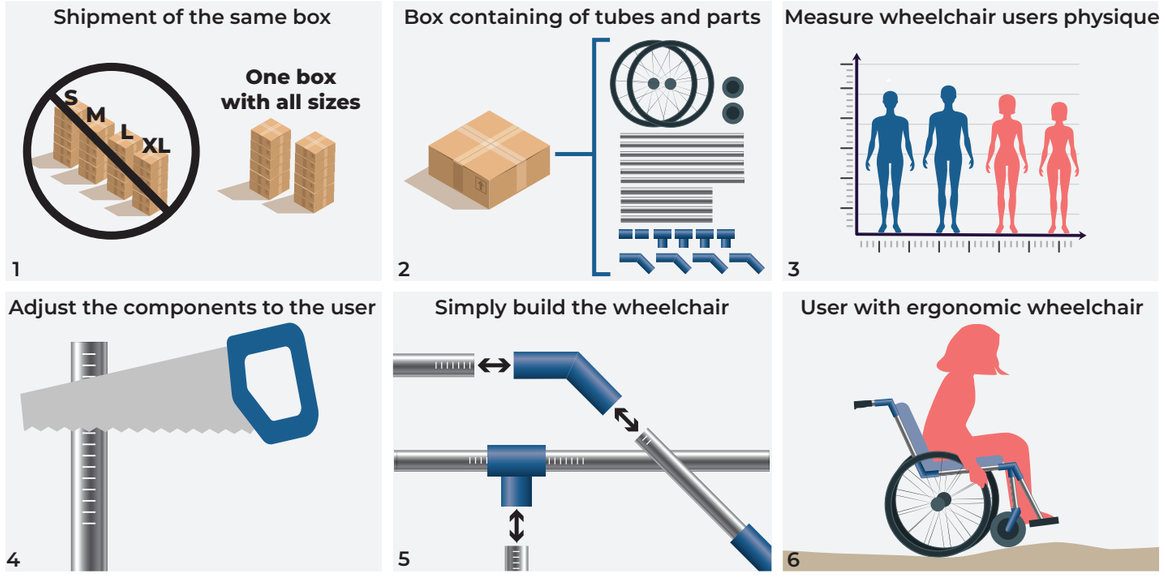


Figure 26: Value Proposition Storyline

Alongside the value proposition of this self-build custom-fit, affordable wheelchair a storyline shown in figure 26 further explains the potential vision of what this new proposed wheelchair ‘could’ offer.

The universal components, tubes, bars and wheels, enable a more simple shipment as one box entails all sizes. By assessing the users physique, wheelchair components can be specifically adjusted to their measurements. The following step is simply putting the wheelchair together with the use of components to build a frame. This way the user is fitted with a wheelchair which encompasses all necessary measurements for an optimal ergonomic wheelchair posture.

7.2.2 Why PEZY?

With this project, PEZY has already demonstrated interest in applying their knowledge and expertise to make a positive impact. Despite the risks associated with the market and the development process, PEZY is still interested in exploring the possibilities of a self-build, customizable, and affordable wheelchair.

PEZY is one of the few companies that are able and willing to truly offer high-quality innovation in the wheelchair market for developing countries. PEZY is a recognized design firm in the Netherlands with extensive experience in product development. In addition, through their venture O4 Wheelchairs, they have over 20 years of experience in custom wheelchairs and can translate this knowledge well to other applications, such as those in developing countries. Finally, PEZY has two production facilities that can affordably realize the production of prototypes, models, and/or initial batches.

Chapter 08

Concept strategies

The aim of this chapter is to lay out a framework for PEZY to proceed with the possible development of a new wheelchair. As PEZY is merely a design agency with limited experience in this market, alliances could offer interesting strategies to enable wheelchair development. The subsequent strategies will serve as the initial iteration to evaluate how PEZY views potential strategies and further advance the most promising strategy.

8.1 Strategic Alliances

Strategic alliances in international business provide benefits such as easier market entry, risk sharing, shared knowledge, and synergy, as outlined by Bernadette Soares in 2007. These alliances could help reduce costs and overcome obstacles like competition and regulations, while also offering access to valuable expertise, leading to advantages in market entry and research & development (Soares, 2007).

Furthermore the paper of Kang and Sakai (2000) explains that firms enter international strategic alliances to reduce production and research costs, enhance market presence, and access intangible assets like managerial skills and market knowledge. An alliance provide strategic flexibility to adapt to changing market conditions and new competitors, with high-tech sectors driven by innovation and advanced technology development, and other sectors focusing on sharing sales and distribution networks. The driving forces behind international alliances can be categorized into economic, technological, and governance factors (Kang & Sakai, 2000).

Economic Factors

Intensified global competition and the need for global restructuring drive the formation of international strategic alliances. This enhances competitiveness through cost-saving synergies and market access. An alliance focus on consolidating tangible assets, such as production facilities and distribution networks, market expansion, cost minimization, and technical expertise for long-term profit optimization.

By partnering with funding organizations, PEZY can access additional resources and expertise to develop a wheelchair suitable for developing countries and scale up production. Collaborating with wheelchair manufacturers enables PEZY to consolidate tangible assets like production facilities and distribution networks, minimizing costs and maximizing efficiency.

Technological Factors

Technological advancements facilitate cross-border collaborations by easing communication and sharing of knowledge. Rising research costs and shortening product life cycles prompt technology-related alliances aimed at gaining economies of scale and scope in research and development. These alliances are prevalent in knowledge-intensive sectors.

Partnering with wheelchair manufacturers (ODMs) allows PEZY to leverage technological advancements and expertise in wheelchair design and production, enhancing the quality and efficiency of their products. Collaborating with aid organizations, which often have extensive knowledge about wheelchair requirements in developing countries, enables PEZY to incorporate crucial insights into their design process, ensuring the suitability and effectiveness of their wheelchairs for the target market.

Governance Factors

Market liberalization and deregulation involve reducing restrictions and barriers in markets and removing government regulations and controls from industries, respectively, thereby fostering more freedom, competition, and innovation among businesses.

By forming partnerships with aid organizations, PEZY can navigate regulatory challenges and gain access to new markets in developing countries, facilitated by the encouragement of regional market integration. Collaborating with wheelchair manufacturers (ODMs) complements these efforts by streamlining sales and marketing activities, leveraging the expertise and networks of established industry players.

8.1.1 Interesting Companies

Forming alliances with the organizations shown in figure 27 can greatly benefit PEZY in its product development of wheelchairs, particularly by addressing the current lack of innovation in this area.

Figure 27: Companies for alliances

Funding Organizations

The Global Disability Innovation Hub (GDI Hub) offers extensive experience in disability innovation and has successfully collaborated with entities like TAI and Motivation to improve assistive technology in Kenya (Kamau, 2024; p.121). With operations in over 60 countries GDI hub works with more than 70 partners through our AT2030 programme, delivering projects across a portfolio of £50m (Global Disability Innovation Hub, 2021). Showing GDI Hub's substantial R&D support.

ATscale, as a cross-sector global partnership, is dedicated to transforming lives through assistive technology. Their focus on raising awareness, increasing access to high-quality and affordable AT, and investing in market interventions aligns well with PEZY's goals. Their recent funding initiatives, such as the three-year Investment Plan to reach more than 275,000 additional AT users by 2025 in Kenya, highlight their commitment and potential as a valuable ally (ATScale Global Partnership, 2024).

Aid Organizations

The International Committee of the Red Cross (ICRC) has a humanitarian mission that includes a physical rehabilitation program providing wheelchairs to disabled people (ICRC, 2010). Despite its limited reach in wheelchair distribution (Cooreman, 2024; p.86), ICRC's established infrastructure and commitment to disability support make it a strategic partner for expanding wheelchair accessibility.

UNICEF ensures the availability of assistive and inclusive supplies globally, with a strong focus on wheelchairs. Their recent introduction of eight types of wheelchairs into their Supply Catalogue demonstrates their proactive approach (UNICEF office of innovation, 2020). UNICEF's established global network and expertise can significantly help PEZY's distribution and innovation efforts.

Wheelchair Manufacturers

Free Wheelchair Mission boasts a large annual production of 60,000 units, supported by substantial funding and a vast network of humanitarian organizations for distribution. Their production is based in Asia, but they have not introduced a new model since 2013, indicating a significant lack of product innovation (Free Wheelchair Mission, 2023).

Motivation has a well-established production line in Asia and maintains long-term partnerships with major organizations like ICRC and UNICEF. Despite their strong production capabilities, they lack a dedicated product development department, resulting in minimal innovation. They are, however, exploring local production in Kenya (Childs, 2024; p.128).

APDK operates locally in Kenya with its own production facilities and strong governmental ties. They function as both an ODM and OEM, demonstrating production versatility. However, like the others, they lack significant technological innovation (Nzuki, 2024; p.136).

Conclusion

Alliances with these organizations can offer PEZY diverse opportunities to enhance technological innovation in wheelchair design and production and economic advantages in terms of market entry costs. PEZY's design expertise will add significant value to these partnerships as well, driving advancements in wheelchair technology and improving mobility solutions globally.

8.2 Strategy Ideation

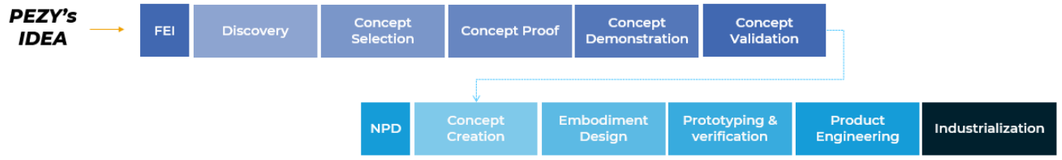


Figure 28: Design Process of Pezy (FEI & NPD)

Each of the four strategies has its own unique proposition. What all strategies have in common is that there are three factors for realizing a wheelchair. The importance of this wheelchair development lies in realizing strategic alliances. The Front End Innovation (FEI) & New Product Development (NPD) model from PEZY advised by Vervoorn (2024, p.153) is used to describe the different strategies (see figure 28).

Strategy 1

Figure 29: Strategy 1

The first strategy shown in figure 29 envisions swift alliances, involving a manufacturer who will work with PEZY to design the wheelchair. This alliance ensures quick involvement of parties in the project and enables the product to be effectively realized with the help of the customer and factory network. This development will be financed by the manufacturer, who is financially capable of hiring PEZY as a design firm to actualize the wheelchair. As manufacturers are struggling with finances, only Free Wheelchair Mission could be able to finance such an R&D project.

Strategy 2

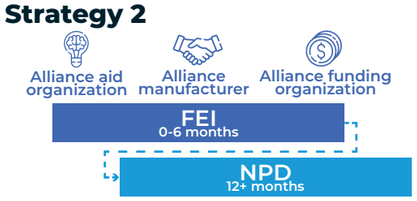


Figure 30: Strategy 2

The second strategy shown in figure 30 is almost identical, except for the financing aspect. The majority of wheelchair manufacturers struggle with low incomes, relying on donations and funding, which can be challenging. Consequently, they have little money available for wheelchair R&D. To finance the project, efforts will focus on securing Assistive Technology funding to carry out the R&D.

Strategy 3

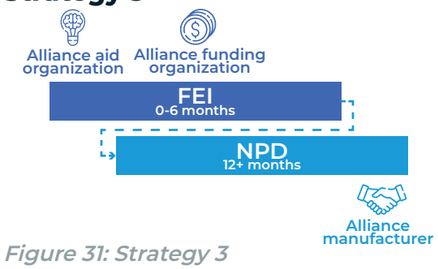


Figure 31: Strategy 3

In this strategy shown in figure 31, initially no alliance will be pursued with a manufacturer. PEZY will independently seek AT funding to finance the wheelchair's R&D. At a later stage, once PEZY has a wheelchair design ready for market entry, alliances with wheelchair manufacturers will be explored. This could also result in product sales.

Strategy 4

Figure 32: Strategy 4

The final strategy shown in figure 32 also involves developing the wheelchair independently and securing AT funding. After the wheelchair's development, PEZY will seek IP rights to establish an advantageous position in the market by fostering innovation and realizing brand recognition (Fromer, 2012). This allows PEZY to offer the design to multiple manufacturers and continue its development without fear of the product being copied by other market players.

8.3 Strategy Development

PEZY's Strategy Evaluation

During the strategy scoping with CEO Henco Pezij, Group Leader/Operation Manager Vincent van Tol, and Project Lead Mark van der Schoot, insights emerged regarding PEZYs vision and potential strategies.

Strategy time pacing

The overall time pacing of the strategy was not in line with PEZY's vision. They elaborated on product development merely being the beginning of a long-term strategy for PEZY. The process, after realizing the wheelchair, would also provide an interesting view on market viability.

Validate market interest

Validating market interest through customer feedback is crucial for PEZY to understand cost and product demands. Acquiring knowledge from customers aligns with PEZY's objectives and is reflected in all four strategies. This process could also lead to further collaboration through pilot tests.

Finance

PEZY does not prioritize quick financial returns for designing the wheelchair. They are willing to invest themselves in product development if market validation shows to be interesting.

Collaborations

Despite having minimal R&D resources, PEZY acknowledges competition from other wheelchair manufacturers (ODMs). Therefore, PEZY is unwilling to take the risk sharing details about their product proposition. This excludes strategies 1 and 2, as they focused on early-stage collaborations with manufacturers.

Long-term possibilities

PEZY is interested in securing Intellectual Property (IP) rights to enhance its competitive position and concentrate further on product development. This approach aligns with strategy 4. Additionally, PEZY envisions another option: selling the wheelchair design to a manufacturer (ODM) once the development of the wheelchair reaches a sufficient level. This option aligns with the core principles of strategy 3.

Both approaches present a compelling and profitable strategy for PEZY. Strategy 3 is considered a viable alternative if strategy 4 proves ineffective.

New Strategy Proposal

The new proposal, presented in figure 33, represents not only the design process (FEI and NPD) but also includes long-term planning with a product implementation plan and a business plan. Feedback from PEZY on the four strategies led to alignment with strategies 3 and 4, which are ultimately implemented in all three stages.

The first stage, the product development plan, aims to achieve a functional wheelchair, with steps such as market validation and securing R&D funding facilitating this process.

Subsequently, a product implementation plan outlines the post-design process, focusing on validating the product's capabilities in the field. This iterative approach aims to enhance the wheelchair's suitability for its environment.

Additionally, the long-term plan for PEZY offers two options. The first involves acquiring intellectual property rights to strengthen PEZY's competitive position and potentially establish a new venture. The second option entails selling the design to wheelchair manufacturers, potentially fostering further collaborations. This revised strategy provides a clearer overview of the pre- and post-product development phases, with the overarching goal of positively impacting the wheelchair market.

Figure 33: New Proposed Strategy

Chapter 09

Market Entry Strategy

The Market Entry Strategy has been formulated through a strategic roadmap, outlining the various stages for bringing the product to market. The tactical roadmap also considers PEZY its interests in market validation (the extent to which the product is validated by the market) and PEZY its own investments (in product development and production) throughout the process. Market validation meetings with key players produced insights, including actionable points, to map out the final market entry strategy for PEZY.

9.1 Strategic Roadmap

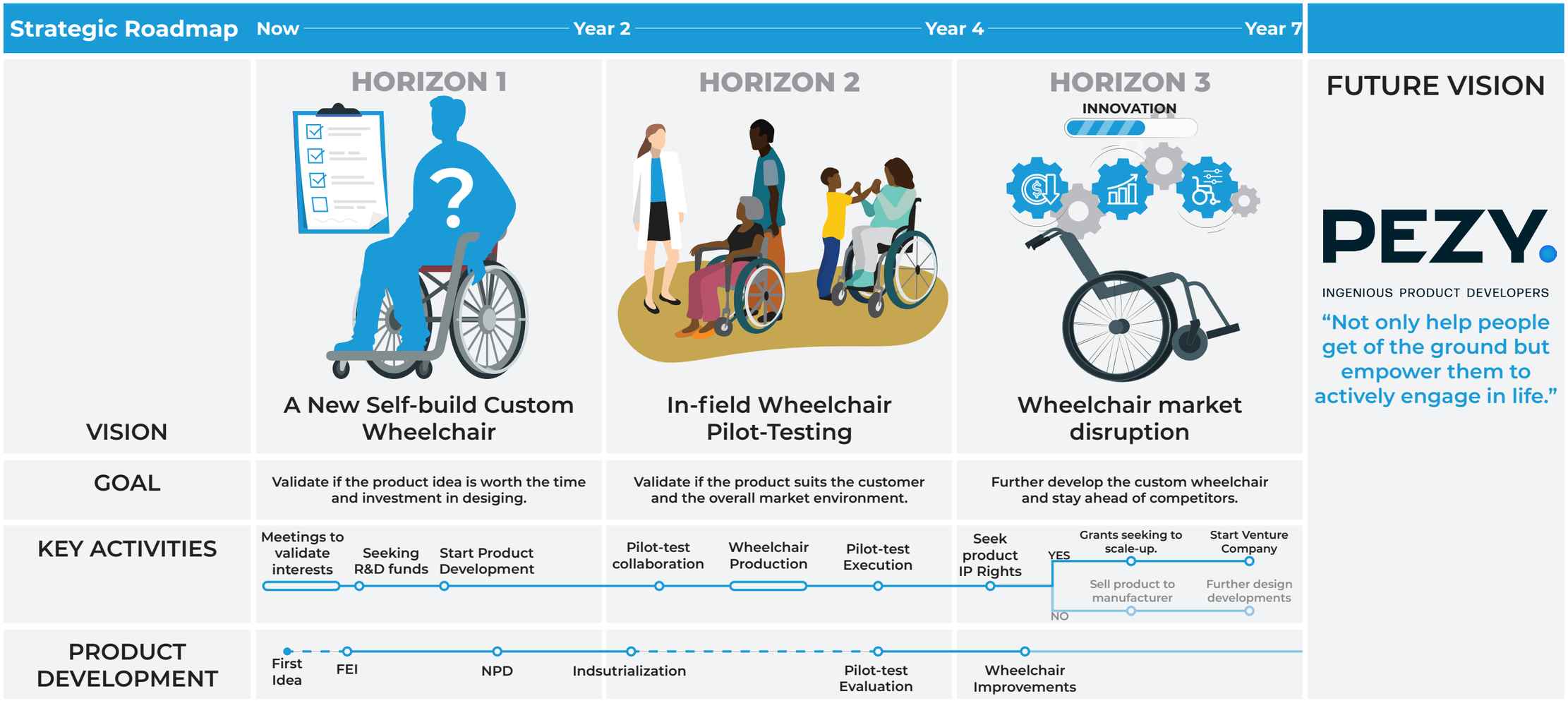


Figure 34: Strategic Roadmap

A roadmap visually tracks and strategically explores future design innovations. The three horizons model from Simonse (2018) focuses on three strategic life cycles projected onto a future timeline. The first horizon concentrates on design innovation, the second envisions new user value segmentations, and the third highlights the disruptive new value proposition of a highly promising upcoming business (Simonse, 2018). The roadmap illustrated in figure 34 is explained through these three horizons.

Horizon 1

Executing the first phase is vital for PEZY. According to the conducted research, the product proposition aligns well with the market. However, it has not yet been translated into immediate interest from potential buyers (customers) for this new wheelchair. Therefore, the product must be validated by market players to ensure there is direct demand from users and that it meets customer needs and requirements. This validation will be the starting point for wheelchair development, where PEZY will actively work on Front-End Innovation and New Product Economics to create a self-build, custom-fit, affordable wheelchair by the end of the first Horizon.

Horizon 2

The second horizon will focus on implementing the wheelchair into the context of developing countries. This will involve collaborating with an aid organization, which is also a customer, to further validate the product's utility. Insights can be obtained by manufacturing a small batch of wheelchairs and installing them locally in collaboration with aid organizations. This pilot-testing phase is crucial for proving the concept and making additional design improvements to optimize the product for users and customers in this market.

Horizon 3

The final horizon addresses how PEZY should bring their new wheelchair into the market to reach mobility impaired users. Currently, due to the small production scale, only a small part of the wheelchair shortage is addressed. For the future, PEZY aims at producing wheelchairs on a large scale to address a bigger part of the wheelchair shortage in developing countries. Initially, PEZY will seek to obtain IP rights for the wheelchair, creating a favorable market position to establish their own venture focused on design and production (ODM). Alternatively, PEZY could opt to sell the design to manufacturers, such as Free Wheelchair Mission, with their large-scale production and limited wheelchair innovations, allowing PEZY to concentrate exclusively on design enhancements.

9.2 Tactical Roadmap

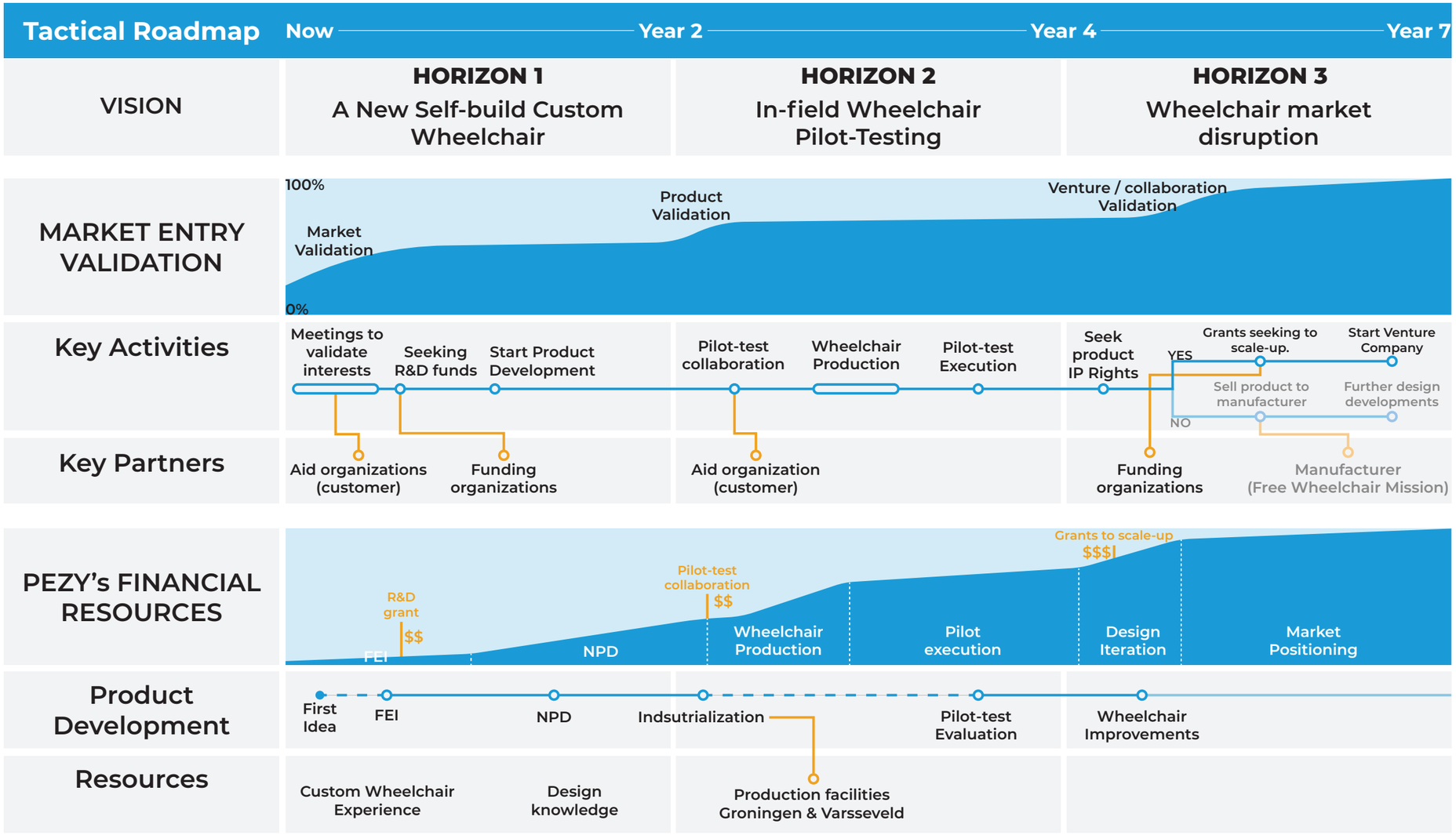


Figure 35: Tactical Roadmap

The tactical roadmap depicts the three horizons in even more detail, coherently linking key activities, market players, product development, and resources. Additionally, it focuses on market validation and PEZY its financial investments. Market validation ensures the product is validated by market players to prevent a misfit between product and market. Through effective market validation, the market risks become clearer, potentially increasing PEZY's financial investment in the product, as shown in figure 35.

Horizon 1

In the first horizon, the focus is on validating the product in the market. Market players, such as aid organizations like the ICRC, will be approached. Feedback on the product proposition will enable PEZY to better assess how well the product fits in this market. This will provide the green light for PEZY to begin product development (FEI & NPD) of the wheelchair, investing their own time and money. Additionally, PEZY will seek financial support alongside their own investments by approaching funding organizations with their proposition to innovate wheelchair designs in the Assistive Technology sector.

Horizon 2

The second horizon builds on the contact with these aid organizations, aiming for PEZY to set up a pilot test in a developing country with an aid organization to gain useful insights about the product. This will help PEZY determine not only market interest but also validate the product's functionality within this market. To achieve this, PEZY will produce the designed wheelchair in their own facility in Varsseveld. The small batch produced will be shipped to the location to gather insights about the product. This collaboration could provide some financial support from aid organizations such as the ICRC, although PEZY will still need to make significant investments in production and potential costs associated with executing the pilot test. Feedback from this test will be incorporated into the second product iteration, making the product even more suitable for the market.

Horizon 3

Prior to the final horizon, the product has been validated, tested, and improved. The primary focus of this last horizon is to introduce the wheelchair to the market. Given the significant costs associated with obtaining IP rights and setting up a venture company for large-scale wheelchair production, PEZY will seek additional financial support from funding organizations. Alternatively, PEZY might negotiate with wheelchair manufacturers to sell the product and potentially be hired as a design firm for further wheelchair innovations.

Throughout these three horizons focused on product development, implementation, and market launch, PEZY advances toward their future vision: "Not only help people off the ground but empower them to actively engage in life."

9.3 Market Validation

9.3.1 Setup

To implement this roadmap, PEZY its proposition must be validated by market players. The interested market players previously contacted are mapped out in figure 36.

Market Players

The two aid organizations, the ICRC and UNICEF, are well-known for providing global health assistance. In prior communications, interest is expressed in PEZY its search for wheelchair innovations for developing countries. Additionally, the GDI Hub, an innovation hub supporting developments in assistive technology, is a potential funding partner that could financially support the wheelchair development. Lastly, Free Wheelchair Mission and Motivation are wheelchair manufacturers active in developing countries, including Kenya. These organizations are competitors in this strategy but are worth monitoring due to their significant market share in production.

The ICRC and GDI Hub have been successfully approached to present PEZY's proposition. These meetings serve as the initial market validation for the product.

Figure 36: List of Market Players

9.3.2 Execution

To effectively conduct this market validation, a pitch deck (see figure 37 and appendix F) is created for PEZY to clearly convey their message. Two variants of the pitch were developed to cater to the different interests of the organizations. The pitch deck for aid organizations focuses on collaboration opportunities, while for funding organizations, the emphasis is on realizing innovations in the wheelchair industry.

Figure 37: PEZY's Innovation Pitch Deck

9.3.3 Results

The market validation yielded concrete results, including financial support from the GDI Hub. Additionally, it sparked interest in the product and potential collaborations with the International Committee of the Red Cross. These new insights, see Appendix G, contribute to an additional iteration of the generated roadmap.

Firstly, the ICRC and GDI Hub have confirmed their interest in new wheelchairs in this market, including potential funding opportunities. Subsequently, the ICRC has shown willingness to participate in developing and testing a new wheelchair design. However, distribution through the ICRC is unsuitable because they rely heavily on their own technicians for wheelchair assembly and lack sufficient personnel. Although PEZY's wheelchair concept aims to be self-explanatory in terms of assembly and repair, making specialized technicians unnecessary, the ICRC did not see this as a viable option. Therefore, large-scale distribution does not align well with the ICRC, also showing no interest in scaling up their human resources to potentially handle distribution.

9.4 Extensive Roadmap

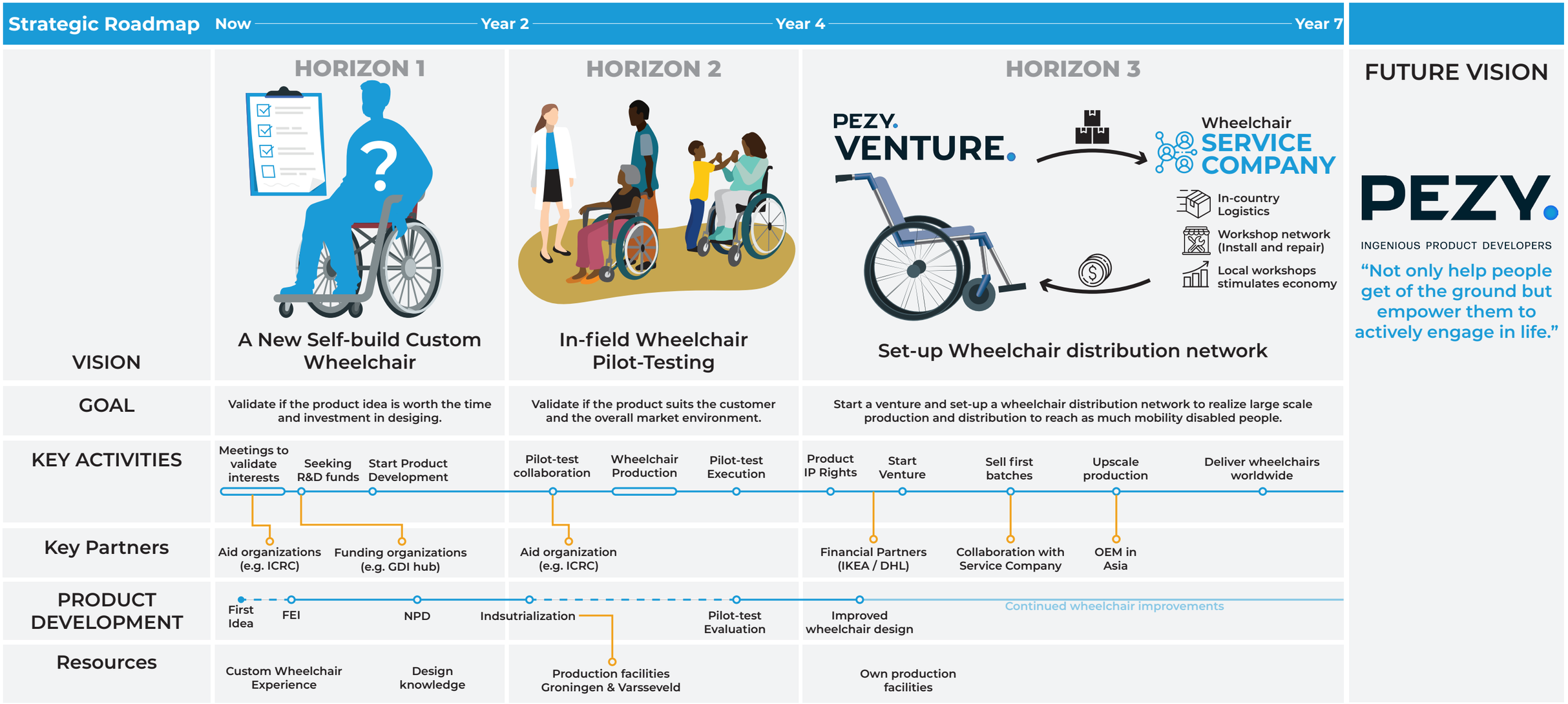


Figure 38: Extensive Roadmap

The market validation results implies that PEZY needs to present a different proposition to achieve large-scale production. While horizons 1 and 2 align with market validation, horizon 3 needs to be reformulated. This extended roadmap shown in figure 38 will focus on the complete market picture in horizon 3, and given that the ICRC highlighted a shortage of human resources for large-scale wheelchair distribution, an alternative organization must be found.

Horizons 1 & 2

The first two horizons of the product development trajectory have been validated by both market players, in terms of direct interest in the product for cocreation and potential funds. Meaning PEZY will begin the product development process and also apply for additional funding.

Horizon 3

The final horizon remains unchanged during the initial steps, with PEZY aiming to secure IP rights for the wheelchair design and establish a venture by setting up a production line. Here, PEZY’s venture will seek financial support from larger foundations potentially aligned with PEZY’s vision, such as IKEA Foundation (due to the wheelchair’s assembly like an IKEA kit) or DHL (for wheelchair transportation).

The second part, regarding how the wheelchair becomes available in the market and how the venture relates to the market, has not been defined previously. Previously, the target customers were aid organizations like the ICRC, which distribute wheelchairs on a relatively small scale. Now, PEZY will explore alternative customers. This includes organizations that, like the ICRC, provide logistical services to transport the boxes to the location and subsequently install and repair the wheelchairs to user specifications. With this new wheelchair, customers will find it easier to set up workshops since there is less demand for skilled technicians to install and repair the wheelchairs. This approach can also positively impact the local economy.

In this horizon, PEZY will focus on forming such partnerships with customers. Initially, PEZY will look at establishing its own production facilities. Over time, as production needs to scale up, PEZY plans to outsource manufacturing to Asia. This strategy ensures both quality and cost-effectiveness in meeting the increasing demand for the wheelchairs.

9.5 Wheelchair Distribution Network

In a co-creation session with Vincent van Tol and Mark van der Schoot, a new market overview has been created to identify the necessary market players for large-scale wheelchair distribution. This model requires one party to focus primarily on the product and another to provide on-site services for wheelchair installation and repair.

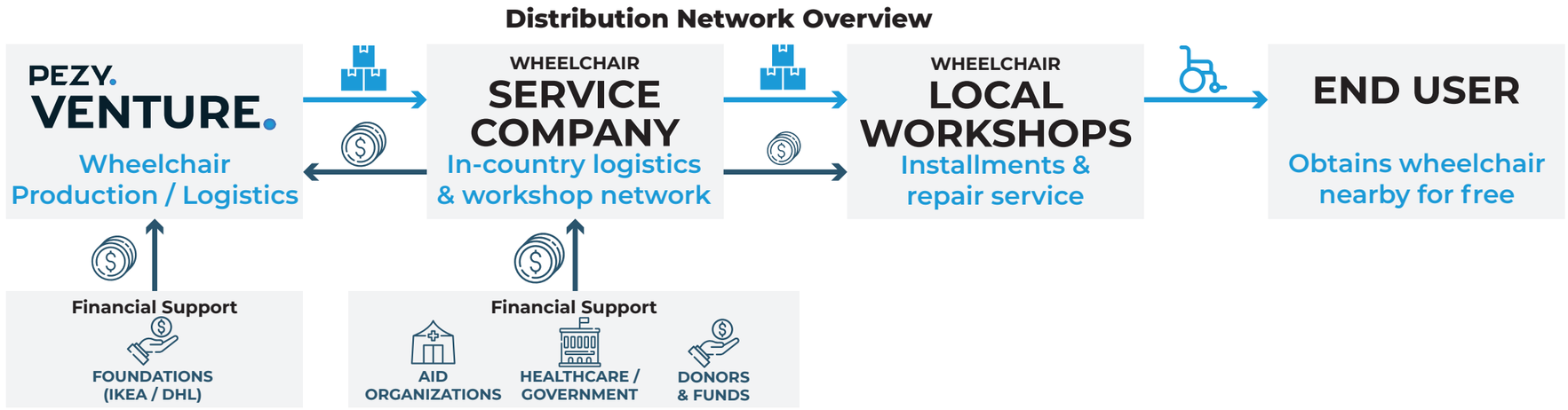


Figure 39: Distribution Network

PEZY venture

In this model, PEZY its venture will establish a venture that will function solely as the wheelchair manufacturer, also handling the logistics of shipping the boxes to the desired locations. The service company will simply place orders with PEZY its new venture, which will then produce and ship the wheelchairs to the required destinations. Initially, production will take place in the Netherlands (see figure 40) and will eventually be outsourced to Asia, where large-scale production is cheaper.

Wheelchair service company

The service company will play a larger role in this visualized market. Ideally, this company will be fully responsible for the logistical transport to the workshops, the installation of the wheelchairs, and their repair. The primary tasks include setting up local workshops where installation and repairs take place. Additionally, the service company will ensure that each workshop has a sufficient supply of wheelchair kits and that the quality of installation is maintained. These workshops can be run by local entrepreneurs who can install the wheelchairs themselves using the smart design, eliminating the need for specialized technicians from aid organizations. Figure 40 illustrates that countries like Kenya, where PEZY could utilize its current network, may be ideal for establishing these workshops in the initial phase, with the network gradually expanding over time.

Cash flow

This creates a complex system regarding cash flow. Figure 39 provides an overview of all parties and potential cash flow. The end-users of the wheelchairs still cannot afford to purchase them. Therefore, it is crucial for the service company to connect with parties which are interested in wheelchair distributions. Each country can look into

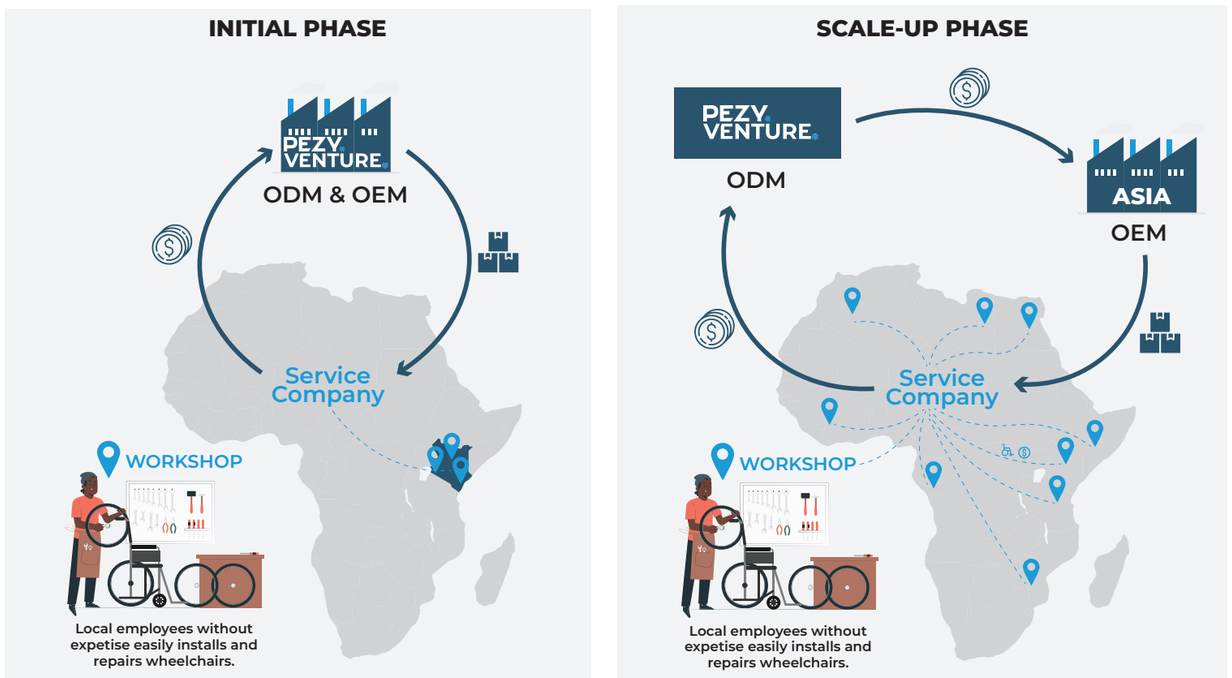


Figure 40: Distribution Network in phases

general healthcare, where, for instance, Kenya has poor wheelchair provision for insured individuals. This is partly because wheelchairs are not cheap. Additionally, other organizations, such as aid organizations like the ICRC or UNICEF, might need wheelchairs on-site but lack technicians for installation. Lastly, general funding parties and donors remain a lucrative source of income for this business.

The service company can then use this income source to finance the wheelchair production and logistics that PEZY must perform to get the wheelchairs to the location. Subsequently, they will have their own transport costs to the specific workshops and will financially support the local entrepreneurs.

Conclusion

This service company outlines what is needed to achieve large-scale production and delivery of wheelchairs in developing countries. Since current market players are not suitable for this, PEZY must look for other parties that can offer the same service. Additionally, there is an option for PEZY to set up this initial network in Kenya with a second venture, using funding and contacts within Kenya. Once this service company becomes large enough, it will become a standalone company where PEZY's production venture only acts as the producer in the system.

9.6 Business Models

A business model for PEZY its venture and the service company has been formulated to further explain how both entities can secure an advantageous position in this market. The innovative approach of PEZY will demonstrate the feasibility of large-scale production, given the significant demand. Figures 41 and 42 show the business model canvases of Osterwalder & Pigneur (2010) which describes the rationale of how both PEZY its venture and the wheelchair service company could create, deliver and capture value.

9.6.1 PEZY's Venture

The business model for PEZY its venture focuses on the production and shipping of wheelchairs. Their value proposition includes high-quality wheelchairs that are affordable and easy to assemble to user specifications. Unlike current wheelchairs, no specialized technicians are required. This product will cater to customers responsible for the service of installing and repairing wheelchairs, offering advantages in ease of installation and maintenance.

PEZY its venture will incur costs related to product development in the short term, with the main expenses being production, logistics, and maintenance/operational costs. Revenue will come from wheelchair sales, and the venture will actively seek financial partners for potential funding. Henco mentioned various partners to approach, such as the IKEA Foundation, which could be a good fit due to the wheelchair its self-built, DIY design similar to their product portfolio. Additionally, collaboration with a large transport company like DHL was suggested for support in logistics.

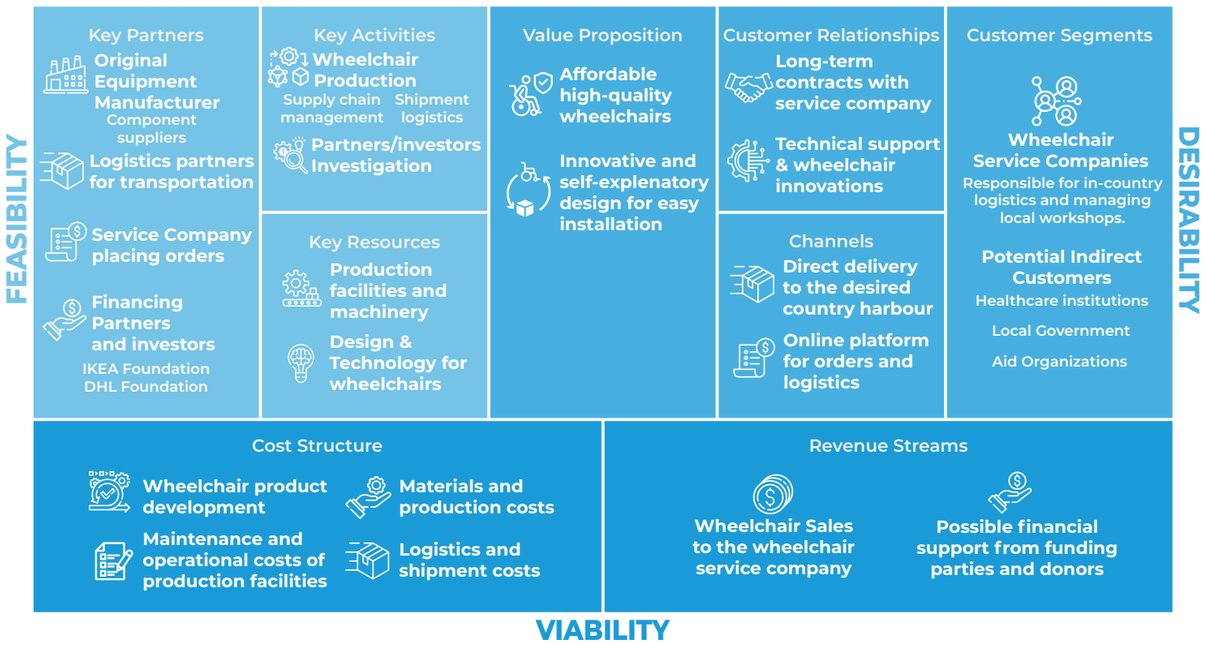


Figure 41: Business Model Canvas

9.6.2 Wheelchair service company

The service company will focus on providing service and building the necessary network. Their value proposition is the ability to offer high-quality local services for the installation and maintenance of wheelchairs. Workshops will boost the local economy by employing local workers who can assemble the wheelchairs without specific skills. This service targets end-users and could also appeal to local healthcare, governments, or aid organizations.

To achieve this, the service company needs a close partnership with PEZY its venture for wheelchair production and with local entrepreneurs to set up workshops. If the service company takes over wheelchair distribution from potential customers, these entities would become significant financial partners. For example, the ICRC could cease its own wheelchair production and instead collaborate with the service company.

Since the service company does not sell wheelchairs directly to end-users, financial support will be necessary from aid organizations, healthcare providers, governments, or financing partners/donors. The costs associated with the service company its business model include logistics and distribution, training and support for local entrepreneurs, operational costs of local workshops, and customer relationship management.

Conclusion

These two business models provide an initial overview of all aspects necessary for creating a streamlined supply chain. PEZY will first focus on establishing the wheelchair production venture and find a partner to take on or share the role of the wheelchair service company.

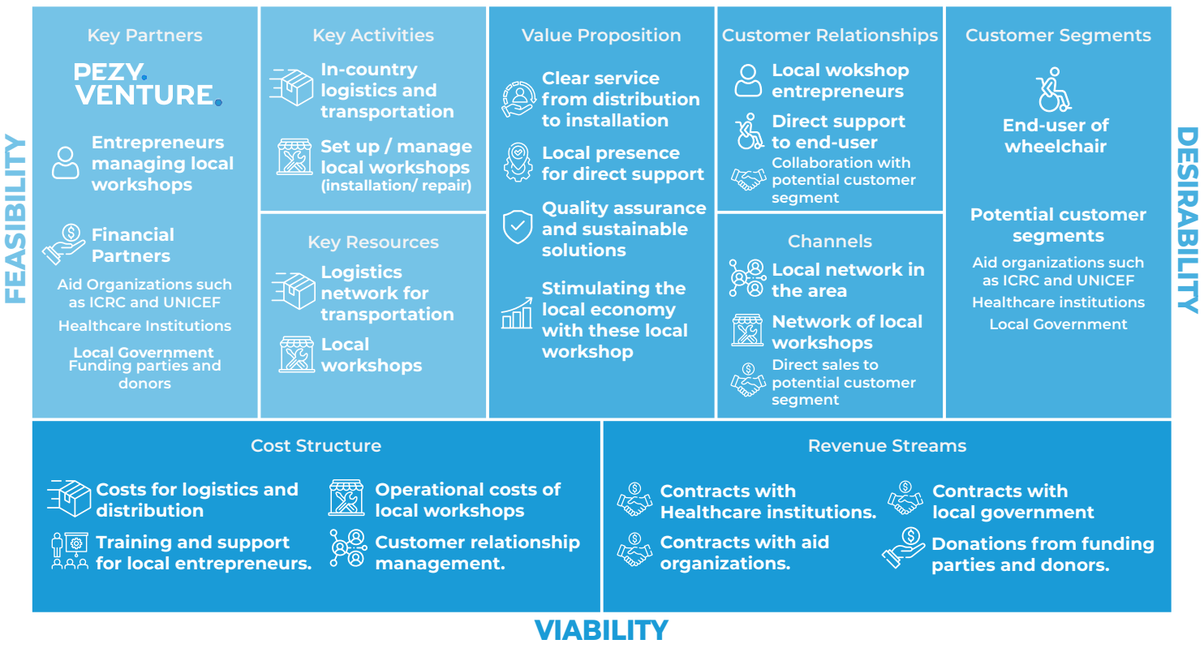


Figure 42: Business Model Canvas

9.7 Course of Action

Product Development
The very first step for PEZY is the product development process. PEZY will assign a few colleagues to create an initial minimal viable product (MVP). This MVP will then be used to gather feedback from the ICRC in the next stage, to identify areas for improvement.

User Research
The physical rehabilitation program manager in Kenya, Philip Morgan, has offered his assistance for any necessary user research. A PEZY representative could travel to Nairobi, Kenya, to collaborate with the ICRC in conducting research on user and customer requirements and preferences for the wheelchair.

Financial Planning
Regarding finances, PEZY needs to follow up on the meeting with the GDI Hub. The funding request form provided by innovation manager Daniel Hajas, see appendix H, must be completed to potentially secure initial funding for the wheelchair development.

Long-term Funding
In the long term, as PEZY aims to establish a venture, they can reach out to other funding partners such as IKEA or DHL. Engaging with these partners over time will support the establishment of the venture.

Service Company
If a suitable service company cannot be found, PEZY might choose to establish a second venture to fulfil this role. This second venture would ensure the installation and repair services needed for the wheelchairs are adequately managed.

Conclusion

The market research, which examines the two market segments in developed and developing countries, revealed that the most potential lies in developing countries. In this market, there is less competition, a significant demand for wheelchairs, and a lack of awareness about customized wheelchairs. These market insights, combined with PEZY's commitment to applying their expertise and knowledge for an even greater purpose, create an intriguing and fruitful position for innovation. The subsequent market explored in this context was Kenya, examining the presence of interesting market players and taking a broad look at both international and local production entities.

In Kenya, numerous market players are involved in delivering wheelchairs to end-users. The market supply chain analysis highlights differences between local and international wheelchair producers. Stimulating local production is beneficial for development of its local economy, while international production offers cost efficiency. Since PEZY is seeking to produce self-build, custom-fit, affordable wheelchairs international production of components and final production locally aligns well with their goals and interests.

Initial market validation has revealed a demand for product innovation in the field of wheelchairs. Through alliances with aid organizations and funding parties, PEZY will initiate product development. However, while the initial focus was solely on aid organizations and governments, it appears that few wheelchairs are being purchased by them, hindering the concept of large-scale wheelchair production. To address this, a necessary wheelchair distribution network was mapped out through a co-creation session with PEZY.

Overall, there is indeed a demand for wheelchair innovation, and there are many areas where PEZY its proposed wheelchair could be innovative in the market. PEZY, in collaboration with the ICRC and potentially with financial support from the GDI Hub, will initiate the product development process. Meanwhile, PEZY will continue to explore pilot-test opportunities and establish their own wheelchair production venture. Throughout this endeavor, PEZY aims to develop a distribution network to establish a robust and sustainable business model. In doing so, PEZY will actively engage in the developing country wheelchair market through their new venture.

With this strategy PEZY is able to:

"Not only help people get off the ground, but empower them to actively engage in life."

PEZY.

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Appendices

Appendix A: Competition Developed Countries

Company	Revenue	Source
Ottobock (Germany)	1.3 Billion (2022)	Ottobock grows by around 12 percent in 2022 – another year of profitable growth. (z.d.-b). Ottobock. https://corporate.ottobock.com/en/company/newsroom/ottobock-grows-by-around-12-percent-in-2022
Sunrise Medical (Germany)	820 million (2023)	Sunrise Medical, Inc. Revenue: Annual, Quarterly, and Historic - Zippia. (2023b, juli 21). https://www.zippia.com/sunrise-medical-careers-40039/revenue/#
Invacare (France)	705 Million (2023)	Invacare Revenue 2010-2023 | IVCRQ. (z.d.). MacroTrends. https://www.macrotrends.net/stocks/charts/IVCRQ/invacare/revenue
Permobil (Sweden)	461 Million (2023)	Permobil Revenue: Annual, Quarterly, and Historic - Zippia. (2023, 21 juli). https://www.zippia.com/permobil-careers-1177662/revenue/
Etac (Sweden)	400 Million (2023)	Etac. (z.d.). About ETAC. https://www.etac.com/about-us/about-etac/company/#:~:text=Headquartered%20in%20Sweden%2C%20Etac%20is,of%20approximately%20EUR%20400%20million.
Küshall (Switserland)	53 Million (2023)	Küschall - Overview, News & Similar companies | ZoomInfo.com. (z.d.). ZoomInfo. https://www.zoominfo.com/c/kuschall-ag/352246024
Vermeiren (Belgium)	52 Million (2023)	Vermeiren Group - Overview, News & Similar companies | ZoomInfo.com. (z.d.). ZoomInfo. https://www.zoominfo.com/c/vermeiren-group/1126700366
Meyra (Germany)	16 Million (2023)	MEYRA GROUP - Overview, News & Similar companies | ZoomInfo.com. (z.d.). ZoomInfo. https://www.zoominfo.com/c/meyra-group-gmbh/444152978

Brands	Price/type	Source
Ottobock	$ 1602 (Basic) $ 1787 (Rigid)	Recare. (2024, 30 januari). Ottobock Motus Folding Self-Propel Wheelchair - Recare. https://www.recare.co.uk/product/motus-ottobock-folding-wheelchair/ Ottobock Ventus Wheelchair. (z.d.). Aspire2 Mobility. https://aspire2.co.uk/products/ottobock-ventus-wheelchair
RGK	$ 4897 (Rigid)	Mobility, B. (z.d.). Better mobility. Better Mobility Ltd. And AnnWebCom +44 1296 770848. https://www.bettermobility.co.uk/catalog/product.php?CI_ID=3056
Sopur	$ 2500 (Basic) $ 3591 (Rigid)	SOPUR QS5 x Faltrollstuhl | Sunrise Medical. (z.d.) https://www.sunrisemedical.de/rollstuehle/sopur/qs5-x SOPUR Nitrum Rollstuhl | Sunrise Medical. (z.d.). https://www.sunrisemedical.de/rollstuehle/sopur/nitrum
Zippie	$ 2753 (Child)	Manuelle Kinderrollstühle von ZIPPIE | Sunrise Medical. (z.d.). https://www.sunrisemedical.de/rollstuehle/zippie/kinderrollstuehle
Quickie	$ 2108 (Basic) $ 2819 (Rigid)	Quickie Helix. (2024). In Sunrise Medical. https://www.sunrisedice.com/asset-bank/assetfile/4598.pdf Quickie Argon. (2024). In Sunrise Medical. https://www.sunrisedice.com/asset-bank/assetfile/23682.pdf
Breezy	$ 851 (Basic)	Pflegerollstühle & Standardrollstühle | Sunrise Medical. (z.d.). https://www.sunrisemedical.de/rollstuehle/breezy/standard-pflegerollstuehle
Invacare	$ 409 (Basic) $ 749 (light weight)	UK Wheelchairs. (z.d.). Invacare Action2 Self Propelled Wheelchair free UK delivery. https://www.uk-wheelchairs.co.uk/invacare-action2-ng-self-propelled-wheelchair Invacare Action 3 | Light / Manual Wheelchair. (2024, 27 februari). The Mobility Store. https://thehearingandmobilitystore.co.uk/product/invacare-action-3-ng-light-manual-wheelchair/
TiLite	$ 3096 (Basic) $ 3408 (Rigid)	Gerald Simonds Healthcare. (2024, 25 april). TILITE ZRA - Lightweight Rigid Wheelchairs - Gerald Simonds Healthcare. https://www.gerald-simonds.co.uk/shop/tilite-zra/ Gerald Simonds Healthcare. (2024a, april 25). TILITE TRA Lightweight Rigid Wheelchairs - Gerald Simonds Healthcare. https://www.gerald-simonds.co.uk/shop/tilite-tra/
Progeo	$ 3617 (Basic) $ 3981 (Rigid)	Mobility, B. (z.d.-b). Better mobility. Better Mobility Ltd. And AnnWebCom +44 1296 770848. https://www.bettermobility.co.uk/catalog/product.php?CI_ID=2990 Mobility, B. (z.d.-c). Better mobility. Better Mobility Ltd. And AnnWebCom +44 1296 770848. https://www.bettermobility.co.uk/catalog/product.php?CI_ID=2983
Panthera	$ 8178 (Rigid)	Panthera X - V-Trak. (2023, 19 januari). V-Trak. https://www.v-trak.co.uk/products/panthera-x/
Etac	Unknown	
Ki Mobility	$ 1982 (Basic) $ 2017 (Rigid)	Mobility, B. (z.d.-d). Better mobility. Better Mobility Ltd. And AnnWebCom +44 1296 770848. https://www.bettermobility.co.uk/catalog/product.php?CI_ID=2216 SpinLife. (z.d.). https://www.spinlife.com/Ki-Mobility-Ethos-Rigid-Wheelchair/spec.cfm?productID=172192
Küshall	$ 2366 (Basic) $ 2967 (Rigid)	Gerald Simonds Healthcare. (2023, 1 juni). Kuschall Compact 2.0 - Gerald Simonds Healthcare. https://www.gerald-simonds.co.uk/shop/kuschall-compact-2-0/ Gerald Simonds Healthcare. (2023b, juni 1). Kuschall K Series 2.0 - Gerald Simonds Healthcare. https://www.gerald-simonds.co.uk/shop/kuschall-k-series-2-0/
Vermeiren	$ 600 (Basic) $ 2168 (Rigid)	Thuiszorgwinkel.nl. (2024b, april 24). Rolstoel V500 Light Vermeiren – THUISZORGWINKEL.NL. THUISZORGWINKEL.NL. https://thuiszorgwinkel.nl/product/rolstoel-v500-light/ Vermeiren Trigo Manual Active Light Wheelchair. (z.d.). indiamart.com. https://www.indiamart.com/proddetail/vermeiren-trigo-manual-active-light-wheelchair-25694765255.html
Meyra	$ 295 (Basic) $ 1900 (Rigid)	Wheelchairs - Unihaus. (z.d.). Unihaus. https://unihaus.lv/en/catalogue/wheelchairs/

Brands	Cheapest Wheelchair	Most Expensive Wheelchair
Ottobock	Price (Folding): 1602 euro 	Price (Rigid): 1787 euro 
RGK		Price (Rigid): 4897 euro 
Sopur	Price (Folding): 2500 euro 	Price (Rigid): 3591 euro 
Zippie	Price (Child): 2753 euro 	
Quickie	Price (Folding): 2108 euro 	Price (Rigid): 2819 euro 
Breezy	Price (Folding): 851 euro 	
Invacare	Price (Folding): 409 euro 	Price (Folding): 749 euro 

Brands	Cheapest Wheelchair	Most Expensive Wheelchair
TiLite	Price (Folding): 3408 euro 	Price (Rigid): 3096 euro 
Progeo	Price (Folding): 3617 euro 	Price (Rigid): 3981 euro 
Panthera		Price (Rigid): 8178 euro 
Ki Mobility	Price (Folding): 1982 euro 	Price (Rigid): 2017 euro 
Küshall	Price (Folding): 2366 euro 	Price (Rigid): 2967 euro 
Vermeiren	Price (basic): 600 euro 	Price (Folding): 2168 euro 
Meyra	Price (basic): 295 euro 	Price (Folding): 1900 euro 

Appendix B: Competition Developing Countries

Company	Production	Price	Reference
Free Wheelchair Mission	61.732 (2023)	90 euros	Free Wheelchair Mission. (2023, juni 29). Free Wheelchair Mission | Our Wheelchairs. https://www.freewheelchairmission.org/our-wheelchairs/
Motivation	6.500 (2022)	290 euros	Motivation. (2024, 9 april). Products Portfolio - motivation. https://motivation.org.uk/our-work/products-portfolio/
Whirlwind wheelchair int.	2.000	165 euros	RoughRider Wheelchair. (z.d.). https://whirlwindwheelchair.org/roughrider-wheelchair/
The Accessible Institute	50	350 euros	TAI - Technology. (z.d.). https://tai.ngo/technology/
Wheelchairs of Hope	2.000	110 euros	New our product. (2020, 29 juni). Wheelchairs Of Hope. https://wheelchairsofhope.org/new-our-product/
Beeline	??	350 euros	Beeline Wheelchairs. (2024b, maart 4). Home - Beeline wheelchairs. Beeline - FREEDOM. FUNCTION. FLEXIBILITY. https://www.beelinewheelchairs.org/
Participant	??	??	Home | Participant Life. (z.d.). Participant Life. https://www.participant.life/

Company	Wheelchair Offer
Free Wheelchair Mission	
Motivation	
Wirlwind Wheelchair	

Company	Wheelchair Offer
The Accessible Institute	
Wheelchairs of Hope	
Beeline	
Participant	

Appendix C: SWOT-Analysis & Confrontation Matrix

Developed Countries

SWOT-Analysis

PEZY

Strengths	Weakness
1. Expertise in custom wheelchair design 2. Interests in wheelchair developments. 3. Production optimalisation knowledge.	1. Pezy Groups design efforts are costly. 2. No manufacturing facility for large scale or collaboration leads.

MARKET

Opportunities	Threads
1. Changing user's physical conditions demands adjustability. 2. Custom wheelchairs are expensive. 3. Large medical device market in Europe. 4. European population is expected to increase. 5. Infrastructure well-adjusted to wheelchair users.	1. Large Wheelchair competition. 2. Current wheelchairs are offered for free by either government or health insurance. 3. MDR demands extra attention in case of modularity. 4. Different healthcare systems and policies across Europe.

Confrontation Matrix

Matrix		Opportunities					Threads			
		1	2	3	4	5	1	2	3	4
Strengths	1	++	0	+	+	0	0	0	-	0
	2	++	+	+	0	0	-	-	-	-
	3	0	++	+	0	+	-	0	0	0
Weaknesses	1	0	-	+	+	+	--	--	-	-
	2	0	0	+	+	0	--	-	-	--

Developing Countries

SWOT-Analysis

PEZY

Strengths	Weakness
1. Expertise in custom wheelchair design. 2. Interests in wheelchair developments. 3. Productoptimalisation knowledge. 4. Aware of the limited market financials.	1. Pezy Groups design efforts are costly. 2. No manufacturing facility for large scale or collaboration leads. 3. No international partnerships within the market.

MARKET

Opportunities	Threads
1. A large number of wheelchair needs is unmet. 2. The amount of disabled people is expected to increase. 3. Limited wheelchair offer & developments 4. Large NGO market largely active in health 5. Collaboration lead: Free Wheelchair Mission	1. Locals expect wheelchairs to be for free. 2. Infrastructure not well adjusted to wheelchairs. 3. MDR demands extra attention in case of modularity. 4. NGOs have limited financial resources for R&D

Confrontation Matrix

Matrix		Opportunities					Threads			
		1	2	3	4	5	1	2	3	4
Strengths	1	++	+	++	+	++	-	-	-	--
	2	++	+	++	0	++	0	-	--	-
	3	++	+	++	+	++	0	0	-	+
	4	+	+	+	++	+	0	0	0	+
Weaknesses	1	--	-	0	0	-	--	-	--	--
	2	-	-	0	-	+	-	-	-	--
	3	0	0	0	0	0	-	-	-	-

Appendix D: Product Requirements

"Self-built, custom-fit, affordable wheelchair."

Wheelchair Usage

Custom-Fit Ergonomic Seating

1. Wheelchairs should be adjusted to the user's physique.
2. Current wheelchairs offer limited adjustments to fit the user.
3. Foldable wheelchairs come in standard widths, showing limited custom-fit.

User Education

1. Education on wheelchair use is nearly as important as the wheelchair itself, according to most organizations.

Adaptation to the Environment

1. Wheelchairs like all-terrain models have their center of gravity positioned further forward, making them less likely to tip over in rural terrain.
2. Wheelchairs must be durable enough to withstand rough terrain and misuse.
   a. Rural areas often lack paved roads and have uneven terrain.
3. Wheelchairs should either fit inside users' homes or be suitable for 24/7 outdoor use.
   a. The Motivation all-terrain 3-wheeler, for example, does not fit inside homes.
4. Wheelchairs should be resistant to weather conditions like heat and UV rays.
5. Ideally, wheelchairs should be compatible with taxis and buses to facilitate transportation.

Wheelchair Distribution

Affordable Pricing

1. Wheelchairs are generally priced between €250-€350, except for the €90 wheelchair from Free Wheelchair Mission. Aid organizations note that some wheelchairs, particularly those with high backrests, can be expensive.
2. Compliance with Medical Device Regulations (ISO 7176 Testing)
   a. ICRC and UNICEF require wheelchairs to meet Medical Device Regulations.

Easy Transportation

1. Compact sizing of boxes improves transport

Simple Assembly with Intuitive Design

1. Skilled technicians are expensive in Kenya.
2. Aid organizations struggle to distribute more wheelchairs due to the scarcity of skilled technicians.

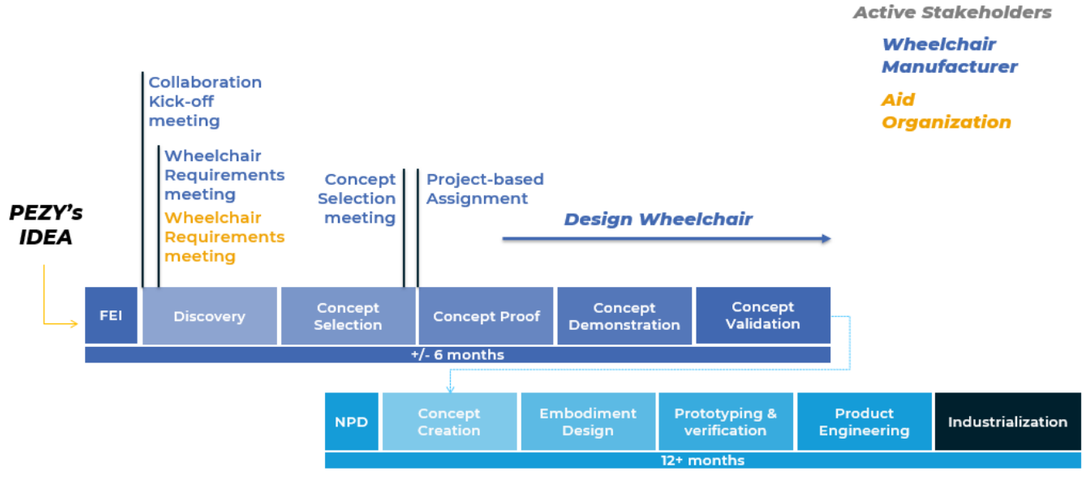
Logistics & Production

Efficient Transport Sizing

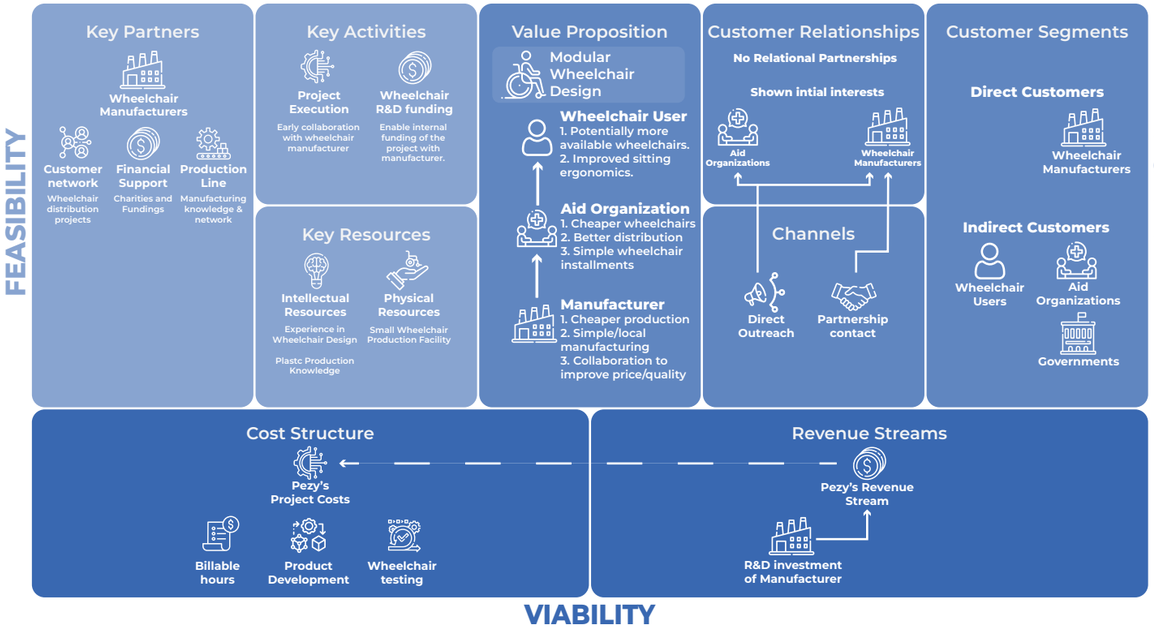
1. Optimizing the size of boxes with disassembled wheelchairs for shipping allows more units to be transported per container.

Appendix E: Concept Strategies

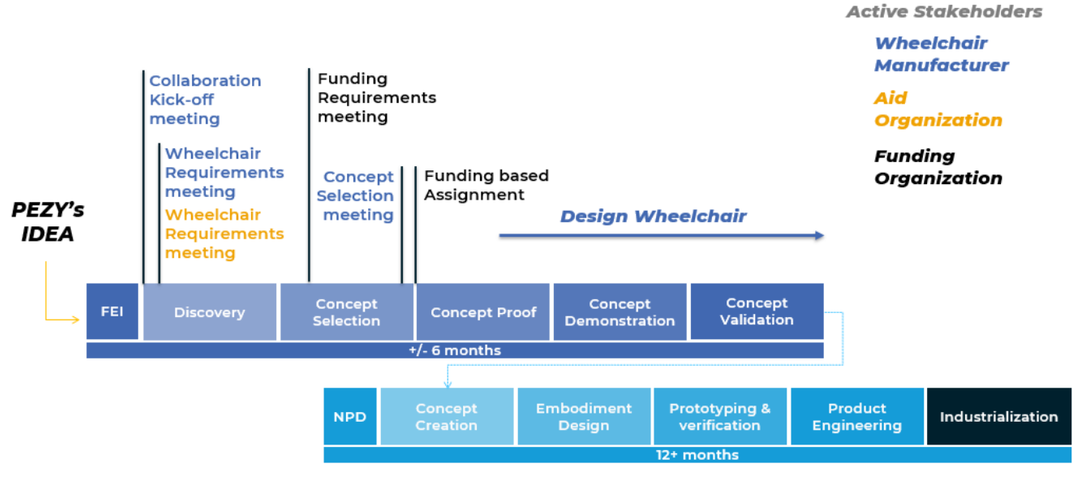
Strategy 1
Design Process timeline



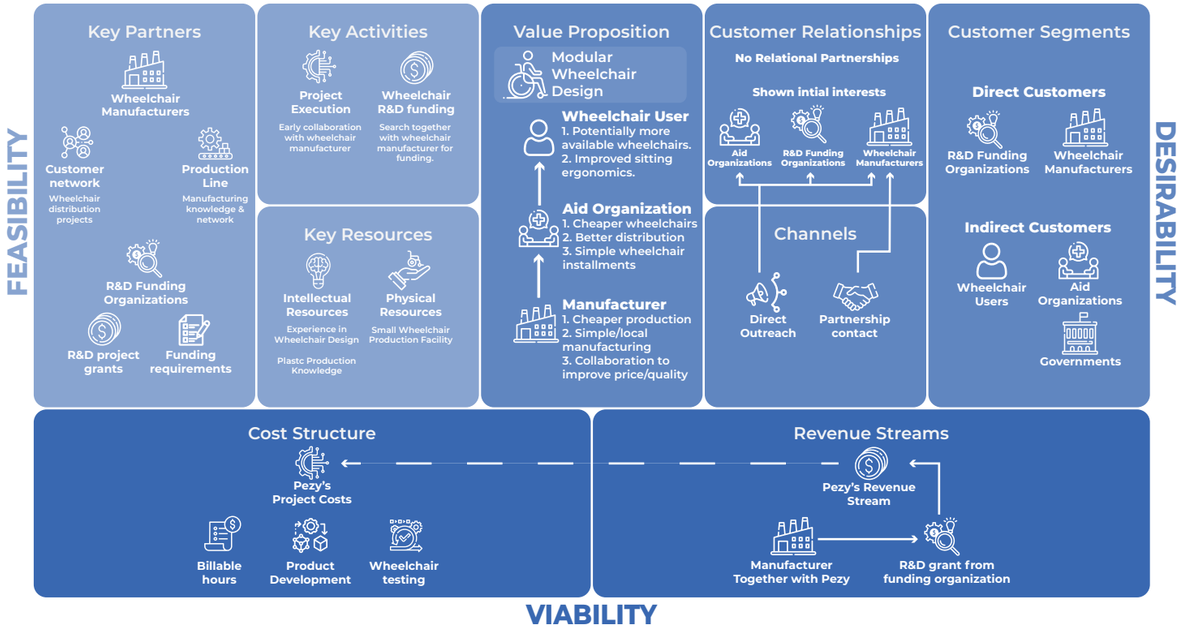
Business Model Canvas



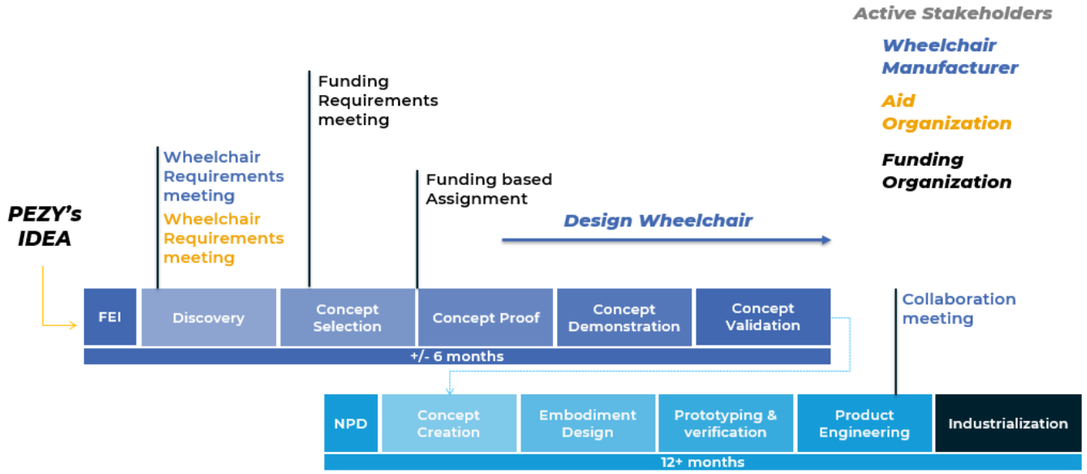
Strategy 2
Design Process timeline



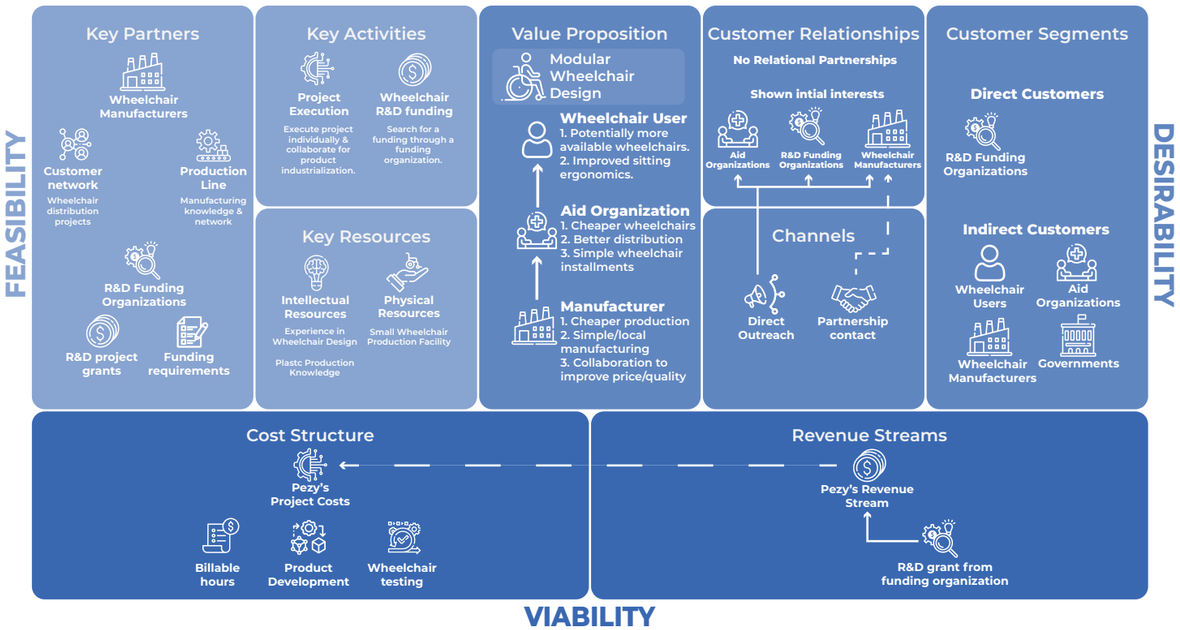
Business Model Canvas



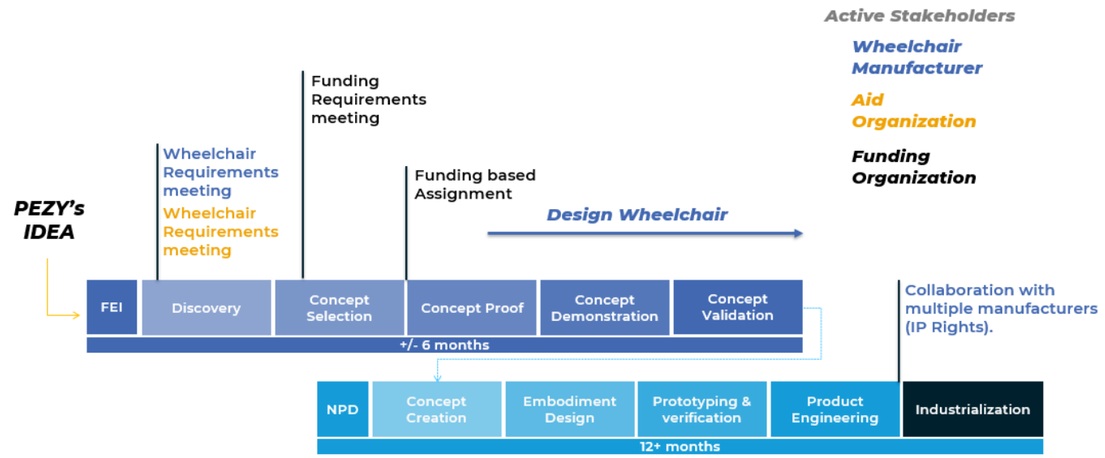
Strategy 3
Design Process timeline



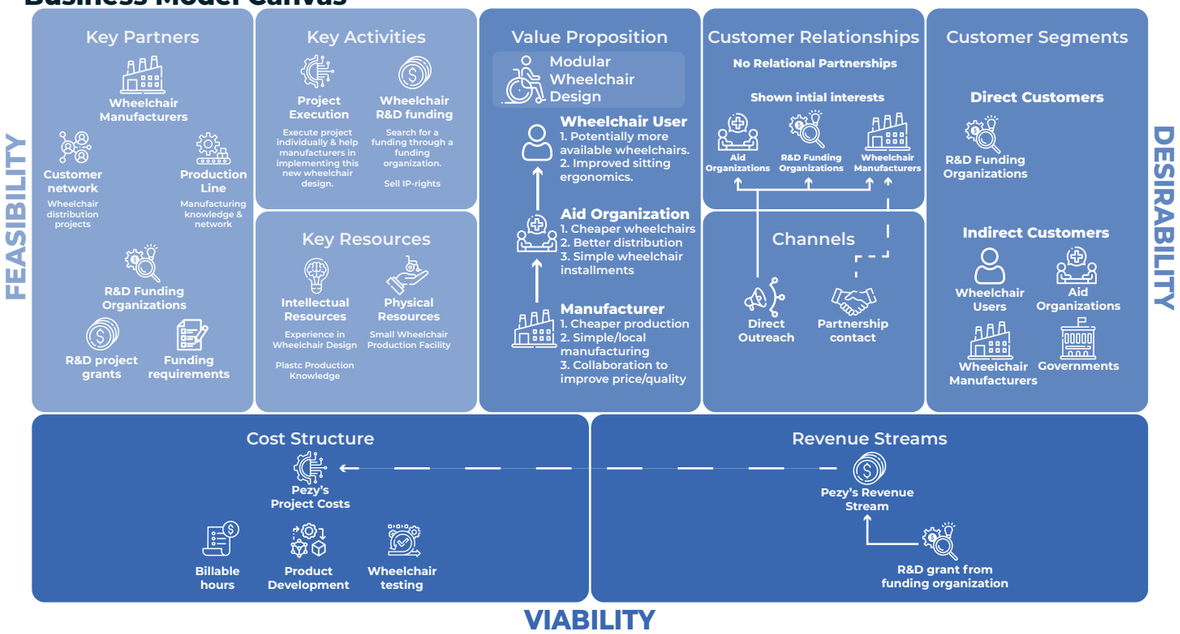
Business Model Canvas



Strategy 4
Design Process timeline



Business Model Canvas

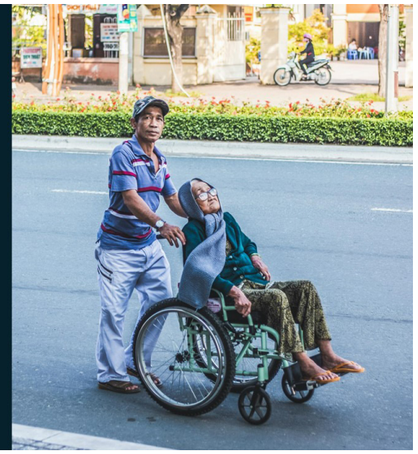


Multi Criteria Analysis

Number	Weight	Criteria	Description	1	3	5
1	30%	Market Desirability	The market desirability in implementing Pezy Group's modular wheelchair.		3 4	1 2
2	35%	Financial Viability	The viability of the market in terms of financial resources to set-up a project.	1	3 4	2
3	25%	Product Fit	The ability to best suit the modular wheelchair to user specific needs.		3 4	1 2
4	5%	Limited project requirements	The amount of involved parties having their requirements for this project.		2	1 3 4
5	5%	Long-term wheelchair developments	Setting-up a long term plan for future wheelchair developments.		1 2 3	4

Appendix F: Pitch Deck

WHEELCHAIR INNOVATION



PEZY.

The Proposition

Current Wheelchair Offer

Standard sizes to fit the user
(Sizes S, M, L, XL only provide limited fit)

Ship 4 sizes to location
Adjust to user at location.

New Wheelchair Proposition

Custom Fitted · Self-Build · Affordable

Self-build wheelchair enables users to install the wheelchair to custom measurements
(Adjust component sizes to user preferences)

One size fits all, simplifies shipment

Product-to-market Plan

Co-creation of new Wheelchair Innovation

Validate the proposed wheelchair	Develop the wheelchair	Execute pilot-test
What are respective prices for ergonomic wheelchairs?	What are important wheelchair requirements?	PEZY can manufacture wheelchairs for testing.

The Industry

80 Million people need a wheelchair (WHO)
4 out of 5 lives in a developing country.
Only 5-10% has no access to a wheelchair.

Around 60 million people lack a wheelchair

+- 100.000 wheelchairs are being manufactured and shipped.

Market Entry Model

Market validation	Product Development	In-field Pilot-testing	Wheelchair accessible in market
Validate if the proposed wheelchair is interesting for NGO's.	Ultimately develop the product to suit the end-user as well as the customer	Test the product functionality & usability in the field with an NGO.	Further investigate how the product can become accessible in the market.

Wheelchair Innovation

Improve current wheelchair designs for developing countries

Validate the proposed wheelchair with customers	Investigate new product designs & production techniques	Test & improve wheelchair with a pilot-test.
Assure that the product aligns to the customer.	Innovate wheelchair design with PEZY R&D.	Validate product suitability with an NGO.

The Challenge

1. **Lack of wheelchairs**
   Expect to grow even more due to aging world population (United Nations, 2023)
2. **No ergonomic seating**
   Non-ergonomic wheelchair do more harm to the user its body than no wheelchair (UNCEF & ICRC, 2024)
3. **No wheelchair innovation**
   The largest market players haven't innovated in their wheelchair design in last decennia (FWM & Motivation, 2024).

Management Team

Experienced design agency
(product development & plastic engineering)

Wheelchair Specialist
(+20 years experience in design, production, and sales)

Compact wheelchair solution
with their innovative product Revolve.

"Not only help people get of the ground but also empower them to actively engage in life"

PEZY.

Appendix G: Market Validation Summary

Funding Clarification

Global Disability Innovation Hub

Innovation manager Daniel Hajas of Global Disability Innovation Hub.

PEZY with Mark van der Schoot.

The introductory meeting with Hajas, D. was productive, highlighting our mutual interests in the development of assistive technology. Previously, GDI Hub had access to a £200,000 funding pool through the Assistive Tech Impact Fund for projects in assistive technologies. They are currently seeking similar funding opportunities once again.

To this end, they are looking for established companies capable of delivering innovative solutions. It was also noted that PEZY's location in the Netherlands is not a concern, as the primary criterion is that the company receiving the funding (ideally in High-Income Countries) can make a positive impact on Low- and Middle-Income Countries (LMICs).

Moreover, there was keen interest in the relationship between O4 Wheelchairs and PEZY, the size of our design firm, and specific financial details such as PEZY's annual revenue.

Overall, the meeting generated significant interest from Hajas at GDI Hub in PEZY's commitment to advancing wheelchair design. The Value Proposition Statement, as detailed in Appendix Fixme, has been provided to support our application for potential funding.

Customer Validation

COMITE INTERNATIONAL GENEVE ICRC

International Committee of the Red Cross with Francois Friedel, Denver Graham and Philip Morgan.

PEZY with Henco Pezij, Vincent van Tol & Mark van der Schoot.

The discussion highlighted differences between locally and internationally produced wheelchairs, with local ones being more adaptable and easier to repair but of lower quality. Also many developing countries have small initiatives for wheelchair production and there are limited large market players.

Philip emphasized the need for cost-efficient wheelchairs to achieve universal health coverage. The ICRC, which distributes 8,000 wheelchairs purchased from Motivation, stressed that production is not the only challenge. There is also a lack of technicians to set up rehabilitation facilities.

Henco suggested a systemic change, proposing that disabled individuals run production facilities and use online video instructions to assemble and adjust wheelchairs. He also suggested looking for logistics partners and setting up microfinance with local entrepreneurs.

The ICRC underscored the need for qualified technicians to install wheelchairs. Denver further highlighted the need for sustainable wheelchairs in terms of durability and repairability. Where Philip expressed willingness to help define wheelchair requirements for developing countries, Denver mentioned the need for new prosthetic limb designs, which can also potentially be designed by PEZY.

After the meeting, Henco mentioned that the goal of producing 500,000 wheelchairs would require collaborations with large organizations like the IKEA Foundation or DHL for sufficient funding.

Appendix H: Value Proposition Statement

Value Propotition Statement GDI Hub

Detailed venture profiles
Overview
Methodology

Business name

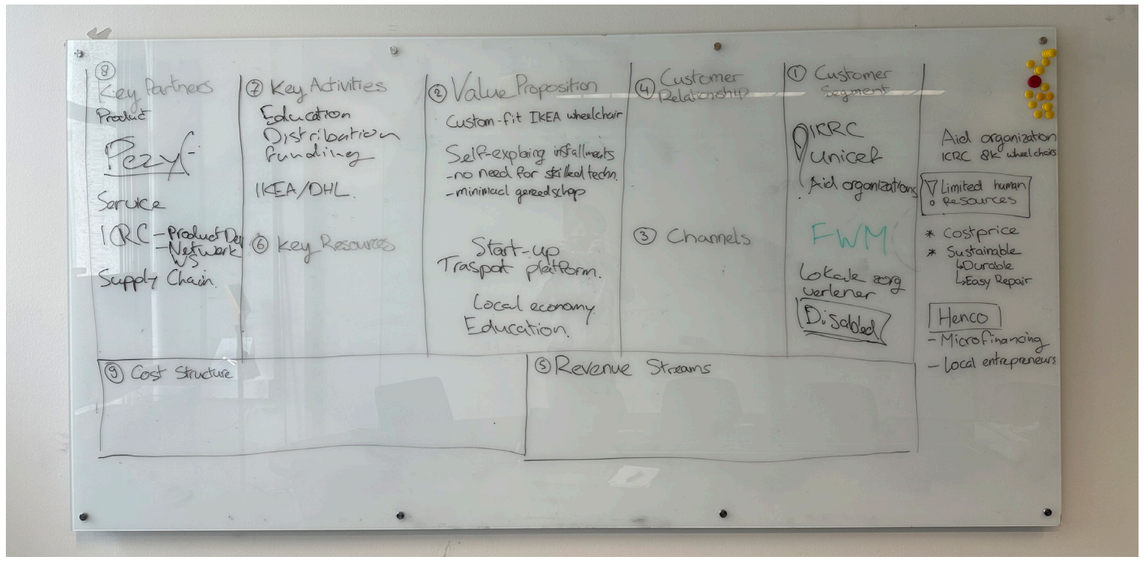
Value proposition statement for business

Countries	
Funding model	
Years of operation	
No. of people served	
Potential for rapid growth	
Stage of business	
Revenue: last year	
Revenue: next year	
Total funding to date	
Size of Market	
Strategic goals	
TA Needs	
Investment Ask	
No. of employees	

SOCIAL FINANCE INVESTING FOR GOOD

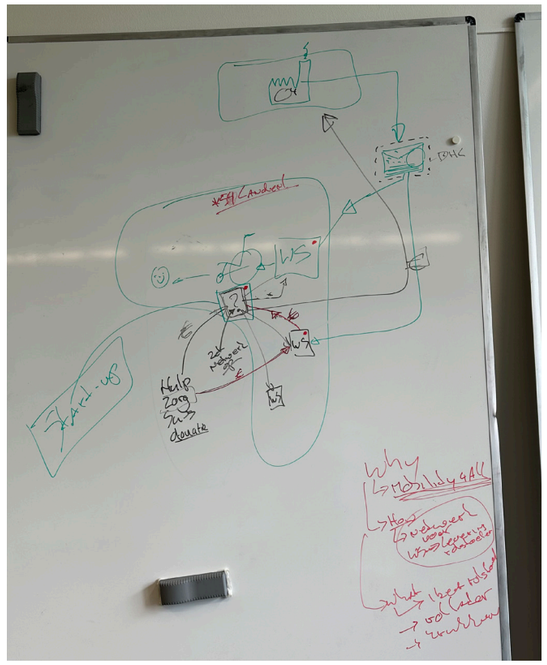
Appendix I: Co-creation Session

After the meeting with the ICRC revealed they are unsuitable for large-scale distribution, it became clear that the approach to identifying the customer needed to be entirely reconsidered.



This co-creation session began with filling out a business model canvas for PEZY's venture, focusing on the question of who the customer should be. A key missing element was identifying a clear customer who, like the Red Cross, provides logistics, installation, and repair services, but unlike the Red Cross, is not conservative about who is allowed to perform these tasks.

The session started with a partial completion of the Business Model Canvas, followed by the creation of a more visual representation of the type of partner required to help PEZY achieve their ambition of bringing half a million wheelchairs to market.



Appendix J: Interviews

O4 Wheelchairs

Vervoorn, D. & Nieuwendijk, J. (2024, 24 Januari).

Interview Text (NL, not recorded):

O4 Wheelchairs heeft een basis rolstoel, een active flow (die specifieke verstelbaarheid heeft in zithouding) en hieraan toegevoegd worden ook specifieke aanpassingen gemaakt aan de rolstoelen. Het eerste model kost 2500 euro en naarmate de persoonlijke aspecten toenemen kan de rolstoel wel 10k euro worden.

Rolstoelgebruikers zijn voornamelijk mensen die ergonomisch goed passen in de rolstoelen die worden aangeboden door hulpmiddelen aanbieders. 90 procent zit wel ergonomisch in een deze rolstoelen. Dit gaat niet over rolstoelen die in 3 maten beschikbaar zijn, maar dit zijn rolstoelen die op basis van heupbreedte en lengte een ergonomische rolstoel kunnen aanbieden. Verder zijn de grootste afnemers van onze rolstoelen mensen die nog actief zijn (nauwelijks 65+ rolstoelgebruikers).

O4 Wheelchairs biedt echter niet dit soort rolstoelen aan. Ze bevinden zich in een niche binnen de rolstoelenindustrie. Zij leveren ergonomische stoelen die ook nog een aanpasbare zitvlak/rugleuning bied. Ook wordt het frame op basis van specifieke afmetingen in elkaar gezet in stappen van minder dan 25mm. Hierdoor zitten mensen maximaal ergonomisch omdat de voetsteun, onderbeenhoogte, zithoogte/diepte, rugleuning lengte/hoek, wiel diepte / hoogte allemaal op de persoon wordt ingesteld. Echter aangezien ze in een niche markt zitten verkopen ze gemiddeld 2/3 stoelen per week. Dit is enigszins laag voor de rolstoelenfabriek/werkplaats die ze hebben ze doen alle omtrent frame ontwerpen en met behulp van twee weefmachines maken ze ook de zittingen. Alleen de coating van het frame wordt outsource gedaan net zoals de wielen die bij andere bedrijven worden ingekocht.

Al met al lijdt O4 wheelchair nu verlies aangezien het maken van een rolstoel veel manuren kost. Verder staat de fabriek in Varseveld vol met technische apparatuur dat nauwelijks wordt gebruikt. Als laatste is er geen duidelijk beeld over de productkostprijs en waarop de verkoopprijs is gebaseerd. Ze blijven in een niche marktgedeelte omdat ze er ander uit worden geconcurreerd door merken zoals Quickie.

Er zijn enkele ziektes waarbij het niet mogelijk is om een handgedreven rolstoel te gebruiken maar eigenlijk ligt de focus op het laten bewegen van de gebruikers om zo nog gezond mogelijk te blijven. Dit is ook de reden waarom ze niet zich hebben verdiept in motor gedreven rolstoelen. Wat ze wel als optie aan kunnen bieden aan klanten zijn beweging assisterende wielen, die voor 75% van de kracht ook om kan zetten in voortbeweging. Hierdoor kunnen mensen met weinig kracht in hun armen nog steeds in een O4 rolstoel kunnen zitten.

Verder vraagt een handbewogen rolstoel ook om een hogere personalisatie in ergonomische positie, omdat de gebruiker de rolstoel veel moet gebruiken. In het geval van een motor gedreven rolstoel zit de gebruiker veel statischer en hierdoor is ergonomische eisen minder van belang.

Rolstoelen van O4 worden wel eens gekocht door gebruikers zelf, echter is het voornaamste gedeelte van klanten dealers of fysiotherapeuten (of andere medische adviseurs). Naast Nederland wordt de helft van de rolstoelen ook verkocht aan Duitse dealers, hier is het veel gebruikelijker dat dealers rolstoelen aanbieden aan gebruikers (dus dit gaat niet via particulieren).

De MDR zijn medical device regulations en die zijn van belang dat medische producten goed ontworpen worden en zodat het veilig te gebruiken is door de gebruiker. Nu is het MDR beleid erg lastig om te begrijpen en hiervoor heeft Dennis zich al maanden over gebogen om er meer duidelijkheid over te krijgen. Het voornaamste idee is dat de rolstoel een aantal testen moet ondergaan om te laten zien dat het veilig is. Zo zijn de voornaamste testen gericht op mechanische gedeelte en hoe goed het tegen stoten/lomp gebruik kan. Hiernaast zijn er ook aspecten als dat de zitting niet snel ontvlambaar zijn of dat de zitting geen stoffen loslaat als het

nat wordt. Al deze regels zijn van belang voor het garanderen van een veilige rolstoel. Al met al is er wel vaak veel tijd verbonden met het uitvoeren van testen en certificering. Zo hebben ze nu 3 rolstoelen naar Hannover gestuurd om de testen uit te voeren, wat ze in totaal 15k euro kost. Het MDR maakt ook de fabrikant van de rolstoel verantwoordelijk voor de kwaliteit van de rolstoel.

Omtrent onderhoud van rolstoelen is er duidelijk te zien dat dealers en medisch adviseurs geen techneuten zijn en niet weten hoe een O4 rolstoel in zijn werk zit en hoe je die moet instellen. Als gevolg dat er weinig techneuten zijn hoe ze de rolstoelen moeten repareren en dit veel tijd en moeite kost.

The International Committee of the Red Cross

Cooreman, D. (2024, 29 January).

INSIGHTS:

1. Furthermore, providing wheelchairs alone isn't enough; individuals also need education and support to address their needs comprehensively (Cooreman, 2023).
2. Wheelchairs are purchased in large quantities for distribution projects, and many customers have longstanding relationships with manufacturers.
3. For example, Cooreman explaining that wheelchairs with a high backrest are expensive, but as there are no alternatives they settle for the more expensive ones for their projects.
4. Cooreman also points out the challenges in assisting individuals with Cerebral Palsy, highlighting their need for specialized wheelchairs with full back support, which can be costly to obtain.
5. However, even taxis present challenges, as some wheelchairs may not fit into these vehicles due to their size and design.
6. The ICRC forecasts a rise in mobility impairments, currently addressing only 2% of affected individuals, totaling around 200,000 people annually.
7. High-quality, safe, and reliable mobility aids
8. ICRC demands that the wheelchair meets European MDR regulations, specifically the ISO7176 Certification.
9. Pilot testing is around 6-9 months in field.
10. 3 Wheel wheelchair not usable inside houses
11. However, even taxis present challenges, as some wheelchairs may not fit into these vehicles due to their size and design.
12. 'Design the wheelchair like a Kalashnikovs: simple and functional.'

Transcribed Interview Text (EN):

I'm from Belgium and 26 years ago I decided to move and work in low and medium countries with Handicap International and then a few years later I met ICRC, the Red Cross, on the field and at that time they used to produce already componentry that in Handicap International we had to do the componentry ourselves. So we have to take a piece of wood and design your feet, then we have to do the shaft and then it takes like five days just to do the componentry. With ICRC they had already this technology 20 years ago where it was molded in plastic, polypropylene. So I like this technology, it was quite appropriate and this is why I moved to the ICRC. So my role as a head of project in general, in each country I used to work, 22 countries, it was to design an approach for access for the services for the people to physical rehabilitation. So it means working with physiotherapy, with simple approach, making sure that people know how to work with the device or gain mobility with a wheelchair for example. [INSIGHT 1] This is why we need physiotherapy. It's not just us making the processes, or adapting the chair, and put them in the chair and say okay goodbye and good luck. So it's a lot of work behind that, the physical rehabilitation. It's quite expensive and it takes time. To do the physiotherapy as well. Because you have to reinforce the muscles, you have to get balance and you have to relearn to work. To be mobile even a wheelchair it takes time to you know to handle it and what type of wheelchairs are you mostly giving away is it temporarily many years with an NGO called Motivation yes motivation uh [INSIGHT 2] we start with them 15 years ago okay and for that uh but it's important if you design your wheelchair you have to design also training professional how to assemble it and then uh how to adapt because the wheelchair we use need to be adapt to each of the patients so of course it's not only the size but it's also getting the back support head support uh feet and foot rest this is super important and in hrp we work also a lot with uh cerebral palsy children I don't know if you know that. cp children so cerebral palsy this kind of disability that is quite uh muscular musculoskeletal and uh so you cannot move properly all your parts of your body but also uh you can have a lot of contraction and uh it's quite difficult with people and children especially they have a lot of deformities. [INSIGHT 3 & 4] so the idea is to have a full total back support okay right like a special seating and this is important and there's nothing very cheap in the market right now no that's also a little bit what um what we're looking into because we also see some potential in having indeed a little bit of a modular like wheelchair so if you think modular would be nice yes that's also a little bit what we're looking into and we're interested in looking into what kind of projects you do with the ICRC and I think maybe it's also interesting to if you have any contact with Motivation because they already are looking into these wheelchairs right they already produce wheelchairs however we are yes they produce wheelchair in uh in uh there's even a unique uh model where you can just adapt of your patient this is super nice in terms of supply chain for example I don't need to write to buy uh 20 small 20 large and 20 medium just by 60 and then I can cut according to my needs so this is quite uh I have to say unique compared to the what is in the market so the supply chain is important you know because it takes a lot of space wheelchair. So if you have something that cannot adapt the size according to the patient but you have only one model to propose for the store this is nice ah okay so indeed it is also to move it from one place to another. It's fairly expensive you mean also if you need to and you need a lot of space also wheelchair take a lot of space in a in a warehouse a hospital so if you can make it very efficient in terms of storage it's nice. And in what type of it's a voice also missed take for people to order the spare parts so you have to make things quite lean and easy and intuitive for the storekeeper to order materials in general.

- And in what type of situations do you normally provide these wheelchairs because I can imagine that every project is different from each other um and in which cases is our wheelchairs mostly needed is that also in disaster areas or war areas or more in developing projects?

So in general uh it's for double amputee where we cannot provide the type of device that we want processes will not work for them or they're too weak because of the age of the disease or because the amputation is too high and our device is not functioning uh will not function properly. It can be also for long distance if uh it's a child for example that need to go far from school then we try to give them a wheelchair also to help the parents

go to the school. We don't have too much spinal cord injury because it's quite difficult to address their issue because they die in the conflict where we are they're the first one to die of infection right uh not pressure but like a urinary problem you know it's not just the spinal cord it's not only the legs that's not working it's also the the bladder and they get a lot of infection to uh to divide the needs and then sadly there's not so much so much. Spinal cord injury in uh acute uh conflict.

- Well it's also a lot of information but it is still very very interesting I would say because uh I think the direction of my company on where the wheelchairs can go when looking into modularity.

I think that provides a lot of perspective and got a lot of potential in terms of the wheelchair for example we like to have a quick release it's important so it's easy to put them in a taxi for the patients [INSIGHT 5] Because if the rigid frame uh and the you cannot remove the wheels then in general the patients stay aside they cannot access to the bus, they can the taxi not put them in the in a car so it's quite complicated so we try to provide wheelchair that is uh foldable exactly with some quick release on the on the back wheels.

We provide also sports wheelchair because uh we initiate in 2012 uh wheelchair basketball and we have organized quite uh some international tournaments and uh it's quite sport is an incubator for personal disability people look at them at least so I like it a lot and in which areas are you are these projects mostly in is that mostly in everywhere. We work in 44 countries but I guess 30 countries who will have a sport activity with uh which can be tennis, we have football also with wheelchair but football with coaches so it depends we have a lot of sport and he said also most basketball we have middle-east / Asia.

- And in Africa are these wheelchairs mostly focused for children and young adults or all for the elderly?

It's more for adults. We don't take children in the sport because of insurance, you know, if there's something happening, more completely.

- And how do you see the amount of disabled or mobility impaired people in these countries?

They will just increase, it will increase. [INSIGHT 6] We tackle maybe 2% and we address ICRC, we address the needs of 200,000 people per year. , okay, But it's just the tip of the iceberg. , I can imagine. The bottleneck is the human resource. We don't have enough specialists to provide the services. So even if we have all the materials, we cannot take care of more than three patients per day, we cannot keep two legs per day. It takes time, you know, this is the issue because it's handicraft basically. There's no standard, it's not out of the shelf. But wheelchairs can be given quicker. The problem is not just to get the wheelchair, like I said, it's education of the patient, they need to do the transfer. There's a lot of things. And what is it? There is nice training online, I don't know if you know the double-edged wheelchairs. Wheelchair training. And there's the basic, the intermediate and the advanced. Okay. I'd say online training and it's nice. Okay, that's good. They give you a lot of information.

- And what would be interesting for you? What if I would, Is your focus more on providing, imagine that if we can make a really cheap wheelchair in that case?

We have very, Motivation is the chief of the chief. They give us for $200 the wheelchair. So I don't know if we can build that. That's our bottom price for us.

- And how much, do you also have some initiatives where people are making their wheelchairs locally? Sorry, I didn't get you. Can you repeat, please? Are there also projects where people are making their products locally?

So the wheelchairs by themselves, or are you mostly buying the wheelchairs and then? , we, so we took the, since 20 years or so in terms, just for quality reason, we produce everything in Switzerland. It's personal visibility, so nothing foreign to us. Personal visibility, produce the components, and we buy out of the shelf, like the wheelchairs, because we want everything to be CE certified. It's important for us the certification. , the CE certified. Okay. Check. Exactly. [INSIGHT 7 & 8] We want to have the MDR, the ISO. Everything is important for us to supply chain purpose, but also by respect to the people. We don't want to have quality in Palestine different than the quality of Iraq. So we buy everything at the same place, and then it's more ethically correct. And we used to do in the past to produce in each country or on the, each year. The problem, it depends on the individual that supervise the team who do the welding and supply that. Depends on the supply chain. Sometimes they have nice wheels. Sometimes just the supply chains change, and then the quality was up and down. So it was complicated to provide good services to the people. So we decided to have a central system and to make sure that the quality control and supply chains is controlled by us. , I can. But it's nice in terms of sustainability, understand, of sustainability countries who in the future they will have to develop their wheelchair so they don't need to depend the problem is that most of the items uh even if you produce yourself. you have to import you have to embark it's just a bearing system we cannot an African country with a bearing system you have to import it anyway that's right and the MDRs that is the European medical device regulations right exactly I do that for all my componentry. You know so it takes time but it's a problem so your base is in my way understood well or not sorry where are you based uh we're based in the Netherlands

Netherlands okay okay so I guess I got two calls different two limitations. I'm doing my way guys also to call me I said that's strange oh okay that's a little bit weird that was not my intention but no problem no

- But uh we're indeed um our we have three uh offices in the Netherlands and from there we also have a small pilot factory where we can also try to make our initial concepts if we have indeed some way for a modular wheelchair or something like that.

So I think that's a really good point I think that's a really good point and then uh from that moment on then we will be looking into also shipping it as well uh but indeed what you say it's the supply chain that we need to there because you would have to certify your wheelchair and I don't know where you can do that uh there's uh one place in France they do that it's called sarah. For two months your wheelchair will be at two meters high and then drop for one meter with 40 kilo inside the wheelchair just to see the resistance it's quite nice to see the testing to get the CE and it's not easy to pass the certification okay

- We also have now two wheelchairs which are also being shipped to Hamburg to also do these tests so okay we already have a we already know what how we're going to test it but it's a little bit indeed the combination of how to make it indeed modular and also keeping it within the CE restrictions but is it is it since recently that you do also the ce certification that needs to be added to the wheelchairs or oh

Because we buy the product already finished we were not involved with this uh testing oh okay oh that's motivation would do themselves I guess because they're uk they did in uk yes it may appear on certification all right and within projects how do you specify when you're going to buy and a certain amount of wheelchairs compared to I don't know uh walking sticks or something like that how is it how we uh we include it in the field you mean right how do you uh how do you decide how many wheelchairs you need.

This is my job in fact it's uh I'm thinking of my last my last day tomorrow they cut my position but um uh the my job was to uh code for a new device item that will need by a professional in the in the field and then I have to do the field testing so it means to make sure first that the price is according to orange because we want to give a maximum of services so I cannot take treatment because it will not work uh so the price was an issue the scale up is this a startup with a company that have the capacity to you.

hey I've been cut I don't know I don't know so

like I say uh the volume are huge so I cannot ask a small startup to uh to provide 50 000 uh items for example you know is this so yes is that the amount in which you ordered then a certain amount of wheelchairs oh no no no no it's not a wheelchair to be five thousand but it's uh but for some items so it can be quite big so we need to make sure that the company is complete because so you know there's this thing. client also particularly so there's no children working in the basement and stuff like that uh we uh so this is what we check we check also that the device because in general they are made in Europe will they sustain the harsh condition of refugees or people like in Gaza where there's no street anymore is it possible to make maintenance locally so it's a lot of criteria here that we set up and then [INSIGHT 9] also I test it for six to nine months on the field and uh when the pilot test is conclusive and then uh the purchaser and someone else will discuss the price with each company so this is how we work to integrate any items in our list and for the timing we have 1100 items in our list so it's quite uh it's a big thing but it's something that is evolving this is the job of technical coordinator is to see if something new is coming like the 3d for example I look at it but I'm not yet involved too much because we cannot scale up a lot of stuff and there's no evident place that it works. So you see there are all the criteria to see if one item will come in uh on the field and how and the company which you are working together right now is mostly Motivation are they also providing other NGOs yes of course it's uh they provide on cap international I think.

they provide the UN there's a big company uh or platform for which the clasp in the USA I don't know if you know this one class it's a platform where you can find all the wheelchairs all over the world there's a one-stop shop for NGOs and they go there okay Well that's what I know about wheelchair okay um and what also the international society uh for which I think I'm going to say to is to value but there's a society also at international level that you can have a lot of information. I mean if you want if you your goal is to use cheap and resistant uh wheelchair you have to definitely to go to this direction and to make sure that this uh that's compliant with the supply chain and contact them you see what is available in Africa / south Africa there's a shown wheelchair there's three wheels wheelchair.

- I've also found some initiatives as well indeed those are already you need to look at the wheelchairs and also simplify the concept a little bit indeed I don't know there's also one with the white uh with the white plastic uh chairs (Free Wheelchair Mission) I don't know no this is uh I guess all the rules

This is a no-go because it's uh you create a pressure sore and people die of infection within our three days so this is a no-go for us it's uh first of all it's uh okay the plastic the plastic uh with the with the light you know it becomes brittle it doesn't work.

- uh okay they also have quite quickly they've made some changes also to the to the wheelchair so that was their first that was their first uh concept and then they quickly changed it as well so indeed maybe that's the reason oh

What the big issue is also is that everybody wants to do uh their wheelchair and I find a bit sad that there's no a consortium that keep uh make the modification of what is existing because at the end behind all the orthopedic center in the world you have a mountain of wheelchairs that is because they cannot repair it they don't have the spare parts because everybody comes with their own concept then uh you end up with 36 type of model different and uh in Africa you know. They would say yes it was free they give it to me but then they told you it's an ah okay so for sustainability it's super important and it's not existing there's no one screwdriver for all the wheelchair everybody have inside uh bolt and nuts and uh it's a bit sad.

- And whatever features are now going to because you say you are collaborating with motivation but are you also buying in old wheelchairs to provide uh also in uh in different projects or us or are there are those mostly just from what is this?

No we have a motivation wheelchair no we have a motivation wheelchair but there was other wheelchair also but it's more for the hospital it's quite simple one you know with uh playing uh however one we go to a picture but those are quite simple one it's clinical one so it's uh standard those are also more but motivation is the one that can sustain the dirt the road we used to have the three wheelers but then uh the three wheelers was not working properly because [INSIGHT 10] the house of the people uh are too small so you cannot move inside the house with a three-wheeler so they have to stay outside it was not the ideal solution also but for long for long uh we have also the one with the hands you know the you can pedal use with your hands to move okay for long distance this this one we have zero electric. is an issue and uh and to maintain is impossible okay and what are also difficulties with wheelchair usage in these type of areas you mentioned the need that the three-wheeler couldn't go in the house but exactly are there also also some things about wheelchairs you uh about wheelchairs in in these areas or sorry are also also other different difficulties within uh having wheelchairs in these type of areas things to watch things to look into or to say well don't design a wheelchair like this and this and this because it will not work or I don't know the three-wheeler of course it was a problem to move in a car or in a bus because it's a rigid framework and then it's super long so it was not uh easy for uh for inside and of course or hospital or a prc uh what else and what about sometimes breaks sometimes doesn't function also uh not very uh properly uh the the springs doesn't work but it's a bit complicated uh the caster wheels in general are quite weak uh the caster wheels in general are quite weak The castor wheel is the first that breaks. It should be with pneumatic and normally the castor wheels, most of them they set it with plain, so it's not very comfortable for the patient.

- And what is the wheelchair for motivations? Are those specifically designed for real outdoor usage?

Yes, it's really for outdoor. [INSIGHT 11] For places where there's no street and it's very for dirt. Even though the tire is like a mountain bike. , it's a little bit like a mountain bike wheel. I think I've already seen it indeed.

How is that? I'm also curious about that.

- You said something about that the repairment of these wheelchairs are sometimes quite difficult because you lack the type of screws and such to fix the wheelchair itself. How are you guys now trying to solve this problem a bit or is there not really a solution for it right now?

They provide no QR code and then you can have the instructions for use or straight away on your phone or they provide a step by step how to assemble your wheelchair. Okay.

- Let's see. And how... I was... I forgot if you mentioned it already, but do you also provide wheelchairs for in emergency aid projects? So in these nature disasters and in war areas, was it or not? Can you repeat? If you also placed wheelchairs in when there is somewhere a nature disaster or there's an earthquake or something like that, do you also provide wheelchairs in those situations or...

Everything that has the mobility okay um and uh what do you have a solution for uh pressure so you have a what kind of cushion you use it's a cushion with gel it's a cushion with a cushion with hair or it's something that is molded with foam what is your solution we have we have mostly um foam we use but I'm not I'm not specifically sure how that's how that really is being designed I've got I'm not really the expert in the foam uh area but um that's also something we are currently also looking into because also we have quite some specific uh people in need for a wheelchair there or also we also need to look into how the cushion is.

um but that is that is also something maybe to look into but is it also something you that is maybe it's a missing in the wheelchair yes we have a solution but it's not the idea because it's a it's a form that we have to curve according to the shape of each patience but like you if we do ourselves the curving it can lead to mistake it'd be something like a gel or something that is quite cheap but it's not existing cheap gel is the problem unless you find a solution. But that is one of the issues you have with people sitting in wheelchairs is

that that the cushion is not right but exactly okay and there is no specific cushion in the wheelchair itself already there is one that we have to occur but like I say it's according to the skills of the technicians if the technician doesn't have the skills he can create problems to the patients but the idea is to have something standard because in Europe it's existing you have a gel cushion and all but the cost and also the it doesn't last long you need to be very cautious with this but you know people in a refugee where you have a six children playing on your suitcase on your wheelchair when you're not in your wheelchair destroying quickly so okay oh that's also a good one to look into that I will also uh I will also keep that [INSIGHT 12] your wheelchair should be like a kalashnikov simple and functional.

- Do you also maybe have because I think it's my it could also be interesting for me to also speak with someone within motivation I don't know if you have any contacts or if you know someone I can maybe try to contact with because I think they already have also a little bit more experience in this area than we have and I think 15 years of experience designing producing and exporting.

if that if that is possible then we would love to also have a chat with them to also see on how they have provided wheelchairs for you as well and uh also to see if we can add some value you can totally contact Claire Charles she's on my LinkedIn. You can type motivation she's there okay. Sorry I have to go again that's uh that's my problem I hope everything is fine and you just uh link me and then you can always continue with questions

- I will just keep you in the loop and then if I have questions I hope to maybe uh have another chat with you. Thank you!

Certificerings Advies Nederland

De Jong, L (2024, 30 Januari).

INSIGHTS:

1. Furthermore, manufacturers are not able to delegate associated responsibilities to another company according to MDR guidelines.

Transcribed Interview Text (NL):

- Als ik het zo in ieder geval even een klein beetje kan samenvatten. Ik ben nu aan het afstuderen bij de universiteit. En daarvoor doe ik nu bij een bedrijf een project. En dat gaat over rolstoelen. En omtrent rolstoelen zijn er natuurlijk heel veel eisen aan binnen de MDR. Wat de rolstoel allemaal moet kunnen en wat hij het allemaal moet aan moeten kunnen. En ik kan hier binnen met mensen, collega's, het er allemaal wel over hebben. Maar ik dacht eigenlijk, omdat jullie ook natuurlijk een certificerend advies zijn. Dacht ik van misschien weet jij er wat meer over. Over waar het allemaal aan moet voldoen. En waar ze van misschien ook wel juist problemen liggen in dat gebied.

Ja, nee zeker. Want je bent via de universiteit dan bij een bedrijf. Of een bedrijf dat onder de universiteit valt.

- Nee, dat kan in samenwerking. Soms heb je van die samenwerkingsprojecten. Oké, ja snap ik. Ja. Ja, even denken waar te beginnen.

Want de MDR is inderdaad de Europese verordening voor medische hulpmiddelen. Ja. En een rolstoel is ook een medisch hulpmiddel. Dus die moet binnen Europa altijd aan de MDR voldoen. En degene die die rolstoel, maar dat is even kort gezegd, er zijn wat uitzonderingen. Maar degene die die rolstoel in de handel brengt in Europa. Onder eigen naam. Dus eigen naam, merk, adres. Ja. Dat is de fabrikant. En die moet aan de meeste eisen voldoen.

En dan heb je nog een aantal andere rollen in de MDR. Distributeur, importeur, etcetera. Ja, die eisen liggen dan weer net iets anders. Dus eigenlijk als je een traject begint, dan ga je altijd kijken van goh, heb ik hier een medisch hulpmiddel? En zo ja, wat is dan mijn rol ten opzichte van dat hulpmiddel.

- Ik zat even te denken, want je had het natuurlijk over nu verschillende takken waarin zo van een rolstoel vanuit de fabrikant naar de gebruiker komt. Met een distributeur en dergelijke.

En fabrikant is niet altijd, niet per se degene die hem maakt trouwens hoor. Dus misschien even als toevoeging. Ja, dat is natuurlijk wel een goede correctie. Maar verschuift er zo van, ja, één iemand die produceert het product, die zet het product in elkaar.

- Als die het vervolgens doorgeeft aan een distributeur. Verplaatst de verantwoordelijkheid. Of is de verantwoordelijkheid van die persoon dan ook naar de distributeur? Is dat de distributeur verantwoordelijk staat voor de kwaliteit van het product? Of hoe zit dat dan mee?

Nee, zeker niet. In principe is de, want je rol bepaalt ook zeg maar welke verantwoordelijkheden of welke artikelen van de MDR voor jou van toepassing zijn. En op het moment dat je fabrikant bent, heb je gewoon veruit de meeste verantwoordelijkheid. Dus dat is ook de verantwoordelijkheid voor een groot deel van de productkwaliteit zeg maar. Ja. En de distributeur, en dan moet ik heel duidelijk even zeggen, als die geen aanpassingen maakt, dan heeft die maar beperkte verantwoordelijkheid. Dat staat in artikel 14 van de MDR, staat oké, de distributeur moet zorgdragend dat, nou ja, dan moet die wel de labeling en de etikettering checken. En nou ja, hoe je iets moet, moet opslaan en verzenden. Maar dat zijn eisen die horen eigenlijk bij die rol. Dus die rol en de bijbehorende wettelijke verantwoordelijkheden, die verschuiven niet zomaar. Ik zeg expres niet zomaar, omdat ik las in jouw mail van, jullie maken een toepassing volgens mij voor bij een rolstoel.

- Ja, de toepassing is dus nog een beetje de brede zin, want ik weet nog niet precies waar mijn project precies naartoe gaat. Alleen wij zitten te kijken naar een vorm van modulariteit binnen een rolstoel. En dat zou eventueel kunnen leiden tot dat een rolstoel gedeeltelijk in onderdelen wordt opgestuurd. En dan in elkaar gezet zou moeten worden. Wij zitten heel erg met de issue van, hoe kijkt de MDR daarnaar? En ja, tot in hoeverre, zeg maar, op het moment dat de persoon die het product koopt, als die accepteert dat die het zelf in elkaar moet zetten, verplaatst dat de verantwoordelijkheid.

Ja, het is moeilijk als je iets zelf in elkaar moet zetten, of je de kwaliteit altijd behouden kan blijven. Omdat misschien iemand net een schroefje anders erin zet dan de bedoeling is. Ja, oké, dat snap ik. Maar dat snap ik dus wel goed.

Dat het niet zo is. Dat het niet een soort van accessoire of bijbehorend is bij een rolstoel. Maar het is eigenlijk wel de hele rolstoel die levert, alleen dan in delen. Oké, nou dat maakt het in ieder geval wel een klein stukje makkelijker. Want als je het hebt over aanpassingen en losse onderdelen die iemand anders gaat leveren, dan wordt de relatie tot die fabrikant van de oorspronkelijke rolstoel dus heel lastig. Dus ik dacht dat je het daarover ging hebben. En dat is een heel moeilijk gebied, moet ik eerlijk zeggen. Oké. Maar op het moment, kijk. Want jullie, het bedrijf zou de rolstoel dan wel onder eigen naam leveren. Ja.

Nou ja, dat betekent dus dat je fabrikant bent en ook al laat je bepaalde onderdelen maken, dat is dus allemaal uiteindelijk onder jouw verantwoordelijkheid wettelijk gezien. Ja. Het is opzich denk ik niet een probleem als je zegt van nou ik stuur dat in onderdelen naar de consument of tussenpartij die dat in elkaar moet zetten. Waar je dat denk ik heel duidelijk in mee moet nemen is bijvoorbeeld, je moet een stukje risicomanagement doen als fabrikant. En daar zal dit zeker in naar voren moeten komen. Je zult dus echt wel moeten nadenken van oké, wat zijn de risico's die daarbij komen kijken en zijn die wel, nou ja, wegen die wel op tegen de benefiets, zeg maar. Ja, precies. Dus je zult heel duidelijk moeten kijken van oké, wie is dat dan? En is diegene ook capabel om die rolstoel in elkaar te zetten? Dus dat is eigenlijk het pre-market stuk.

En dan heb je nog het post-market stuk, wat bij de medische hulpmiddelen wereld heel duidelijk aanwezig is. En dat is dat je eigenlijk constant moet monitoren. Dus niet alleen passief, klachten, feedback, et cetera. Maar ook echt actief gaan ophalen van wat gebeurt er nu met mijn product? Ja. En als je daar dus dingen ziet die op die risico, op dat risico komen. En als die risicomanagement weer effect kunnen hebben. Ja, dan moet je gaan nadenken van oké, moet ik iets in het ontwerp of in die samenstelling of hoe het samengesteld wordt of in elkaar gezet wordt gaan wijzigen? Moet ik iets extra's in mijn gebruik gaan wijzigen? Dus zo wordt dat eigenlijk een soort constant proces wat je doorloopt. Waarbij met nadruk je wel moet laten zien dat je aan de voorkant, dus bij het in de handel brengen, die risico's al of hebt weggenomen. Of zo ver mogelijk hebt geminimaliseerd. Dus dat is denk ik een hele belangrijke. Kijk, op het moment, je zult sowieso die onderdelen moeten kunnen traceren denk ik. Het product heeft één CE, maar als je het natuurlijk in onderdelen levert, sowieso is traceerbaarheid een hele belangrijke.

Dus als je natuurlijk verschillende samenstellingen of verschillende onderdelen levert, dan zul je daar ook even over na moeten denken van hoe doe ik dat dan? En hoe kan ik traceerden? En hoe kan ik traceerden uit welke onderdelen een door mij geleverd product bestaat? Ja. Maar ja, bottom line is, als fabrikant moet je dus voldoen aan de eisen die horen bij een fabrikant vanuit de MDR. En dat zijn er best wel wat.

- Ja, nee, dat geloof ik inderdaad. Want wat is het bij een rolstoel? Heb je enige overzicht van wat ongeveer daar gevraagd wordt van het product? Eh, nou ja, weet je, dat is voor een rolstoel.

Niet heel erg anders als voor een hoog risico klasse product. In die zin, een rolstoel is een klasse 1 product. Die eisen zijn ietsjes lager. Betekent dus ook dat je niet naar een Notified Body moet voor een CE certificaat. Dus het betreft dan zelf certificering. Dus jij zegt eigenlijk door middel van je conformiteitsverklaring, hé hallo, ik ben die en die en mijn product voldoet aan de eisen. En vervolgens zijn het klanten of een inspectie die daarover natuurlijk opmerkingen kunnen maken of die dat ook kunnen controleren in de laatste geval. Dus in het geval van een inspectie. Dus zo zit dat eigenlijk in elkaar. En de lijst van zaken waar je aan moet voldoen, ja die is best lang. Ik weet niet of je MDR wel eens hebt opengeslagen?

- Ik heb het al wel eens opengeslagen. Ik heb ook nog een paar collega's die ook al nu twee naar Hamburg hebben gestuurd inderdaad om die testen te laten doen. Dus we hebben er al wel enige overzicht over, maar ik was toch benieuwd inderdaad. Ja, waar inderdaad ook een beetje valkuilen zaten en ook voornamelijk voor die verantwoordelijkheid. Want wat potentieel een idee is vanuit het bedrijf en dat zit ik ook een beetje te onderzoeken is van wij zien nu bijvoorbeeld, want wij vroegen ons heel erg af van op het moment dat wij een product in onderdelen verkopen, zou het dan mogelijk kunnen zijn dat we dan het stokje overdragen, maar tot in hoeverre kunnen we het stokje overdragen naar de persoon? Naar de installateur van de rolstoel? Als dat een bedrijf is die dat inkoopt?

[INSIGHT 1] Nee, dat kan niet. Tenzij je met dat bedrijf afspreekt van goh, ik ben alleen toeleverancier en dat bedrijf wil graag optreden als fabrikant. Oké. Snap je wat ik bedoel? Dus dat is ook iets wat je onderling natuurlijk kunt bespreken. Kijk, er zijn heel veel bedrijven die optreden als fabrikant van een product, maar het niet maken. Maar die bedrijven hebben wel de wettelijke verantwoordelijkheden, die horen bij de rol van fabrikant. Die moeten wel, die zijn wel aansprakelijk, even MDR gezien, ik bedoel hoe dat aan de achterkant zit, dat moet je dan zelf regelen, maar MDR gezien spreekt een inspectie dus de fabrikant aan, ook op bijvoorbeeld het uitbesteden productieproces. Ja, precies. Dus dat kan, maar als je als bedrijf zegt van nou ja nee, ik ga dit onder mijn naam, in de handel brengen, ja nee, dan is daar geen twijfel over mogelijk dat je die, je kunt die verantwoording dan niet doorgeven. Nee.

Het is anders als jouw klant denkt van goh, ik ga hier eens even wat leuks mee knutselen of een wijziging of hé, een van die onderdelen kan ik zelf wel leuk vervangen. Ja, dan val je ook onder een bepaald team van de MDR en dan word je zelf fabrikant, maar dat komt dan omdat jij zelf degene bent die wijzigingen aan het bestaan heeft. Ja.

Dus als je een medisch hulpmiddel, waarvoor al die testen en analyses zijn gedaan, dat je daar wijzigingen gaat aanbrengen, ja dan zegt de wet van ja, hou even, als jij aan een product gaat zitten sleutelen, dan mag je ook zelf de volledige verantwoording dragen. Ja, oké, oké. Maar dat is sleutelen als in je gaat echt wijzigingen aanbrengen, dat staat in artikel 16, mocht je geïnteresseerd zijn. Oké. Maar nee, het is niet zo dat omdat je het in onderdelen opstuurt en iemand anders assembleert dat of zet dat in elkaar, dat je dan die verantwoordelijkheid verschuift. Oké. Nee, sterker nog, je moet zelf heel erg die verantwoording dragen dat het dus ook op de juiste wijze geassembleerd of in elkaar gezet kan worden. Ja, oké. Voor degene die dat doet.

Ja, dus dat biedt voor ons inderdaad ook meer en meer aandacht inderdaad om te kijken of inderdaad daarvoor mensen inderdaad kunnen, techneuten voor kunnen opladen die dat dan inderdaad op een goede verantwoorde manier kunnen doen zodat het in ieder geval daar niet mis gaat in de assemblage. Ja, nee, dat is inderdaad een risico wat jullie zelf dragen. Ja. Dus als je gedurende het proces waarbij je het al op de markt hebt gebracht denken van oké, dit blijkt toch niet zo lekker te gaan, ja, dan ben je dus ook verplicht om actie te ondernemen. Ja. Ja, oké.

- En zou dan, ja, nou ja, dat is natuurlijk moeilijk om dat zo specifiek te omschrijven, maar stel wij zouden daarvoor x aantal mensen in training voor kunnen zetten om te weten hoe ze die rolstoelen in elkaar moeten zetten, maar ja, dan nog steeds zijn wij verantwoordelijk voordat die training voldoende is zodat mensen dat goed kunnen doen. En dan is het moeilijk dat we dat kunnen monitoren, want wij hebben natuurlijk niet echt dat wij onze eigen mensen van het bedrijf uitzenden naar verschillende locaties om daar rolstoelen in elkaar te zetten. Dat is misschien niet waar wij hun beoogd doel in zien.

Nee, dat is inderdaad een keuze die je dan zelf maakt, inderdaad. Ja. Maar dat dat post-market stuk, post-market campaign heet dat dan, ook een eis waar jullie aan moeten voldoen, dat houdt dus ook wel heel duidelijk in dat je dus wel actief iets daarover gaat monitoren van hoe gaat het dan bij diegenen die het in elkaar zetten. En ja, hoe gaat het uiteindelijk bij de klant, komen er bijvoorbeeld veel reparaties terug en hoe bevalt het product. Dus daar zul je iets, een systeem voor op moeten zetten. Dat staat ook in de wet. Ja. Oké.

- Nou, dat is in ieder geval gewoon om te weten, want uiteindelijk is dat voornamelijk een beetje het moeilijkste onderdeel. Want die MDR, we hebben die testen, die hebben wij zelf ook al met een aantal rolstoelen zelf al gedaan. Welke testen? Nou, die om een CE-certificering te krijgen. Dus inderdaad de krachttesten en dergelijke op die rolstoelen. Want we hebben al een aantal rolstoelen die, ander soort rolstoelen, die we in ieder geval ook al hebben laten testen in Hamburg.

Oké, want dat zijn denk ik de testen volgens de norm voor rolstoelen die u bedoelt. Ja. Oké, dat is iets anders dan de MDR, voor alle duidelijkheid.

- Wat, oh, excuse me, wat is dan precies het MDR?

Nou ja, de MDR is echt de verordening voor medische hulpmiddelen. En die geeft gewoon heel duidelijk aan, hé, let even op. Als fabrikant moet je eerst gaan uitleggen waarom ben ik fabrikant. Heb ik hier een medisch hulpmiddel? Je moet dat medisch hulpmiddel, moet een Unique Device Identification op. Die moet je registreren. Je stelt een conformiteitsverklaring op. Je moet een kwaliteitssysteem inrichten wat aan bepaalde eisen moet voldoen. Staat in artikel 10. Daar zou ik vooral even naar kijken, want artikel 10 is de basis voor de fabrikant. Oké. Je moet een klinische evaluatie doen. Je moet aan risicomanagement doen. Ja, zo kan het nog even doorgaan. Maar dat is dus niet van, oké, ik doe die testen en dan heb ik

een soort van CE-certificaat. Oké. Dat is niet waar. Dus dat moet ik je even meegeven. Het CE-certificaat is dit allemaal, alles wat je net hebt opgenoemd, dat valt allemaal binnen het CE-certificaat. En daaronder zit ook een onderdeeltje. En dat is inderdaad dat de rolstoel inderdaad al die, ja, zo van die krachtmetingen aan kan. Ja. Oké. Klopt. Ja. En dan is er een certificaat voor klasse 1 medische hulpmiddelen is er geen CE-certificaat. Want een CE-certificaat is iets wat een Notified Body uitgeeft voor hogere risicoklasse producten. En als dat certificaat is uitgegeven, dan pas mag je CE aanbrengen. Maar voor medische hulpmiddelen klasse 1 is het dus zo, wat ik net zei, dat je zelf verklaart door middel van je Declaration of Conformity, DOC, conformiteitsverklaring, dat jij, die ook aan allerlei eisen moet voldoen, dat jij dus voldoet aan de MDR. Ja. Ja, oké, precies. En dat is je basis voor het uiteindelijk aanbrengen van het CE op het eind. Oh, dat is wel interessant.

- Ik heb gisteren nou met iemand uit van het Rode Kruis gesproken en die had het over dat zij alleen rolstoelen wilde hebben met het CE-certificaat. Maar ik weet dus niet...

Ja, want dan bedoelen ze waarschijnlijk je DOC, dus je Declaration of Conformity. Oké, ja. Nee, precies. Moet je even... Kijk, ziekenhuizen kopen natuurlijk ook veel hogere risicoklasse producten in en die zijn ook heel erg belangrijk. Maar die hebben een CE-certificaat. Volgens mij kopen ze ook allerlei gewone medische hulpmiddelen in en dan is die conformiteitsverklaring dus voldoende. Ja, ik moet even zeggen, ik hoop dat dat voor alle ziekenhuizen duidelijk is. Er is hele strenge wetgeving op het gebied van toepassing van medische hulpmiddelen voor ziekenhuizen. En je ziet dat dat vaak resulteert in allerlei vinklijstjes voor die inkoopafdelingen. Van, oh nee, ik moet dit hebben, ik moet dat hebben, maar eigenlijk begrijpen ze niet.

Hoe het nou exact zit en dat resulteert in wat lastige discussies vaak ook over ze willen CE op producten die helemaal geen medische hulpmiddel zijn, want anders komen ze niet in. Nou, ik zal je niet vermoeien, maar waar dat discussie geeft, hou dit even in gedachten. Waarschijnlijk willen ze gewoon je conformiteitsverklaring hebben. Oké, dat is in ieder geval gewoon te weten.

- Want een CE-certificaat bestaat niet voor een klasse 1 medische hulpmiddel. Check. En ik was even ook nog een beetje benieuwd. Want ik weet nu dat in Europa hebben ze in ieder geval MDR. Hoe zit dat? Klopt. Is dat in Amerika? Hebben ze dat ook eigenlijk? Of niet?

Ja, daar hebben ze een andere wetgeving. Een andere wetgeving. Oké, nou, dan ga ik daarmee. Maar die hebben ook... Het loopt wel enigszins met elkaar, maar nee, het zijn met wat andere eisen, ja. Oké. Ja, zeker. Nou, dan zou ik er zelf nog even verder in moeten onderzoek doen. Ja, daar ben ik ook, kijk, ik weet er wel iets van, maar daar ben ik geen, daar help ik bedrijven niet bij. Nee, precies. Ik help echt voor de MDR en de ISO.

- Maar in het geval van een rolstoel, heb je enig idee of dat er van enigszins overeenkomt of is dat totaal anders?

Nou, het is wel anders, omdat je hier het Europese registratiesysteem hebt en de traceerbaarheid door middel van die Unique Device Identification die je bijvoorbeeld bij GS1 moet aanvragen, zoals dat je ook voedingsmiddelen hebt. Ja, dat is in Amerika wel anders. En ja, ik weet het niet exact. Oké. Het kan een heel verhaal ophangen. Nee, precies. Nee, heel goed. In zekere zin lijkt het op elkaar, maar er zitten zeker verschillen in. Oké. En daar is die CE natuurlijk niet, ja, CE is echt Europa. Oké, ja, weer check. Nou, dat is in ieder geval wel goed om te horen. Ja, dank je wel voor alle antwoorden.

- Ik denk dat ik al een goed weg vooruit ben met het overzicht van wat nou een MDR precies is.

Ja, nee, dat is goed. En als je ooit wel hulp nodig hebt, dan weet je waar je me kunt vinden. Ja, dat is helemaal fijn zo. Mijn achtergrond is, ik heb zelf 14 jaar bij de inspectie voor de gezondheidszorg gewerkt, dus ik heb eigenlijk bedrijven door heel Europa heen gecontroleerd op, eerst de MDD, dat was de voorganger van de MDR, en toen de MDR, dus toen dacht ik, in plaats van controles heb ik inmiddels genoeg gezien om de bedrijven te helpen. Kijk. Maar goed, ik vind het prima om op deze manier je in ieder geval even te wijzen waar je kunt kijken en ja, kijk, het is niet dat ik dat iedere keer doe. Nee, nee, nee, natuurlijk niet, dat schut ik. Dus, maar goed, in ieder geval heel erg bedankt. Heel leuk dat je hiermee bezig bent en heel veel succes met je project.

- Ja, dankjewel, dankjewel. Je hebt me heel veel informatie gegeven, dus ik kan hier heel veel mee. Dus dat is helemaal top. Nou, dat is fijn. Oké, heel veel succes. Helemaal goed. Dankjewel Linda. En tot snel. Oké, bye. Doei.

PEZY

Pezij, H. & Van Tol, V. (2024, 31 January).

INSIGHTS:

1. PEZY has outlined two visions on how they believe they can make a difference in the wheelchair industry.

Transcribed Interview Text (EN):

Ga op zoek naar influencers en geldbronnen, dit kan voor Pezy interessante inzichten geven. Verder kijk hoe het project eventueel gelinkt kan worden aan de UN Sustainable Development Goals (SDG's).

Ook is het interessant om naast markthaalbaarheid ook te kijken naar producthaalbaarheid. Wat zijn complicaties in een modulair rolstoelontwerp. Henco opperde echter dat de focus moet liggen bij het vinden van een geschikte markt met voldoende vraag, het product zal hierna ook van zelf wel volgen.

Al met al omschrijft Henco dat de rolstoelenmarkt erg gecompliceerd is met alle partijen die allemaal een hapje nemen van de verkoopprijs en dat het belangrijk is om dat uiteindelijk goed in kaart te kunnen brengen.

[INSIGHT 1] Verder verteld Henco over zijn optiek van de modulaire rolstoel. Hij ziet het product voor zich in twee categorieën:

1. Rolstoel (stijf en licht) die makkelijk in maten aanpasbaar is voor de gebruiker (mogelijkheden in een high-end markt)
2. Rolstoel die je goed in elkaar kan zetten en kan instellen op de gebruiker (eventueel in ontwikkelingslanden).

Deze twee opties onderbouwt hij met dat er veel mogelijkheden zijn in het vernieuwen van rolstoelen. Zo heeft Pezy Group een spuitgietmachine en ziet veel potentie in het ontwikkelen van spuitgiet onderdelen in de rolstoel. Dit kan potentieel de rolstoel goedkoper maken omdat dit productieproces ook erg goedkoop is zolang er maar genoeg oplage zijn i.v.m. de spuitgiet matrijzen. Ook zegt Henco op basis van ervaring in rolstoel testen van de MDR dat deze onderdelen makkelijk door de test heen komen.

Verder is er vanuit Henco een duidelijke voorkeur voor het verder uitzoeken hoe de keten er uit kan komen te zien tussen een bedrijf als Motivation en Rode Kruis.

Verder staat Pezy Group open voor een brede benadering voor het project. Het doel is om een geschikte markt te vinden voor het kunnen produceren van rolstoelen in grote oplage. Verder in het geval van ontwikkelingslanden is het voornaamste doel impact te maken met eventuele bijdrage en in het geval van high-end Europese markt is het doel om er geld mee te verdienen.

In beide gevallen is het eigenlijk het belangrijkste om een continuïteitsbeginsel te hebben: geld, toegevoegde waarde, menselijke energie.

Free Wheelchair Mission

Herr, K. (2024, 21 February).

INSIGHTS:

1. The Gen3 wheelchair represents a significant improvement, featuring a foldable design tailored for navigating narrow passageways and enabling easy transportation in vehicles.
2. Wheelchairs are being offered in four different sizes.
3. Free Wheelchair Mission sheds light on the complexities of designing wheelchairs suitable for use in rural areas with inadequate infrastructure. These areas often lack paved roads, leaving individuals to use dirt roads, muddy paths, and uneven terrain.
4. international manufacturers who produce in Asia and ship wheelchairs to Kenya
5. providing cost-efficient wheelchairs
6. Partners undergo receive instruction on wheelchair assembly techniques through videos and two-dimensional assembly manuals being provided with each chair
7. they are mostly focusing on the optimal donation to project ratio
8. maintaining a high program-expense ratio
9. "The toughest thing is saying no to a person because in some cases the person is just not the right user for this basic wheelchair."
10. a global need of 80 million wheelchairs, with a significant amount required in developing countries
11. Some people with disabilities attribute their condition to the lack of modern medical resources, resorting to drastic measures like amputation due to the unavailability of insulin and monitoring devices in cases of diabetes
12. Some manufacturers, such as Motivation and Latter-day Saints Church (LDS Church), are conducting further research to explore how local production could be established.

Transcribed Interview Text (EN):

- I'm currently doing my graduation internship that's what it's called and they have a broad range of expertise and one of these expertise that they have is they have expertise in health tech product development, complex plastic solutions, circular product development and smart product development. A lot of the cases that they had they're currently working on mostly are in private so the company itself do not want that the projects are being uh presented here on the website itself but they have somewhat experience in healthcare products and why did they choose to go into the wheelchair industry is because the owner of this design agency also owns another company and that is this one and this is also a Dutch wheelchair manufacturer um which is mostly doing fairly specific target group for people who are ill and need um the extremist of personalization within wheelchairs so the range of these wheelchairs are going um between I don't know between 2500 and 10 000 euros. Now they also wanted to look into if there's because they have their expertise in in designing wheelchairs so there is at least some uh beginning entrance of knowledge within this within this area but they also wanted to look into if there were also other options to look into and that's also what my project is for the next couple of months I will do this for like four or five months and there I also will be looking into how the wheelchair is are divided throughout the world and where the where there is if maybe some potential in designing a new type of wheelchair or designing some additional to the wheelchairs that are being provided I don't know but that is a little bit my uh my project and I also need to I don't know there's a really large fuzzy front end where I need to make some logical direction in what I'm going to do in the future new or improved wheelchairs can be a solution. And also knowing that there's large competition also. I found today that there are 26 different wheelchair manufacturers only within the United States itself. Also knowing that Europe also has a large amount of manufacturers. I was also thinking of where there are maybe also different type of manufacturers distributed. So that's a little bit why I was so interested in getting in contact with you. And , I'm a little bit wondering.

Yeah, I can definitely help you answer some of those questions. Good. I've been at Free Wheelchair Mission probably years before that with Sandow Automotive. I'm just gonna go right in through your questions if that's all right with you. , that's fine. , that's okay.

- So how did the three different models differ from each other?

I'm sure you've looked at our website. The first model is called Gen 1. That is no- Okay, Because this was the original idea that our founder had and he made some of these in his garage and then had a company make them. And so, and I'm not telling you anything that you can't find through our website or what do you call it, social media or things like that. But Gen 2 and Gen 3, the main difference as you look at those, the Gen 2 is what's called a rigid frame. All of our wheelchairs are for a basic user, someone that can hold their trunk up. The wheelchair that you showed me is for someone that has a lot of, looks like a lot of difficulty holding their trunk up and things like that. This is just for a basic wheelchair. And so this is rigid. What some of our distribution partners do is make modifications by drilling and putting wood and foam and covering on various parts of the wheelchair. But it's a fairly good wheelchair in that you can make those modifications. The benefit, I'm sorry, the downside or the disadvantage is that it's very wide and you can't fold it. And so that's when the Gen 3 came out and that's the main difference between that. [INSIGHT 1] It's foldable, so you pull up in the center of the wheel and those two cross braces fold and come up. And so from that standpoint, it's for people that need to go into a building that need a narrow wheelchair or it's collapsible so that you could put it in a car. You can put it on a bus, you can take it to different places. So that's what Gen 3 is. Oh , okay.

- And can you maybe also, I'm now thinking about it, can you also adjust the width of the wheelchair or is it just one basic width that you have and then it is, when it folds out, then it folds out?

Right, it folds out. So , [INSIGHT 2] we have four different sizes and our distribution partners, we're trying to fit through an assessment the user to a particular size. So there's a small, medium, large and extra large. Oh , , check. Same thing with Gen 2, there's four different sizes.

- What type of difficulties do you find when designing for developing countries?

Oh, that's a good question. , that's the, The biggest or the toughest challenge is that people take these outside. And so they're used on rough terrain, as well as sometimes they're used for transport within a hospital. So someone would get into the wheelchair and be transported to their hospital room or transported down to rehabilitation or surgery or things like that. But that's the easy part. [INSIGHT 3] The difficult part is when people use them in what we call rural areas, areas that don't have paved roads. They have maybe dirt roads, maybe they're muddy. And they're very difficult from a terrain standpoint. So that's the most difficult thing. And so just because, are you familiar with ISO 7176?

- Oh, no, not specifically, no.

Okay, ISO 7176 is for wheelchairs, and for testing wheelchairs on what's called a double drum. There's some of these are it has to meet 200,000 cycles of that and then there's a drop test. What we found is, even though a wheelchair meets that, it doesn't necessarily work well in these rural areas. And so what we have is another assessment tool, which is a test track that looks like a treadmill. And so what that does is that allows us to put more stress on the wheelchair and understand and do comparisons between our wheelchair, other wheelchairs, and also comparisons between any design changes that we want to make. Okay. Is it also obliged in the US to have the, maybe not the last one, you personally have your own testing, but the first testing of the falling and such that is, , that's required. If you want to sell the wheelchair in the States, you have to go through that testing.

- Okay. That is also somewhat similar to what we have in Europe. There we have the medical device regulations. And there you also have these type of testing indeed. Right. That's very similar. What else did you ask?
- On the website, you mentioned $96 for a wheelchair. That's right. How much is it production, shipment, et cetera?

I really can't tell you that. Because it's something that we do that's specific to our company and it's proprietary information. But I will tell you, you may have seen on the website or in some of our posts, we don't make the wheelchairs in the US and we don't distribute in the US. [INSIGHT 4 & 5] We make the wheelchairs cheaply in one of two places. We make them in China. Okay. Or we make in near Shanghai or we make them in India near Kolkata. And then we distribute from there to underdeveloped countries. Whether they're in South America or Africa or Asia.

- And you have also these distributing partners, right?

So the way it works is we have a programs team. We have a team of people that assess these partners. We do not own the partners. We simply, what's called vetting, assess them and make sure that they can administer our wheelchairs. And then we have a team that does the wheelchair program appropriately. And so what we do is that $96 will manufacture the wheelchair and ship the wheelchair from our location in either India or China to the port of our distribution partner. And then once it reaches the port, then the distribution partner pays to clear the container. And then needs, obviously, to get the wheelchairs. And then we have some funds and some money to be able to distribute to various people. And they do that internally by raising their own money. Okay. So if you look at our annual report, I can't remember how many partners we have are currently working with. It's 30 some partners that we're working with. We've over the 20 plus years that the company has been. Around we've distributed to 90, 94 different countries. And also annually you did like 60, 61,000. Something like that.

- And the projects are the other projects from free wheelchair mission to also give the wheelchairs away? Or is that the distributing partner who is also distributing the place from the manufacturing to the to the port?

So free wheelchair mission controls the manufacturing at our subcontractor. In other words, we contract with them to manufacture it. We also pay to have the container shipped from the factory to the port where the distribution partner is. Once it arrives at the distribution partner's port, that's where the money that free wheelchair mission pays for stops and where the partner that clears it and distributes it distributes each of the wheelchairs from the container according to how they need in the market. And what type of quantities should I think we should I think of is that so hundreds, hundreds a pair or something? I don't know. So in a container, there is anywhere. Between 440 to 520 on average, there's about 510 in a container. Okay.

- And that depends a little bit on whether you have more Gen 2 than Gen 3, because I can imagine that Gen 3 is quite more compact than you have the separate frame and the wheels may be separate from each other?

Yes. So believe it or not, it takes up more space. So the box is bigger. Than the Gen 2? The Gen 2, you can take the crossbars. If you look at the picture, the Gen 2, you can take those crossbars up so the side frames can be very close together in the box. That's right.

- Okay. That's interesting.

And it's more than it's better stackable. Okay. So there's a specific size box that looks like a square for Gen 2, another square for Gen 3, but the thickness of the box is bigger for the Gen 3. Okay. Oh, that's interesting. I was thinking it the other way around, but No, the box size is basically, basically needs to be big enough for the 26 inch rear tire. That's the largest component that we have. Okay. So indeed you have the complete wheelchair within one box. It's not that you have one box for the frame or one box for the wheels.
Each, each content, each box has an entire wheelchair, including an assembly, manual, and a user guide. You can assemble that wheelchair and you have every part that you need.

- And how do you, because I can imagine that you as manufacturers, that you have the responsibility of that the wheelchair is sufficiently put, put together, right? How do you?

So what we, [INSIGHT 6] So what we do is we train our partners in the assembly of it. We also audit them. And they have to go through. Training where we have videos of how to assemble the wheelchair. And then we also have a, a, you know, a two dimensional assembly manual that comes with every chair. Okay. But in most cases, um, we are only onboarding maybe one or two partners a year and the other partners have already received the wheelchairs in the past. And so all we're doing with them is auditing. Okay. Exactly. Mm.

- And are there any specific regulations, for us to get clearance?

It's that ISO 71 76 testing that we have to do. Um, some of the, some of the, uh, importation requirements want to see a copy of that. Um, other than that, um, some, some countries require ISO 1348. Okay. Which is a, um, a quality management system specifically for the manufacturer of wheelchairs. And so that's something that the manufacturer has. Or achieves. Free wheelchair mission can't because we don't manufacture it's for a manufacturing company. One more time. Free wheelchair. So what I mean by, what I mean by that is our, our manufacturer in India, for instance, has ISO. 13485 certification because it's the quality management system about how to manufacture, um, uh, medical devices. Okay. Okay. Check. And so it's, it's, it's very similar if you're familiar with ISO 9,001, 2015 and quality management system, it's the medical equivalent of that. Okay. Um, so from that standpoint, those are the only two uh, requirements that, that we've seen with importing into, um, foreign countries.

- That was also a little bit the question, because I also asked with a specialist in the medical device regulations, and she mentioned that, um, we also needed to monitor how the wheelchair is being, uh, installed, uh, when you're exporting it to somewhere else. And that was also the question of how do you do that in a way that you already explained to me. So, um, um, , I think that's a good question.

But I think, , I think those are the most important, uh, aspects as well in Europe as what you say in the U S Okay. Uh, um, as far as the industry goes, um, our business model is very simple. We have fundraising

events throughout the year, throughout our fiscal year, pay for the manual chairs and then the money that we raise also provides, um, dollars for us to do the training. Uh, the audits and personal visits and things like that to our wheelchair partners, our distribution partners. Okay. Right. But you're, and you, we just released our, um, financial report and you can see some information in there. I already took a quick look into that. I did a quick look. I don't know. I was, it was like a couple of, a couple of days ago. [INSIGHT 7 & 8] Okay. But, um, our program ratio is over 75%. Okay. So that means that if someone donates $1 over 75 cents of that dollar is going to, um, specifically get the wheelchair to the location.

- That is a nice, uh, that is a, that is a good, uh, good amount.

Often, often you, often you hear that the, the, the marketing and such of some NGOs is, Worse than you can imagine. 80%. I know. That is, it can be really bad. But you have donations. Oh. And with the donations. You can provide indeed, um, , 75 cents of the, of the dollar is going to, um, Uh, purchasing these wheelchairs and providing them to the distribution partners. And training them and finding the distribution partners and auditing and all those types of things.

- And the distribution partners, do they still then need to buy the wheelchair or are these being given?

So the distribution partner receives a container full of wheelchairs for free. What they have to pay for at the port, get the wheelchairs to their location, store the wheelchairs and then distribute them to. Okay. To the users. And there's, there's money involved in that. I mean. Of course. It's not free. No, no, no, no. I can imagine.

- And do you decide which, who are. And then the. Receiving. Oh, sorry. The stakeholders. That's okay. You said who are the stakeholders?

We have a, a board of directors, um, that you can see on our website, a president and a CEO, the CEO runs the day to day. The president is the person that, um, founded the organization named Don Schoendorfer. Um, and he gets involved in various things, but from a day to day standpoint, um, he's not involved in the operation. That's the CEO. Right. Um, are we accountable in case the witch is incorrectly adjusted? That's, um, that's a good question. And that, um, we make sure that the partner is adequately trained, which is why we do the training in person as well as do audits, um, and videos and virtual training and all those types of things. So, as I said, we're only onboarding one or two new partners a year, the other ones have already been doing this for a while. So that limits how much, how much activity we need to do. And also the monitoring also helps in getting the best quality you can give in, in, uh, setting up these wheelchairs. Right. Um, right.

- And then you said, how did, how do we find the users?

Um, so basically each of the distribution partners is responsible for finding the users. Okay. And so in, in some cases, um, the partners, when they first started out may have had to, you know, petition the government or, or lists or things like that. Most of our partners now, if not all have way more need than they have wheelchairs. Okay. That's good to know. So that's really not an issue for us. No. I can imagine. Um, it's the toughest thing. [INSIGHT 9] And I went on one trip, a distribution trip back in June of last year, the toughest thing is saying no to a person, because in some cases the person's not the right user for this basic wheelchair. Maybe they can't hold their body up straight. Um, you know, there are a number of different reasons why a wheelchair, this wheelchair might not be right for them. And it's, you know, it's difficult to say. No. And to try to explain to someone why they can't get a wheelchair.

- So there's still a large amount of demand for the, for, for wheelchairs in these type of areas, right?

[INSIGHT 10] The estimated number is you've probably seen in our, um, in our annual report is around the world health organization just increased it to 80 million. That's around the globe. A lot of those are in these underdeveloped countries. [INSIGHT 11] They just, they just don't have modern medicine. You know, if someone gets diabetes, um, instead of prescribing insulin and a monitor, they don't have those resources. And so what ends up happening sometimes is they amputate a portion of the leg or the entire leg. And in other cases, people may have had polio or some other diseases that in the Western world, in Western Europe. And, you know, you're not, you're not able to get a wheelchair. So you're not able to get a wheelchair in the United States and developed countries. You don't even hear about those diseases anymore. It feels terrible. Indeed. I can imagine that it was quite difficult then to say no to someone who not perfectly fits.

It's the user that, uh, needs a wheelchair. Again, there's an inner, uh, a basic wheelchair, which we provide, there's an intermediate wheelchair, and then there's an advanced wheelchair and the one that you showed me that's 2,500 to 10,000. That's, um, it's an advanced wheelchair, um, for, for severe disabilities.

- And that's also the reason why our company also wants to, because this is interesting and, but there's the market where they are operating in is so niche that they also were thinking we have enough knowledge to maybe also try to find an efficient way in setting up a wheelchair, which is not even that, um, No, not, not even that expensive. So why not also look into this type of market? So that is, uh, that is at least, uh, A more useful initiative.

There are others within our market that do some to us. [INSIGHT 12] Um, there's LDS church, there's, uh, motivation also doing local productions. There's, uh, beeline, which makes their wheelchairs down in Guatemala. It's just, the need is so great there. But you don't feel any competition between these organizations. We're, I don't know. We have a, , we have a great network of partners. We're the largest, um, and we continue to, to grow. And, um, as long as our, as long as our resources continue to grow, um, you know, we'll, we'll keep working to fill the need and get people off the ground. That's interesting.

- Um, and the last question you had, I've answered that the wheelchairs are actually assembled by the NGOs, by those distribution partners. Um, Through training and everything else. Any distribution partners. Those are the NGOs you're, you're done working together with. Right. And they, what, what, what is their ordinary, uh, thing they do as an NGO? Is it all in the health?

Um, area or is that completely. It's, it's across the map. In other words, some of them are only doing wheelchairs, others wheelchairs is maybe 10 or 20% of what they do. Uh-huh. It just, it, it, it varies. Okay. I will look further into that. I think that's interesting and it also to also to see. What else can I answer for you? I know we've only got two minutes, but is there anything else that I can answer for you? Not. Not yet.

Something in specific, uh, what my project is now about is that I will advise them in, um, , which directions could be interesting. And then, uh, , this direction of in developing countries, that is the most interesting also with the, uh, with the, with the goal of this company. And I will probably dive deeper into these type of development projects and such. Um, so maybe if I have some questions for.

I don't know, in the next couple of months, if I can email you with something or maybe, uh, absolutely. So we'll just hop on another, another team meeting. Let's do that. That sounds good. It's so much easier. Email is one way and things can get lost in the translation, you know? So, okay. Let's do that. Well, good. But I will let you know. With your project. Thanks.

Interested in hearing how it turns out. I know you can't tell me a lot because it's a private company, but Just let me know how things are going. Okay. I will do. Okay. Yes. Okay. Thank you very much. Take care. Bye bye. Bye now.

TAI The Accessible Institute.

Mwarandu, K. (2024, 28 February).

INSIGHTS:

1. Mwarandu (2024) also further elaborates that they make the wheelchair better suitable for this environment by using bicycle wheels.
2. Disability and lack of income
3. In some villages there is still some religious beliefs that disabled people are a punishment from god
4. Money is more important than wheelchairs as they do not mind crawling.
5. NGOs and other well-wishers bringing wheelchairs to Kenya for a long time
6. Alongside this, people in developing countries are rarely able to purchase wheelchairs as well as they expect them to be free.
7. Manufacturers in this market have limited income and rely partly on donations and fundings
8. Self-driven mobility device for people with disabilities. However, this is not a acknowledged wheelchair according to the Medical Device Regulations.
9. Tough environment for wheelchairs
10. Mwarandu (2024) also further elaborates that they make the wheelchair better suitable for this environment by using bicycle wheels.
11. Rural and urban environment
12. According to Mwaranda, it is cheaper for local producers to have production take place in Asia. This emphasizes once again that production in Asia is cost-efficient.
13. Wheelchair manufacturing in Kenya has noted that production is expensive due to competition for skilled technicians who can produce the wheelchairs (Mwaranda, 2024).
14. According to Mwaranda, it is cheaper for local producers to have production take place in Asia. This emphasizes once again that production in Asia is cost-efficient.

Transcribed Interview Text (EN):

Hello good morning or good afternoon hello how are you doing good afternoon good I'm also doing good I'm doing somewhat of a research so sorry no I was gonna say I don't know how to properly pronounce your name so maybe if you can start with that often quite difficult my name is I trust me a Kenyan would never in a thousand years be able to have guests but that's how you pronounce

- I can imagine I already spoke to different people and they all had issues so no worries no worries. I was wondering a little bit I was looking into your website and I and I'm already pleased to see that you already made quick made the contact so quickly.

It interested me I mean it also caught me at a really good time because I was already looking at email so when it came in I was already on my emails um and I'm not in the field at the moment so I was like if this needs to happen it needs to happen now before I start moving forward or I'm not moving in and out of the field because then it becomes really difficult to schedule our meeting because you're now in between of a project then um we're doing field trials so we have the safaris it wheelchair um which is our main product uh but we've done more modifications to it we've uh on both brought up feedback from the users and all the people uh that's it so uh we're moving above and beyond the uh the market so also some experts in the field who are with persons with disabilities on what they think from a medical standpoint what a suitable device should look like or what sort of features it should have. So then we did a whole redesign of the wheelchair.

- So you've recently made a new type of wheelchair design, so the current safari seat I'm seeing online is not the current one you are planning to make?

This one is the one that we've been making and gotten lots of feedback from it and we've seen how it has performed but now we have a newer version. And we're now doing field trials so that we get feedback on what people think of the newer version. And then this is also the design that we'll try and we'll start making from now on, basically.

- Sounds good, sounds good. How does it differ from the first one?

I cannot really get into the details of it right now until it's like officially released. But , there's just certain features that we've improved. Great works.

- I'm seeing a child pouring water into a can. Is it for the weight distribution? The image where the child was using baggage racks that were on the side.

So there was a space on the side of the chair that could be used as a baggage rack. And they were using that because they needed to pour water.

- Ah, okay. Oh, it's even for more easy transportation indeed. Yes. And this wheelchair is specifically more designed for rural areas, right? For more difficult, non-paved roads and such, I can imagine.

Yes. Yes, yes, exactly. So it can definitely be used in a modern setting. [INSIGHT 1] But it is mostly meant for those... Kind of off-roading, like very uneven, tough terrain. That's where it kind of shines the most because... So how it's built, the type of features that it has means that it can move through these uneven grounds much easier. Compared to maybe other devices.

- Okay, interesting, interesting. And how does your production goes? You locally fabric... manufacture your own Safari chair, right?

Yeah, So locally manufactured. So we literally buy the metal bits and then we... So we start the process from scratch. Fabricate everything using basic tools. And then weld the pieces together to basically form the frame. And the only parts that we buy are obviously the mechanical parts because we don't have the technology. And there's no one in Kenya who's making their own chains, tires, sprockets, spokes. So all these mechanical parts, we're buying bicycle parts to use in this way. Okay. But anything else regarding the frame itself, we make ourselves.

- And the metal, do you buy it yourself and then, , weld it together or...? Yes.

Okay. So basically how the process is, is that we buy metal pieces, just long lengths of metal. Different kinds, depending on where they're going to fit. And then we come... When they get into the workshop, we have a production line. And we make them by chopping them in different sizes, different pieces. And then these will then be... We then go through different processes. Some will get bent. Some will get cuts in them. You know, different... Different... How can I say? Different processes. Ah, okay. To get them to specific shapes or specific lengths. And then once we have all these pieces, then small pieces will be welded together to make larger pieces. And then the larger pieces will then be welded together to make even larger pieces. I can imagine. And so we have... Until we have the Safari seat.

- And these metal parts, are these exported from somewhere else or do you buy those locally? Or how do you get these? Sorry, which metal parts? The bicycle parts? For the frame, for example. The metal frame. Because you say you weld it together. So you make it together. It's a whole. But where do you get these separate parts? Are these shipped from, I don't know, somewhere in India or in China or where do you get these?

No, no, no, no, no. So let me repeat myself. Maybe I wasn't clear enough. So when you buy metal, you buy from a local supplier. When you buy metal, you buy 20 feet long tubes. About 20 feet. That's how they are sold. So we bring them.

- So you buy them locally, indeed? So you buy them locally from someone who is selling them?

Okay. Right. That's good to know. That's good to know. They are then brought in a workshop and then we start to cut them up as small pieces and then those small pieces will then be processed. And then after they've been processed, they'll be welded together.

- Okay. And what was the length you buy these tubes in?

Around 20 feet. Around 20 feet. Okay. Right.

- Okay. Because a little bit to get... For your information on what my assignment

is, is that I'm working with a design agency on also looking into how different types of wheelchairs can be improved. And also, indeed, then also the manufacturing process of how, for example, how you do it with Safari chairs. That's very interesting for us also to know on how we can best provide maybe a more efficient way of... Or a more simple way of manufacturing a frame and then only putting what I see. Those are bicycle wheels, right? Or not? Okay. And then the back wheels, are these also both from bicycles or where do those come from?

Yes. So basically, they're all used in bicycles. The bigger ones, they're all used in children's bicycles, basically. Okay. So the front tires are used for children's bicycles, but obviously for slightly bigger children, and then the smaller ones in the back are used for the smallest bicycles. And for children. And they're puncture-proof. They're not pneumatic. You don't have to puncture them. They're just solid. Solid tires. Okay. Because of all the sharp objects and thorns and sticks and everything [Requirement]. The punctures are very common.

- And with who are you doing this? Who are the stakeholders within your company, you're manufacturing these chairs?

Well, stakeholders are... There's different kind of stakeholders. The biggest one is obviously the person with physical disabilities that use the devices themselves. You know, they become the ones who provide feedback. And they have a lot of the design changes or design processes. And we also work with different institutions. For example, like there is one called Bethany Kids and they are really good. They've been really instrumental in providing feedback on what the device should have in order for it to be a suitable device for persons with physical disabilities. And they, for example, work with a lot of expertise from the GDI Hub. I don't know if you know the GDI Hub. The GDI Hub. It's a global disability innovation hub. It's based out of the UCL, University College of London. I would say stakeholders are organizations like this that work with persons with disabilities. So, we work with the persons with disabilities themselves who then kind of form the market base or the customer base. And then we have other local partners, CBOs or..., mostly CBOs or other institutions that then also work with persons with disabilities and form the local networks.

So, for example, we need to distribute wheelchairs in a new area that we've obviously not been in. We find a local partner. A local partner that works locally in these regions. That they would have kind of information on which people can use the devices, which are the most in need cases, because a lot of the times we probably have, I don't know, 10 wheelchair for each region. And when you go into these areas, you find maybe there's 100 people who are in need. So, we try and get the local...local organizations to kind of guide us on the most needy cases so that they then get prior and get prioritized on who gets the wheelchairs.

Then government, obviously, is another stakeholder. In Kenya, there's a department called the National Council for Persons with Disabilities. So, they are basically the arm of government that deals with all issues, disabilities, basically.

- Mm. Okay. And do you get funding from this government, or how do they help?

No, not really. The...this National Council, they sometimes purchase wheelchairs, but we haven't been able to get into their system. To...to do this. These processes are not the most straightforward. I think there's only one organization that has been there since before I was born, and they have a lot of their roots in government. And what is... So, I will stay here.

- Which company is that? Do you know that?

It's called APDK. They produce tricycles and other versions of wheelchairs.

- Okay. And how do you get your..., how do you get...I see on the website you can donate a wheelchair for $250. How are you getting your...your funding? So, how do... how do you finally get your...you...you get your money, and from that point on, you start purchasing, and then building your wheelchairs yourself?

We are mostly donor funded. So, when we started, we...we did a crowdfunding campaign, but this was done by the designers of the wheelchair. They are from the UK. So, they did a Kickstarter campaign. That's how we got our first, let's say, $1,000. So, we did a huge injection of funding to start the whole project, and then afterwards, we've been able to fundraise with different...you know, trying to get grants and all this, but we've... we've had one significant donor that I cannot name. Okay. That's fine.

- Is it a private or is it a company?

It's a Swiss...it's a Swiss family foundation. Okay. , that's as much as I can say. So, it's been mostly things like this, or maybe we participate in an accelerator and we get some funding. So, it's been different ways, you know, either through networks that we're in or participating in various...how can I say? Like... I wouldn't say competitions, but, you know, something like that. You do a pitch, maybe the prices, you get some funding, but it's been mostly this significant funder that I told you about. And then, for example, we also started livelihood programs. [INSIGHT 2] And basically, what happens is that a major challenge beyond just the need for mobility is a lack of income. A lack of income to purchase these type of wheelchairs. Not even that, just a lack of income in general. Like, poverty is very interlinked with disabilities in Kenya. You know? Having disabilities means lack of opportunities. People are not too focused on getting them to school. [INSIGHT 3] Stigma in the old days meant some of them were actually hidden, because people didn't want to even acknowledge that they had children with disability. In some areas, it was seen as a curse, or just people thought it was. It was like they felt a bit embarrassed to admit that they had somebody who had a disability. So, anyway, there's this loop, you know, between disabilities, poverty, and disability. And lack of just self-sufficiency. So, this became, you know, as we kind of maintained ties with the users to get feedback from them, we realized that there was a pattern in all of them, whereby their biggest challenge was a lack of income.

And in some of them, like, they...if you really offered them either a chance at a job or at earning an income, or getting a wheelchair, they would much rather get an income than the wheelchair. [INSIGHT 4] Like, they don't really mind crawling, you know. Like, it's something very significant. The fact that they might have families that they cannot really take care of properly, or, you know, they might not be able to feed themselves, or just different things that are kind of linked to not having enough money to sustain themselves. So, we started a livelihood program where we provide the seeds. And then we also provide upskilling. So, we either take them to school to get some sort of vocational training to gain job skills.

Then after that, some of them, we give job search support through a partner, a partner on the ground who does this for persons with disabilities, or works with persons with disabilities to get them employed, basically. And then on the other end, we have the users who want to... Who want to set up their own businesses, who don't want to get employed. They want to be self-employed. So, we work with them, do a bit of entrepreneurship training, coaching, so that they can set up their own businesses. And then we give them a small business loan as capital to actually set up the business. Because if you just do the training without any capital, then there's no guarantee that you can start the business, you know, because they won't have any capital to invest in this. Okay. So, there's also a cultural difficulty in providing people with wheelchairs.

- Sorry? Sorry, did you say cultural difficulty about people with disabilities. You mentioned. Is that for you still a problem? In providing wheelchairs?

For us, I wouldn't say any cultural prejudices make it difficult. Sometimes it's hard to go... Because you might go into an area where people say, we are sure there's 20 people there who have disabilities. But when you go there, then they are hidden, and you maybe just find 10, or you find 5, or something that gets in the way, but it's not a major issue.

Okay. Okay. You know? For any wheelchair provider in Kenya, the only thing is market. Because you are working with a group of people who, first of all, don't have the money. To them, a wheelchair is important, but they wouldn't spend, for example, money that they have earned the hard way, obviously... [INSIGHT 5] But this is also because for a long time we had NGOs and other well-wishers bringing wheelchairs to Kenya, you know. [INSIGHT 6] So this created a narrative that, you know, people feel that it's my right to get a wheelchair for free. You know, we don't want to deal with the politics of how you fund yourself or how you get this wheelchair. Only that when you bring it here, it should be free. That's what people say and people will tell that to you openly like, no, you cannot sell the wheelchair. The wheelchair should be given for free. You know, that's what they believe. They believe that they deserve to get these devices for free.

Now, that would make sense if, for example, government was stepping up and providing funding because then you could just focus on making the devices and providing as many as needed. But in an environment like this, it's either you have loads and loads of money coming in through, let's say, donor funding or you get grants to just provide these devices, which is not always the case. Even if you get funding, it's not forever.

So I would say it's, you know, like, for example, we tried initiating a microfinance. People could pay less than a dollar a day over a period of one year. And then they, you know, the wheelchair would be theirs and they would have paid, you know, they would have paid for their device. So that they don't have to sit back and wait for donations because donations come from time to time. You might be waiting thinking, how am I going to donate? You never know. It could take one year. It could take five, depending on how things are going. And people just didn't take it up because they were like, these devices should be provided for free. So we cannot contribute to this. So, that kind of thing.

So there are not a lot of local manufacturers who are selling their wheelchairs [INSIGHT 7]. It's mostly from funding. Yes. So, you know, because unless you, unless you have connections to the UN or things like this, then participate in tenders or in the tendering process and then get, you know, then they put you in their system as one of the suppliers of wheelchairs, then maybe you would sell. But also you'd have to have a number of them. You'd have to have a number of them. So you make one order and they're okay for maybe six months. Then after that, you're back to the drawing board because maybe they haven't distributed all the wheelchairs that they bought from you.

[INSIGHT 8] I think another, another important point to bring, to bring into the equation as you're thinking around this is the fact that also the Safari 6 is not really a wheelchair. If you look at the WHO. If you look at the definition of what a wheelchair is, the Safari 6 does not conform to that. You know, so it's an efficient product. It's good quality. But, you know, for organizations like these, they want to, they would want to have documentation saying that this is compliant. So that if they say we're going to buy wheelchairs, then they know that this is something that is compliant as a wheelchair.

just don't fit that bracket because the Paris it was built and designed to be something that works in this context it works in the context of Kenya or Africa so it maybe doesn't conform to these standards that I think obviously were not developed in Africa but what developed in Europe and what is the advantage of this wheelchair compared to a normal wheelchair whether what would you what do you think is the you know are the better qualities I would think first of all it's made of a very rigid frame because [INSIGHT 9] the environment out here is punishing you know if you're at the coast near the ocean the rusting is unbelievable for example but also just going through this tough environment it means that the wheelchair has to be very tough very rugged designed to be very tough and it has to be very stable and it has to be very designed to be able to survive past six months or one year so a lot of these are the devices they come in and they fit the bill of what a wheelchair is but they cannot last more than one year because the problem with this is just that they're not strong enough they haven't been built to really take the beating that they will in a proper African environment. [INSIGHT 10] So ours has a very strong frame we've had wheelchairs out since 2018 that are still working to this day so you know it's maybe a few things maybe some of the mechanical parts maybe the chains break after a few years of being used but you can very easily replace a chain you know that doesn't mean that the wheelchair cannot be used and very easily replace the chain or sometimes they're upholstery so the seat itself it's made of canvas so maybe after a while the canvas also wears out but that can very easily be replaced if you're not using it.

Get a new if you get a new seat that's it you know the wheelchair can still function okay you know that's not that's because the frame is very strong basically and then I think the other one is the fact that the safari seat has a suspension system okay it mimics it basically mimics car suspension whereby each wheel lifts independently. What this means is that if you're going in a very uneven ground the tire comes up against an obstacle as it drives over the obstacle only that tire lifts up only that one tire lifts up and therefore the whole wheelchair doesn't tip it doesn't lift in a way that you feel that you might fall out of the wheelchair. It becomes a very comfortable ride basically because the wheels just lifted independently so just kind of like car suspension anyway as I was saying.

- And how often are, because I can imagine that this is for, is this for specific areas needed or is this the majority of the areas where you are providing wheelchairs for? Is that?

I mean, if I had to do, if I had to do an estimation in terms of rural buses, urban, paid, urban, you know, rural areas, I would say no more than 30% of Kenya is paved roads.

- And how much would you, how much would you expect to be somewhat usable with a normal wheelchair? Is that also those 30%?

[INSIGHT 11] I would say a normal wheelchair, a normal wheelchair would work really well in the normal, in the 30%. The areas that are paved, the areas that are, you know, constructed in a way that someone can move in such a device. But if you go out there, you know, in this remaining 70%, then you better, you better strap in because you need something rugged. You need something that can deal with that sort of environment.

- And what you, there are also wheelchairs like, I don't know if you know them, from free wheelchair mission or motivation. Do you maybe? I know. I know. I know motivation.

I've seen some of their devices. They can be used. They can be used in some of this context. But, you know, obviously bet on this device because I have seen what it can do when someone uses it properly and it's a damn good device. Okay. Okay. That's good to know.

- Okay. Because we are also still looking into what type of type of wheelchair or device is maybe best suited for in these also these rural areas. So, it's good to know also how normal wheelchairs because the only type of wheelchairs in these areas I know are similar like the wheelchairs that Motivation are providing. So, it's also good to compare a little bit.

I mean, I haven't seen the Motivation wheelchairs in action in the field. So, I cannot really say whether they are good, whether they are bad. Obviously, Motivation has a good brand and people trust that it is, you know, what they make is good quality. We are actually in contact with people who have worked at Motivation and they know them to be people who are right. They are, you know, they are committed to making sure that they produce something that is good quality. That being said, I haven't seen a wheelchair in action in this tough environment.

And obviously, when we talk about this tough environment, beyond a certain point, beyond a certain point, there's no wheelchair that can work. There's areas where just it's too hard for even a motorbike to move through that area. So, then for a wheelchair, especially the motorbike. For a manual one, a manual

wheelchair becomes really difficult, you know, but it's better if you have something that is then built for that context rather than something that someone just bought in Europe and then sent over.

- And how do you have any certification for this type of wheelchairs or how do you, is there any certification needed for building these wheelchairs? Are they wheelchair-like products or how do you test these, test the quality of the product?

I think for us, the quality is proven over time. The problem with, for example, ISO testing that we wanted to do is that the rigs, that they, it would be a very expensive endeavor because we would have to initiate a process whereby, firstly, we come up with the rigs, you know. If you say it's a wheelchair, then they have already tested wheelchairs before, so they know what sort of rig is needed to test a wheelchair. If you say a safari seat, that doesn't conform to any definition that you'll find in the book. So, how then would they test for something like this?

That would mean a whole process of them understanding the safari seat and building, building rigs to test the safari seat as is. And, the easiest, lowest hanging fruit would be to just try and get it tested as a wheelchair. And we would fail that because the safari seat is not a wheelchair. So, it would be unfair to us because then they wouldn't really show what the safari seat can do.

And so, in the local, in the local context, we focus on what can the wheelchair do. Maybe it is not WHO compliant or it is not, it's not yet ISO certified, but that's also a very expensive process. So, we try and get local certifications. The only testing that has been done is EISO. So, English ISO standards. English ISO. It's been tested for that. I see. And looking at the, I don't know,

- I'm looking at the price of a safari seat and I was also wondering on what is the most expensive process in building this wheelchair. Is that purchasing the materials? Is that manufacturing the wheelchair? Is that, and I can imagine that also a part of it is maybe somewhat of a marketing indeed, but what is the most expensive part of producing this wheelchair?

It's not even, it's not really even the market. [INSIGHT 12] The expensive things are labor and materials for this, for this device. Those are the two most expensive things because when it comes to materials, prices of metal go up almost every day, especially in the late-week. And what do you...

So, since COVID, obviously, there's been a spike in everything, but I think for metal in Kenya, it's even more so. Okay. It's really expensive. So, that means if your material costs were, let's say, $110, you buy a good enough stock three months later, you might be looking at $150. So... You know? And then in this market, it's kind of, you know, the people who kind of set the price in the market are organizations like APDK that don't really have, they're not really operating as a business. They get lots of government funding and all this, so they can set the price on that because they don't really have to worry about margins and things like that, you know?

Honestly speaking, if I had to price a Safari seat as per what we spend on it, I would say I would probably price it at between three... About $350. For it to even make sense. Okay. For it to even make sense, because the other side is labor. Now, labor maybe with more efficiency, maybe you can make more in a shorter amount of time. So, maybe that wouldn't be an issue, but the thing is we're having to make this with very basic tools because we are not a huge industrial complex. So, there's a limit to how much we can make within a specified period of time.

[INSIGHT 13] Also, we have to get very skilled technicians, and if you're not paying them well, then someone will get them. Someone will coach them, someone who can pay them better, someone who's maybe building something else, motorbikes or anything. You know? So, you have to pay them really well to ensure that you're not just losing people every other day, in order to ensure that the quality that you're producing is also maintained because you have people who are really experienced and they know what they're doing.

So, this is kind of like the... It's a bit of a bottleneck because we would like to sell them at $250 comfortably, even less if we could. Because, again, we understand that if someone has a million dollars and they have to choose between a wheelchair that is $250 and a wheelchair that is $150, they'll obviously go for the $150 because they'll be able to do more with the same amount of money, basically. So, in order for us to be competitive in the market, we still need to find ways of bringing this down, bringing the cost down.

[INSIGHT 14] But this is why also we are exploring industrial production internationally, whereby we get an industrial manufacturer to start making the safari seats. Okay. And they can then just make huge numbers in a very short amount of time because they have the skills, but they also have the machinery to be able to do all of this very quickly. So, that's one idea that we are very actively exploring and looking to put in place. Also, so that if someone needs something in, for example, Tanzania, it doesn't all have to come to Kenya. We can just bring in a container from wherever this will be to Tanzania and then they, you know, then it's simple at that point. We don't have to go through the hassle of bringing it to Kenya, then to Tanzania. It goes straight to Tanzania. And that business is complete. And a little bit back into the manufacturing part.

- Which type of specialists are most expensive? Are those, what should I... It's just the local fabric, the local technicians. And what is, what type of processes are they doing to build this future? Just welding, welding and metal fabrication.

And metal fabrication, you mean in, what do you... I don't know how else to describe it, but it's basically cutting, bending. Cutting and bending. Cutting, bending. And then welding. Those are the three. And then welding. Those are the main processes. Okay, okay, okay.

- Because we are also taking, I don't know, we are also looking into how to maybe, instead of needing to weld parts to each other, have maybe some parts, some extra particles or parts to... A lot of parts. Tubes together. And that's also maybe something we're also looking into. And that maybe also can simplify a little bit the production process. But I, we are still a little bit looking into that and how to make it a little bit more simplified. But that's good to know at least. Okay.

Are you building a wheelchair?

- We are not yet. I'm now doing just the research to...To see if we are looking into maybe make a more efficient or more simple way of manufacturing a wheelchair, then, that's also what we will be investigating. So, But it's maybe also in collaboration with another company. So, maybe, we're also trying to see how we can help and if there is something to improve indeed in wheelchairs for rural areas and also, for example, in Kenya.

I have to be jumping to the next meeting. I can imagine. In eight minutes. Okay. Could I suggest if there's any more questions, you just type them on WhatsApp or send me a voice note on WhatsApp and then I can just reply to that. But I need to do something before this next meeting starts. Of course.

Of course. Go ahead. Thank you for your time at least. Okay. Okay. Well, Feel free to reach out anytime. Okay. Thank you. Okay. All right. Bye-bye.

UNICEF

Søndergård, D. (2024, 8 March).

INSIGHTS:

1. UNCEF purchases half a billion dollars of goods and services
2. UNICEF also purchases product on behalf of governments
3. UNICEF sometimes commits to purchasing millions of dollars' worth of products
4. Big companies are not interested in developing countries market
6. In low-income countries, people don't know anything about wheelchairs.
7. An ill-fitting wheelchair could result in even more discomfort for the user or even injury
8. Governments buy their wheelchairs in bulk and not specified to the user.
9. UNICEF sets high importance in adjustability of the wheelchair.
10. 3 wheeler of motivation has low adjustability however only one within pricerange.
11. Some manufacturers, such as Motivation and Latter-day Saints Church (LDS Church), are conducting further research to explore how local production could be established
12. APDK make crap wheelchairs
13. UNICEF demands that the wheelchair meets European MDR regulations, specifically the ISO7176 Certification
14. People have foldable wheelchairs to be able to travel.
15. Not having much finance for Research and Development (R&D) of their wheelchair as they are mostly focusing on the optimal donation to project ratio
16. International manufacturers who produce in Asia.

Transcribed Interview Text (EN):

All right, cool. Let me let me introduce what we do. So I lead the assistive technology team in UNICEF. I sit in what is called supply division. So UNICEF has three headquarters, one in New York, one in Copenhagen and one in Florence. So Florence does the research. They're called UNICEF in Chente. We do procurement, product innovation and logistics in Copenhagen. And then the main headquarters is in New York where they do all the main advocacy and programming stuff. And then UNICEF has 190 country offices and seven regional offices, 18,000 staff. My team is responsible for ensuring access to assistive technology, both for our own program offices, but also for the development of the system. So I don't know how much you know about the UN system, but UNICEF is by far the biggest procurer in the UN system. [INSIGHT 1] We buy goods and services for around seven and a half billion US dollars every year. So we buy both for UNICEF. We also buy for some of the other UN agencies. And then we buy for governments. [INSIGHT 2] About 40% of the stuff we buy is UNICEF buying on behalf of some government around the world. This is particularly in areas where the governments have strong expertise or where the markets in their countries are so weak that it's difficult for them to do national tendering.

So let's say you're Namibia and you want to do a national tender for wheelchairs. It can be quite difficult because the main suppliers of wheelchairs don't consider the Namibian market particularly interesting, so they don't bid, which means their local tenders will get crappier products than the rest of the world and potentially also more expensive. So we do, that's one of our four main pillars, increasing access, we do this by global tendering. So global tendering means UNICEF will do a tender and that tender will be globally applicable, so companies from all over the world compete to win this tender, which can then be used by all countries around the world. Having said that, in reality they're only used by low- and middle-income countries. If the bigger countries ever use UNICEF for their procurement, because why would they? They have more than enough national capacity and strength to do their own tendering.

So it's in reality only LMIC countries that use us. So we do these tenders to improve quality of the products that can be available in these countries, improve the price, and improve access to spare parts, training, blah, blah, blah, all the stuff that comes with it. Apart from that, we also do in-country pilots, so implementation projects in countries. We do training programs. Anything that has to do with the product part, we do that in countries as well.

So that's pillar one. Pillar two is product accessibility. So this is not for assistive technology. This is for all products that you buy. So this is literally thousands of products, whether it's tents or bed nets or vaccines or... So nutrition or whatever we buy, we review it for accessibility. So just to make sure that it can be used by as many as possible. Pillar number three is cooperation and influencing. So this is to maximize the impact of UNICEF. So we partner with, for instance, we have a signed collaboration agreement with WHO, because they are a sister agency, the Norman Institute of Agency for Health, so they have some strengths over us. And we focus on particularly setting directions, because everybody looks to WHO for standards, for directions, for guidance. So they're very strong on that. Whereas UNICEF is much stronger on procurement, much stronger on in-country presence, and much more cross-sectoral. So our country offices are much bigger than WHO's, so our country presence is better for implementation. And WHO answers only to ministries of health. So UNICEF collaborates. We have all ministries in all countries, because children obviously is not just health, it's also child protection, social protection, it's WASH, it's education, it's the whole thing, right? So that also makes us an easier implementer. So together with WHO, we sort of are much stronger as a unit, so we have a collaboration agreement with them, and then we sit on a lot of boards. I sit on different boards on global partnerships, just to make sure that UNICEF's voice is heard and to make sure that we're doing a good job. So that we're impacting as much as we can. And then the fourth pillar of what we do is innovation, product innovation. So even though my unit actually sits in the product innovation center, the innovation that we do is mostly scaling. So we take existing products that are mainly on the Western markets, but totally unavailable in the low-income markets, and then we make them globally available, so they're easily accessible. So scaling is our primary concern. However, we do product innovation. So should our country offices identify a gap, then we'll investigate the gap, obviously, to see whether it's actually a product gap, because quite often it's not the product that's the problem. It's just that they don't know the product exists, or the programming needs to be tweaked to fit what is already there, et cetera. But if there is an actual product gap, the way that we do product innovation in UNICEF is not to do the product. It's to do the product innovation. So we don't want to be the ones that do the innovation, because we're a small team, and we can't be experts in all product areas.

So rather than doing product innovation, we incentivize product innovation. So what we do is we make what we call innovation product profiles, where we say, this is what we are aiming to have. We currently can't find it on the market. Who wants to work with UNICEF to collaborate in doing this, in creating this product? And then people will bid to be part of the innovation, if we're lucky. If nobody wants to be part of it, we can also incentivize them by saying, we're going to make this product. [INSIGHT 3] When the product is done, we, UNICEF, commits to buying $10 million worth of products. And then obviously more people will be interested in collaborating. Normally, it's not actually necessary for us to incentivize financially, because collaborating with UNICEF is generally a big deal. It's not necessarily considered a good thing for most companies, so they use it as CSR as well. But there are certain areas where we often need a quick solution. So for instance, I don't know if you remember, but around five, six years ago, there was this big Zika scare, where pregnant women weren't allowed to travel in certain areas at the risk of getting a Zika virus. And there was no diagnostics tool on the market. So UNICEF said, we'll buy $10 million worth of Zika. We're going to use Zika diagnostics to whoever develops it first. So it took three months to develop a Zika diagnostics, and by then the scare was over. And we now have $10 million worth of diagnostics in our warehouse. So that's nice. But it is one of the ways to push the market.

On disability, we've explored different things, different innovation projects, primarily in context of humanitarian. So camp settings or humanitarian camps. We have developed certain latrine solutions that works for our humanitarian. And then for a brief period, we explored something similar to what

you're exploring now. Could we develop an emergency specific pediatric wheelchair? That was what we were looking at. So we had a lot of expert consultations with, obviously with experts in the industry. But at the end of the day, the compromises that was required meant that we decided it was probably better to use the existing chairs and then see if we could take existing chairs and market shape the price to a price point where it would be easier for us to deploy an emergency. Anyway, so we looked at it, but we decided not to go down the innovation route, but rather go the market shaping route on existing chairs. So we decided to go with the existing products. Doesn't mean that there isn't actually a gap or a market for a good pediatric emergency specific chair.

I will just come back to the pillar one, which was the tendering thing, because the first tender that we did was on wheelchairs and mobility products. So we did a big global tender on this. We invited, obviously, all wheelchair suppliers around the world to bid. We have six, seven different categories of wheelchairs that they're bidding on. But it turns out that for low and middle income countries, the suppliers that are best at supplying are actually smaller suppliers, NGO suppliers. The bigger companies, Invercare, Sunrise, Beeline, Ottobock, whatever they're called, all the big companies, they're not really interested in this part of the market. [INSIGHT 4] They make all their money in the West, and their products are not particularly well designed for low income markets. They're not designed to work in low income markets. They're designed to work in Berlin or London or New York. They're not really designed to work in the Afghan desert, which is also fair. And also, the price point of their products is totally unrealistic. What was the comparison then?

So the problem is, our Sunrise chair is developed to have features that would attract a European slash American buyer, but those features are totally irrelevant for me. So if they want, let's say they try to sell it cheap to me and they want $1,500, they're going to pay $300 for that chair. I want to pay maybe $300 for that chair. So obviously, I'm never going to pay more than $1,000 for an active chair. Maybe if it's a postural support chair, not even.

My postural support chairs cost $375 in the catalogue. So obviously, I do have an LCA with Invercare because they, but only for the cheapest of the chairs, which is the basic transport chairs. They're used in hospitals. With Invacare. You mentioned Invacare. Okay. That's the only big company that we have an LCA with. The rest of the LCA holders are relatively small companies or NGO companies. So it's companies like Motivation or Participant. Who else do we have? We have Xie Mobility from South Africa. Rehacence, which are single. Singaporean, Polish, sort of a combo. What else do we have? KEO, a disability, diversable disability organization, something like that, a Canadian. But as you can hear, those are all NGO suppliers. The problem with this is obviously they don't make their own chairs. Some of them make their own chairs, but not, [INSIGHT 5] they all have it manufactured in China. So they all use Chinese materials. They all use manufacturing. And that's not a problem in itself, the good quality. But the problem is when COVID hits, I get like, my lead times become super long and transport becomes super expensive for me when I need to deploy it somewhere in Sub-Saharan Africa, an emergency somewhere with all my products that are made in China. So that's an issue. The only non-Chinese based manufacturer I have is Xie, which is based in South Africa. Oh, Okay. But their products have pros and cons. Okay. I don't have all the product line. For me, for the wheelchair part, what we, the reason why we went into the wheelchair market, there were two main reasons. [INSIGHT 6] (1) Number one, in low-income countries, people don't know anything about wheelchairs. Their basic knowledge is horrible. So they buy the cheapest chair. And the cheapest chair is the hospital chair. But the problem is the hospital chair. The wheelchair doesn't provide any support for children who need support. It's a basic folding frame transport chair. [INSIGHT 7] So it can probably, in the long run, hurt them more than it helps them. And that's a serious problem. (2) The other serious problem with it is if you try to take an indoor transport hospital wheelchair outside in these environments, it'll break down within three to six months. It's not designed to work there. So our primary entry point for wheelchairs was to make sure that there were appropriate chairs available in low-income countries so they could get a chair with appropriate support or the chair that is most appropriate for their terrain or diagnosis. So quality was our key element. Flexibility, adjustability was key for the design of the chair because many governments, obviously, if you buy wheelchairs, for us, we don't have a wheelchair. So the difference is you know who you're buying the chairs for so you can get the chairs in the correct sizes so it can be individualized to the user. However, that's not always possible, especially if the government's buying. They don't buy for a thousand individual identified children. [INSIGHT 8] They buy bulk. So they need 5,000 wheelchairs. So obviously, they can tell us the age groups of people or something so we have a basic idea of the sizes of the chairs that we need to send them. But what's important for us is that the chairs are adjustable. [INSIGHT 9] As adjustable as possible in width and length and seating and footrests so that we can fit children in the best fit children groups as best as possible in the different sizes.

- Are the wheelchairs you're providing, are those indeed also adjusting to these specifications or so with the motivation or such?

So some chairs are better than others at adjusting. Not all chairs are equally adjustable. So it depends on what type of chair it is that we are buying. So active chairs generally, okay. We only have one rough terrain chair which is the three-wheeler for motivation. Oh, the three-wheeler, the adjustability in that one, not particularly great but [INSIGHT 10] it's the only three-wheeler that is available within the price range that we can take. It's not because there's no three-wheelers. There's lots of three-wheelers from a lot of companies but then again we get into a price range where no government will ever want to buy them unless they're Holland or Denmark or someone else. So that's the only one in that category. But generally the dual terrain chairs which is the sort of compromise between an active chair and the rough terrain. So we have a middle one which has a, you know, longer distance between the wheels and the back wheels and the front casters making it okay in terrain. They have bigger front casters as well. So it's okay for rough terrain. It's not as good as the three-wheeler but it's decent. And that one comes...

There's some good designs, the Rough Rider designs which is a public domain design by the way. Those are decent and the ones that we have are quite flexible. We have them both in the kit. But, adjustability is important for us. If you're interested, I believe I can share the specifications that we asked for in each of these chair groups. Okay. And then we can go to the next one. That would be good. , that would be interesting at least.

- And what is a little bit the price range in which you are looking into wheelchairs?

So it depends on what type of chair it is but I can give you the ranges. So the transport chair is between $110 and $150. That's the simple hospital chair. We only buy these for hospitals. Then we have active chairs. So we have three categories of active chairs where the user can propel themselves. And then we have the transport chair. So we have active urban, duals terrain and rough terrain. Those are the three urban active chairs we have. The active urban, which is the most common in the West, I believe the price is between $275 and $375 / $400. I think it's in that range. The duals range here costs, we have a simple one for $175 to the most advanced one, which is $375. And then the partial support chair, which is the advanced one for the users that need a lot of seating options. That price is between $375 and I think it's like $500. And then we have an adult version, which is more expensive, but we don't use because we only service children. But we do have an adult one, it's like $900 or something.

- And that is all inclusive, also shipping and such and then it is?

No, this is the chair. Okay. For the partial support chair, this includes cushion and seating system. For all the other chairs, you need to buy the cushion. And the reason

why we did this, this is a little weird, but the reason we did this is in low income countries, cushions are considered a luxury. They have no clue what they're doing on the seating. This is not part of the curriculum for most physiotherapists. So, taking the cushion out of the chair forces people to buy an appropriate cushion. So that forces them to have a conversation with me, so I can understand what is their needs, so I can tell them which cushion to buy. If it was already in the cushion, they would just give everybody a standard cushion, which is not appropriate seating for the children. So, they need to buy a cushion, but the cushion price for the standard one is like $16, almost nothing for a standard foam cushion, to the most advanced one, which is a high pressure redistribution cushion. And I think it's a Vicaire, it's a Dutch product. I think it's $200, something like that. It's the most expensive one. But, a partial support chair comes with a seating system, so that's included. But shipping is never included.

Shipping is always on sale. So, it depends on where they're shipping it, anywhere in the world. But the companies, the manufacturers don't pay for shipping. UNICEF pays for shipping. So, the terms of the condition with the companies is near sea or airport. So, they do that. They deliver the chairs to the nearest sea or airport, and then UNICEF takes over and does transport. Because obviously, if we buy goods and services for seven and a half billion dollars, we have really, really good deals with shipping companies. So, it's always cheaper for us to do shipping ourselves. You do shipping yourselves instead of that the manufacturer is... Yes. They're just nearest sea or airport, and then we take over and ship it wherever it needs to go in the world. Okay. Okay. This is also because the UN has better access. So, customs, clearance, etc. is much easier if you're a UN organization than if you're a private company. So, it's also for expediency. Okay. And... Cool. Okay.

- A lot of information to take in. But , it's nice to hear. It's nice to hear that. I've already spoken with the Red Cross as well. They're also doing collaborations with Motivation indeed. How much is Motivation producing? Because I've looked online, but they said something like 6,000 a year. But how much are... How much wheelchairs do you often...

Wheelchairs is new for us. So, we don't buy a lot of wheelchairs. I think we buy like 3,000, 4,000 a year. And it's really low. And we hope to increase in the next two to five years. We need to go beyond at least 10,000. We're not the biggest player in the wheelchair space. ICRC is bigger than us on wheelchairs, which is nice. But we need to be better. WHO buys almost nothing as well. So, what we did was we made the tender and then we gave all the contracts to WHO. And we're now sending them to UNHCR as well. So, they can use the same tenders so we can get some more volume. But , UNICEF ourselves, we buy like 4,000 chairs a year. Okay. And how would it...

- Are you purchasing the wheelchairs based on the amount of money you have to purchase?

Yeah, that's very different. So, depends on many different things. So, there's two sort of program areas for us. That's what we call development program, which is Standard in-country programming. So, maybe in Wanda, they want to give all the children in special schools new wheelchairs, whatever it is. That's a development program. They ask UNICEF, we buy the chairs. It may be funded by Wanda government. It may be funded by donor or it may be funded by UNICEF. That's a little different. Depends on the situation.

The other type of programming is emergencies. So, for instance, now in Gaza, I'm going to send probably 1,000 wheelchairs to Gaza. And that's all funded by emergency money through UNICEF. So, it's UNICEF's own emergency response to Gaza. So, that's funded by us. But generally, most assistive technology is funded by donors. So, donors want to do something on disability inclusion. So, they either give the money to us directly or to the government who then buys to us.

- But is it that you are being... That you're being asked for a certain amount of wheelchairs and then you purchase those wheelchairs with a certain amount of money you have? Or do you have a certain amount of money and you see how much wheelchairs you can purchase out of it?

No, it's always order. It's always per order. So, obviously, if Wanda tells us that they have $1 million for wheelchairs, then that's what we're going to do. Then we're going to figure out how much can they actually get for that amount of money. But most often, it's them saying we need 900 wheelchairs. And then we'll tell them how much the 900 wheelchairs cost and we'll place the order with the company. It's more often the number that comes before the funding. And often, a country will need something and they don't actually have the funding and then we have to help them find the funding to get the products. So, when we place our order, then they produce the chairs and then they ship them or we ship them.

- Oh, okay. So, it's always placing orders and then producing the chairs.

Except for emergencies where we pre-position chairs. So, we have the biggest humanitarian warehouses here in Copenhagen. But then we have warehouses in Shanghai, Dubai. Kenya and Panama. Okay. And the Dubai warehouse will host around a thousand wheelchairs that we can deploy immediately in emergencies. But other than that, it's always placed by us and then manufactured and it's based on orders on number. But it can be based on a donation and then it's quite funding. So, it's both.

- And I also heard you mentioned Kenya. So, why are these locations decided? Is it also that they're representing a region of where they can quickly distribute the wheelchairs to or... It's based on global spread, right?

So, the main one is in Copenhagen because that's where supply division is. But then the rest is just spread out so we can respond quickly. Because we have an obligation to the UN to be able to respond to an emergency with products within 72 hours. So, if we ship everything from Copenhagen, it's going to take more than 72 hours. So, for Latin America and the Caribbean region, we have a warehouse in Panama. For Africa, it's in Kenya and in Dubai. Those are both servicing Africa. And Middle Eastern, served by Dubai. Everything in Asia, served by Shanghai. To make sure that we can do rapid response, that's why we have spread our warehouses. Oh, okay. But generally, UNICEF's effort is divided into seven regions. We have seven regional offices. So, we have... So, we have... South American, it's called MACRO for me, Latin American, Caribbean region. That's also our offices in Panama. In Africa, the regional office for South and Eastern Africa is in Kenya, in Nairobi, which is where we have the warehouse. And then we have the Western Africa, which is in Senegal, in Dhaka. Then we have our MENA, Middle East and Northern Africa office that is in Jordan, in Amman, for... The South Asia region, that's in Kathmandu, in Nepal. For the rest of Asia, it's in Bangkok, Thailand. And for Europe and Central Asia, it's in Geneva, that's our regional offices. Okay. Okay. I also have a specific... Last that you asked...

- I specifically asked also for Kenya, because I'm already also in contact with a local manufacturer there. The Accessible Institute, it's not really... APDK? No, not APDK. APDK is from the government itself, I know. They're collaborating together. Social, yeah. But I already have some contacts with some local manufacturer who is funded by a UK charity, which is TAI, the Accessible Institute. It's not really a wheelchair, but it is a handily driven... Yeah, they call it the Safari seat, they call it. And I was also wondering, because also for my project from the university, they asked me specifically to look into one specific area. And I don't know if you maybe have any certain type of contacts within Kenya, or maybe people you can get me in contact with, because for this project, in looking into wheelchair developments. Where I'm also needing to specify to some rural area where we're going to look into how we can best suit the user. So I already have this contact of Kenneth in Kenya. And I'm also... Fantastic. Sorry?

So in Kenya, actually Motivation is setting up local production in Kenya [Insight 11]. So you can talk to Motivation. Okay.

- Do you have a contact from Motivation? I've already tried to contact them, but they haven't responded actually to my email. And also I've contacted with Claire, but she also

didn't respond with anything. I don't know if it's purely a thing that they don't know me or something like that, but I don't know. I don't know.

Okay. But they're trying to set up local production. I don't know the ones that you mentioned. But the APDK one, which is a social enterprise supported by the government, as you say, they make crap products [INSIGHT 12]. Their products are just not good enough for UNICEF. So I don't know anybody that produces wheelchairs in Kenya, unfortunately. So we have two suppliers that I can recommend in South Africa, if you just generally want to look at African suppliers. So it's Shonaquip and then CE Mobility. Those are the two major wheelchair companies in South Africa. They're probably also by far the two best African wheelchair suppliers. Then there's an American supplier called Participant, who is also looking at setting up local production either in Kenya or Zambia. Okay. He's very talkative, so I would be very surprised if he doesn't want to talk to you. His name is Kyoki King. And you can tell him that I'll share his contact with you. Okay. That would be great. Yeah. He's a very nice American guy who likes to talk, so I'm sure he'll talk to you. What else? [INSIGHT 13] In Africa, there's not a lot of great suppliers in Africa, to be honest. There's a lot of problems on quality control and living up to ISO standards, et cetera, for most of the suppliers. Yeah. So it's difficult to find good locally produced products. I think some of the tricycles, some of the hand-powered tricycles that you were probably the ones you were referring to, some of those are quite okay because they require less – they use them for a shorter period of time. It's not a chair that you sit in for eight hours a day. It means a transport. Yeah. So the requirements for the seating and support is less. Mm-hmm. So the products become better because they're less technically advanced. It's more bicycle than wheelchair. So some of those are quite good, but the actual wheelchairs is limited, how quality they are.

- And the requirements you ask for these wheelchairs, that is the basic ISO 7176. And then also, do you have a declaration of conformity? I can't remember the ISO stat. Yeah, yeah, yeah.

We have all of this. Just the MDR regulations. Yeah. I'll show you the specs. Yeah. Just so you know, I'm not a designer. I'm not a wheelchair person. Okay. When we did the tenders, I'm just a bureaucrat boss man. So when we did the tender, we have a technical specialist who's in on the ISO committee, who's also WHO's primary expert. So she did all the specifications. So I can share the specifications with you. That is so great. Yeah. So you can have a look at all the requirements that she asked for. Yeah. So, yeah, I have no clue. It's not my area. I just know what I've been told. That's all.

- But your UNICEF does have their own design team. Isn't that correct?

Not on wheelchairs. Not on wheelchairs. Okay. Yeah. Yeah. So we do do, I mean, not in my area, we don't do a lot of product narration. We try and make everybody understand. Everybody else do it. But in the product innovation center, we do more hardcore product innovation than my team does. Because my team is more, because the products are already, there's many good products that's just not used. But for many of the other areas, in washing or education and stuff, we do actual product innovation. So that's, we do have some designers, et cetera, that work as project managers out there. But for my area, we don't do actually do any designs or anything. Okay. Generally, I also think Unicef should be careful or the UN in general should be careful because there's a reason why companies, I mean, if companies apply a thousand designers because they're the best company in the world, then they probably know better than the five people who work in Unicef in this particular area. But there's no reason to try and be better than a world leading industry. Right?

So it's a key principle for us to not do something. If others can do it better. Yeah. And the most people who are indeed doing the R&D within the wheelchair designs, that is more, if they do it for Unicef, it's more like a charity, right? Then it's not really that it's only when, only when there's high need, what you actually mentioned, then you also. Yeah. If somebody is asked to do it, it's because they will own the product afterwards so they can sell it to us. Right? So we don't, it's not like if I have a product gap, I want to make a pediatric one. I want to make a pediatric emergency specific wheelchair. Then I won't own the design. I'll just tell people this is what I need. And then they'll make their version of it. And they own that design. They can sell it to everybody in the world. Yeah. Including me. So it's more trying to facilitate and push innovation. It's not for them to design something for me specifically. Yeah. That I will own. Okay.

- No, that sounds logical. Yeah. Cool.

But so can I just ask, so the wheelchairs that you're looking at, what type of wheelchairs is it just, have you had a, are you, how far are you? Do you have any ideas so far where you, what you've got to focus on?

- The focus will probably be because I think, and it's maybe a little bit of an assumption, but the manual self-driven wheelchairs that those are, and also more on the, on the active sides, so not the transportation. That is probably the direction we're looking into also in terms of ergonomics and also in terms of yeah, on, on what people need in those areas. And then indeed we are, as our high end venture company also is really focused on the most, maybe a little bit too extreme of the ergonomic seating. This will also, yeah, we will also take this in account when designing our own wheelchair designs. So yeah, the largest challenge for us is to maybe try to tackle the price range of current wheelchairs that are being provided. So now what you say, a price range between, for an active wheelchair, self-propelled, I think what you mentioned was like 275, 300, something like that. We are also looking into, and there's already a previous designer within our company who was already made a raw first design, but yeah, we're, we're looking into that. We're trying to get as well, the ISO 7176, as well as that we can maybe reduce the price by maybe like a hundred dollars. I don't know, but that's a little bit, the, the, the estimation of our first raw design was around 150, but I think there still need to be lots of adjustments to what, yeah, what is needed within this wheelchair design to also be suitable for rural areas. So I think that will, price will still go up. But yeah, our goal is maybe not even to manufacture our wheels, the wheelchairs ourselves, but also looking into maybe collaborations with such a motivation because we're not the manufacturer ourselves. We're just, yeah, we're just interested in improving the concept or the design of a wheelchair.

So we're also looking into a few, yeah. Let me just say, I'm just looking at, so all my, all our prices are online somewhere. So I was just finding, I was just looking at the prices. So the active urban Rigid chair, so the non-folding one, the price point is between 275 and 3850. The active urban folding is between 375 and 500 because for all chairs, we have at least three suppliers. So depends on, you know, which supplier I used and the price is a little different. Yeah. Okay.

And what is, what is the main difference between the foldable wheelchair and the rigid one? What is the main reason to have a differentiation between those two?

So obviously the folding collapses, so it's easy to transport around. So if you are moving or taking the bus or have a car, then you, it's easy to have a folding chair because you can take it with you. The rigid one cannot fold. So it's, it's big and chunky, right? [INSIGHT 14] So it's difficult to transport everywhere. So that's the main, the main reason people have a folding one is to have one they can transport and travel with. Okay. Yeah. Okay. Because yeah, that's interesting because the rigid one is more, it sounds a little bit like there's a better chance of being, of making those more, yeah, more adaptable also for rural areas, but I can imagine that the foldables also. Yeah. Yeah. Yeah. So I think generally the rigid ones have more flexibility and adjustability and obviously they're often also more durable. So there's a lot of reasons why we would pick that one, but, but the foldable is also easy to transport and also cheaper for us to send, takes up the space, et cetera, in containers. So there's pros and cons for everything. Depends on what the purpose is and who the users are that we pick the appropriate ones. We have a, we have a few tools to pick

the appropriate chair. We have a few tools to pick the appropriate chairs and how to order them, what information you need, because people don't know what they're ordering. And so, so we also developed a few tools, but I will say, I know motivation while motivation is probably one of the bigger NGOs class with 6,000 chairs, which is not a big commercial thing that they, they don't make it's a, it's an NGO, right? So they don't make money, which makes it difficult for them to find money to do new designs of their chairs. [INSIGHT 15] So many of their chairs have been the same design for the last 10 years and it shows both the three wheeler, they also have a postural support chair, which we deemed not good enough for UNICEF, MOTIGO, which also needs an update in design. So they'll probably be interested in collaborating on new designs. Yeah. Just letting you know, but if you do talk to Kiyoki, he's also super into wheelchair design. Yeah. Okay. That sounds good. Happy to talk about that as well. Another thing to consider is actually the biggest manufacturers of wheelchairs are probably the faith based organizations. So Latter Day Saints, the Mormon Church, they produce and distribute, I think it's like 50,000 wheelchairs a year or something like that.

- Which company you said?

It's the Church of the Latter Day Saints, the Mormon Church. Okay. It's a charity, it's not a company, but because their charity is so big, they have their own production. LDS Church. Right? Yes. Okay. Yeah. I found those as well. Yeah. Yeah. [INSIGHT 16] So because they are such a big wheelchair donor, they have their own production line in China, where they produce their own chairs, and it's cheaper for them than to buy it from someone else. There's also the Free Wheelchair Mission and Christian Wheelchair Mission. Those are also, they're not as big as LDS, but they're also very big.

- Oh, I already spoke to Free Wheelchair Mission as well, indeed. They produce 60,000 a year. Oh, really? And I think LDS, from what I've found, is that they produce 17,000 a year, but I'm not really sure if those numbers are correct. And I also couldn't find a specific wheelchair design of LDS Church because their website is not really that explanatory in what they provide and what they don't provide.

Okay, so Keoki can tell you more because he collaborates with LDS. Okay. So he can tell you more about their design. I'm pretty sure I heard 50, but I don't know if I'm quite sure. But okay, so I'll share from my side, I'll share the specifications of the tenders that we did, so you can see them. We're going to renew that tender, by the way, probably next year. So we're going to, yeah, renew that tender. We're going to renew it and hopefully get more competition and more bigger companies. We did have some problems. I don't mind sharing it with you, but we did have some problems with companies, well-known companies, I'm not going to name any names, that were unwilling to share proof of the tests that they say they've done for the safety test and certification standards. They didn't want to share documentation. They just said, yes, yes, we live up to it. And then when we asked for documentation, then they didn't want to provide it. So I also will say that it's a bit of a jungle in the wheelchair space. There's a lot of, yeah, there's a lot of crap going on in the wheelchair space. Also, the competition is really big. I mean, there's a lot, a lot of suppliers globally on this market. Yeah. And yeah, well, however, the competition is most active in the more developed countries compared to the underdeveloped, right? Yeah. Yes. Okay. So key-by-key contact and specifications for you. Anything else that you would like?

- If you maybe can, if you have some context within motivation, that would be also interesting to look further into. To talk to them? Yeah, sure. And then I also will still contact them. But yeah.

Yeah. And if you want to know anything about seating, I can recommend you talk to Mark Schmidt from VK since you're based in Holland. Yeah. You're based in Holland, right? Based in Holland. Yeah, right. Your name sounds so Dutch, so I just assumed. Yeah, that's right. I can't remember. I think he's in Amsterdam or something. But anyway. Okay. But he knows a lot about seating if you want to. He also worked in a lot of low-income countries. So he can also tell you about the wheelchair market in those countries if you want to talk to him. Yeah. Sounds good. So I'll share those contacts as well. Okay. The seating part of a wheelchair is super important. It's quite often overlooked. It's also important for the design that children can get the appropriate amount of support depending on whatever their need is. Cool? That's right. Okay. Yeah. Well, thanks for your time. No worries. And maybe if I have some nice updates, I can let you know. I can let you know on what I've found or maybe even already designed. Oh, if you make something cool, let me know. Yeah, of course. Or if you have questions or etc. Let me know. Yeah. But yeah, always a pleasure to talk to someone interested in assistive technology. Yeah, of course. Cool? Okay. I'll send you an email with the stuff I promised. Yes, that would be great. Awesome. Thank you. Yes, thank you. Have a nice Friday. Yes. Bye. Bye-bye.

Global Disability Innovation hub

Kamau, H. (2024, 27 March).

INSIGHTS:

1. GDI Hub that deals directly with innovators in disability innovation.
2. They fund research in itself because we are a research center.
3. LDS Church and Motivation looking into local production
4. On the streets you see people needing wheelchairs.
5. NGOs form a huge part of, you know, people getting access to wheelchairs
6. Insufficient healthcare insurance, wheelchair costs extra.

Transcribed Interview Text:

- Nice to meet you at first. Are you currently in Kenya as well or not?

Yes, I am currently in Kenya. This is where I work from.

- That's also from where you are doing your work as within the Global Disability Innovation Hub, right?

Yes, I am located in Kenya and this is where I'm based, mostly working remotely.

- And then you're collaborating also with people from the head of the of the hub, right?

Yes, I'm working with them very closely. So tell me, where are you located?

- I'm located in the Netherlands. The interesting part is that as I'm still a student. However, I'm currently now doing research into wheelchair design, so in assistive technologies. And the company I'm now currently doing an internship at a design agency and they also have some assistive technologies they're working on themselves. And they also wanted to dive a little bit further into how this can also show some perspective to the countries like Kenya and how maybe some wheelchair developments can indeed provide some new solutions or maybe even make the wheelchairs cheaper than they currently are. So yeah, my project for now is more getting a sort of scope of how

we can maybe, because my design agency is looking for how they can implement some wheelchair developments so they're looking for some ways of financing, financing their development area in this in wheelchairs. And, and I'm just curious on how it is how the wheelchair distribution is in Kenya itself and what you are doing with the Global Disability Innovation Hub and what type of research you are currently doing and a little bit on what you're working on. Okay.

So first of all, it's really nice to meet you. It's great. So, sorry. , it's really nice to meet you. I'm based in Kenya, I work as the Communications and Engagement Executive. So my role really is in comms and definitely help out with, you know, dissemination of products, research within the continent. and globally. So that is what I do. We don't directly deal with, you know, in the production itself at the local level. That we have left with partners who actually do this on ground. We are mostly a research and innovation center, but we work closely with local solutions that happen within the country. So for example, in Kenya right now, we have, we call it [INSIGHT 1] Innovate Now, which is sort of a subsidiary of GDI Hub that deals directly with innovators in disability innovation. And what they do is that they have lessons or rather work closely with partners to help them scale different products that they have for disability. You know, in the disability innovation space. So an example of that would be one that I'm thinking of called TAI. TAI is called the Accessibility Institute. I think you've seen them. So they're part of, they've gone through the program that you've gone through and they have a fantastic product called Safari Seat, which is a wheelchair in itself made for rough terrain and things like that. And that is just one of the products that they have. They have quite a number of them that they visually do this. So basically that is what we do and how we are able to work within the different contexts and different countries that we work in. Okay.

- I also recently spoke to Ken from the COO of Thai. So , I also got quite an interesting impression about the Safari Seat indeed. It's a quite nice way of getting around in those rural areas. So I think that's a nice thing. But I thought there were a charity from the UK. That's why they were funded, but they also got some funding for research from you.

We didn't really fund the research in itself. What we did was walked through Innovate Now. Innovate Now is a subsidiary of GDI Hub. Which took the innovators themselves to a particular course where they taught them about business development, speaking to stakeholders and things like that. And that is how I came to know about TAI. But not directly funded TAI in itself.

- But you are doing certain type of fundings for projects around the world. Or is that maybe a little bit a misinterpretation of the website?

So what we do is, we do not fund directly the end users of AT. [INSIGHT 2] But we do fund research in itself because we are a research center. We're based at University College of London. So primarily our work is to conduct research and we put it on the AT2030 website. I don't know if you've gone through the AT2030 website. I can just send you a link right now. AT2030. So on this particular project, on this particular program, we test what works, you know. We realize that we don't have a lot of research, especially on this section. And what we do is we collect, we funded a lot of research around the world. I'm just trying to post it here.

You'll be able to see the link in itself. Oh , I see it. Have you gone through the website itself, this one in particular? I don't think I've looked into this one yet.

No, not yet. I've seen it before, but I haven't take a close look to it. But I will do after the meeting. That will be fine. So we have a lot of program clusters that we fund in that area and in that regard, whereby it's divided into four, which is data and evidence, innovation, country implementation, and capacity and participation. These are the different arms on how we work within the world, really. They basically fall in these four categories. And under the innovation cluster, we develop and test innovation support and ecosystems, you know. So what happens is that we work with partners, not necessarily end users like, for example, TAI, but partners that would, ideally, work on such innovations to help them scale and grow what they're doing in that area. So you'll find that we have different sub-programs within that where we help in accelerating startups and things like startups. We accelerate startups. We do, you know, current different researches like building programs and public goods and ecosystem mapping, just to show how much the innovation has gone around the world. Therefore, building a case study and actually building concrete evidence that this is an area that people need to focus on or organizations need to focus on a little bit more.

- And how much of these projects that you're then supporting, at least, how much of those are more locally and how much are more international corporations on doing some type of developments?

We did have a direct number, but we as GDI do believe that the way of enhancing innovations is actually through local support. Local manufacturing is very important just because they're the people who understand the terrain just like TAI do. They're the people who understand the local context a little bit more. Us being in the UK, really, I would say a little bit far, so much removed and enabling and helping, you know, organizations that are local led and within the contextual, I would call it family unit. They're the best people to be able to innovate for what works within their own regions and localities. And I'm also thinking, because TAI has their own, local manufacturing, [INSIGHT 3] we have LDS Church. I think they're also looking into some local manufacturing. I've heard. Motivation as well.

- I have a meeting tomorrow with Motivation as well to also see if, because we're also looking into maybe a little bit more the technical part of product development. So in type of wheelchairs. So tomorrow we will also be meeting with Motivation to see if there's something possible, but they're also looking into local manufacturing. That's also a little bit, what our specific goal is. However, I spoke to Ken last week, two weeks ago, and he sometimes said that there was a problem that manufacturing in Kenya could be somewhat a little bit more expensive than outsourcing it somewhere in China. So what is your opinion about, about sort of what is the, what is the primary goal of the Global Disability Innovation Hub and do they want to have the cheapest type of wheelchairs or do they want to have the local wheelchairs? That's a little, maybe a little bit too difficult of a question, but I'm wondering what your opinion is about it.

I will not speak for the hub in its entirety, but I would say, the goal is to have local manufacturing at the helm because they are the people who are using them the most. They are the people who understand the communities a little bit better. But I'm happy to direct you to, you know, try and set up a meeting with our innovation manager. It's called Daniel Hodges, who can be able to give you more, more insights, you know, on all this and all the questions that you're having. He's currently away for a while, but I can send you, I can send him an email with, you know, with you telling him he would like to speak to you. He may be able to give you more insights on the innovation in itself as a more mostly, mostly broadly on the communication spectrum, speaking on very many different things at different levels. Okay.

- Maybe a little bit more about, because in, within my project, I'm, my university said, okay, well, choose a specific country to further, to further look into how you can develop specific wheelchairs, or maybe my corporation is now looking into, into applying the functionality of modularity within a wheelchair. So having maybe only a couple of frames, you sense somewhere to with, with some parts to, to click it, to click it together. So to get, to have it fairly optimal in sizing. However, they're, they're, they're fairly interesting in, in this project, in, in this product. And I also needed to look in Kenya right now. First question is, which type of local manufacturers because I know you have TAI and you have APDK. Are there also other local wheelchair manufacturers? Do you, do you have any knowledge about that? These, APDK, I know of TAI, I know of Motivation in Kenya who also doing something similar.

There's one, he's not, he's not really on, on any platforms or something like that, but he's

really local within his community. I can send you one of the stories you wrote about him that you can look into. But he does it very interestingly where he recycles batteries and then makes electric wheelchairs from them. Which, which is very interesting way of doing it. And he's really, really good. He also went through the Innovate, Innovate now cohort. I'm trying to find the story as you're speaking. So , I would say those are the ones that we've, that I know of. He's called Wamae, and he's quite good at what he does. He just, he's called Lincoln. Lincoln is an engineer and an innovator and he uses recycled batteries, you know, and recycled stuff, old bicycle parts to create something that, you know, people can use. And this would be a great person to speak to as well, just to see how he's been able to adapt what is there, using what is there to, to make life a little bit easier. So those are the kind of people that we have been able to deal with. People who are using the innovative ways in order to work with the communities and the people around them to ensure that, they are recycling, they're using e-waste and things like that too.

- That's also something that we've also, that's also one of our directions we are looking into, into how much do we need, how much do we need to provide to Kenya to make it work, to build a wheelchair, there with the materials that, that, that, that you have currently to, to make that as optimal as possible as well. But it's, but it's interesting indeed. I would like to speak to him as well. And I'm now thinking about is the amount of wheelchairs that are being offered. How is that compared to the amount of people that are maybe in need of a wheelchair? What's, how is, how is that in Kenya?

That's a tough question. And I think it would be best directed to the organization of disabled people in Kenya. I don't know if you've got to them or you've heard of them, UDPK. I'll send you the link to all of them, United Disabled Persons in Kenya. They would have the numbers as the organization that are, you know, that have been, have been, you know, formed by the government in order for them to, to have this kind of statistics. But for, for us, we, we, we definitely see that you are not many people who need, who need access to wheelchair actually do have it. You know, it's, [INSIGHT 4] it's evident even when you walk around the streets, you will see people who actually do need wheelchairs, but they still have crutches and things like that. This would be the best, the best organization to get in touch with. Okay. Just because they do have all the numbers and all the statistics regarding persons with disabilities in Kenya. And they do, do quite a number of research as well. So, I would ideally say reach out to them for a more concrete evidence-based Kenya outlook on specific, you know, on wheelchairs and things like that. They usually do collect this kind of information.

- That's a good, that's good to know. And what is your, because I can imagine that maybe they also have an answer on, on this question, but I'm also wondering on what you know on how people in Kenya obtain a wheelchair. And you also say that there are enough people who don't have a wheelchair who maybe need one for, for, for daily usage. How do people now currently, because is it, do people obtain a wheelchair through their healthcare insurance or how, or through the NGOs or how is that working a bit?

It is differently. You'll realize that it's quite expensive to get a wheelchair really within Kenya. And the living standards are different for different, for different people around the world and especially so in Kenya. So I would say [INSIGHT 5] NGOs form a huge part of, you know, people getting access to wheelchairs. You'll find that people actually go, do use that route quite a bit. [INSIGHT 6] Healthcare is not the very best as we are in Kenya. So getting that through insurance as well can be quite costly. And you'll find that not many people have access to health insurance in itself. Therefore, if it's not, if it's not fundraised either through family, friends and the collective community, then through the NGO route and the few that are able to get this kind of access, get it through hospitals, but charity led hospitals, you know, you'd find that organizations like I, I would think CARE, CARE is a, is a, is an organization in Kenya, C-A-R-E, that I think would, would be one of the organizations. That do this international. And it's, that has mostly been the, the way that people have been able to get things like this. And it's not through the government isn't specifically working on. The government does, but it would not be extensive. It would be on a case by case basis. But not through, you know, a dedicated way that if you need a wheelchair, you will get a wheelchair from the government. It is, no, I don't think it, it, it works that way here. It's a little bit slower to get such kind of access from, from the government in itself as priorities are huge and immense. And often you'll find that they're competing with other things and calamities that arise.

- Because they're working together with ADPK, right? The government. Yes.
And they sell their wheelchairs or, or not. I'm not too sure about it, but I know UDPK, the one that I just sent, they, it is government led. So this is UDPK is for the government. So they usually do that. UDPK, the one they just, the link I sent. They, it is, it is a government institution. So, so that is the area that is how they would ideally get them from.

- Okay. I was talking about ADPK. That was one of the local manufacturers. Oh, ADPK. Let me just, association of the physical disabled.

They, they, they work closely with UDPK as well. But I haven't worked with them directly, so I wouldn't, you know, we have done some projects with them. I worked with them a long time ago, but I haven't worked with them as close enough to be able to get that answer. Yes. And some of your projects are they also sometimes in collaboration with the government or is it separately your own corporation who is doing.

- Who is executing these projects?

It depends. As you said, sometimes we work with partners. Government is a huge partner. And we mostly do research. So you'll find that for us, we are working with, for example, Jomo Kenyatta, JQA, Jomo Kenyatta University Technology. I think that is what it's called. To conduct research on various things, you know, if it's wheelchair usage, but for the government, you know, and things like that. Or we are doing, some stakeholder management with them, helping them in creating resources so that they may be able to, be able to track how many persons with disabilities are there in Kenya. So that is the kind of level, that is at that level is how we are working with government, but not really at the local level where we are disseminating wheelchairs, we are disseminating eyeglasses or things like that. It's at that level in order for them to be able to structure and able to work that way in able to, in order to help persons with disabilities.

- And you're now, currently also located in Nairobi? Or not?

So we are, we are fully based in, in the UK. , But you are working personally? I am working remotely. Oh , We do not have an office in Kenya per se. What we do is the office is mostly based in the UK, but I am based in Kenya as I'm here. I thought it would be good for me to continue working from home.

- But, but, but what I, I'm also a little bit wondering because I'm, I've seen different types of areas within, within Kenya itself. And then you have, you have the rural areas a little bit in the north and northeast of Kenya, which is, , which, which is quite tough terrain where they also demand a little bit more of an all-terrain wheelchair. Then you have also more the city center of, of Nairobi, which is, which has quite a good infrastructure and such. And you also have the areas just around Nairobi, which also has less infrastructure and also isn't. I was wondering where you're, where the most of your projects are, are being held in Kenya. Maybe it's a little bit all too specific to Kenya, but it's also a little bit my, my area of, of, of interest now for, for, for my project. And we're also just further looking into different type of collaborations to, to, to realize our wheelchair development. But for now, I'm also wanting to get a, get a view on how it, how these projects you're working on, how these are related to these different types of areas.

So, as I mentioned, we work with partners mostly. And in that regard, our partners are diverse and work in different parts of the country, depending on the kind of project, you know, and funding for that as well. So, , I would say we have had reaches. Like, for example, we worked through Innovate Now.

Through Innovate Now, we got to tie works in the southern part of the country, you know, in the coastal region. Which is really hard to do in itself as well. We have others in the western region. We have others in the southern. So, it depends where the project should be based. But, , and what is the target for the kind of different projects that you're having. And now that you've mentioned that, I will send you a link to a report that we did on the built environment in Kenya. Which is through our inclusive infrastructure project, where we were doing case studies for different cities around the world. And Nairobi was one of them. And we wanted to look at the built infrastructure and how that affects persons with disabilities, especially wheelchair users. I think that would be a very interesting one for you to look at. That's interesting. I'm just looking for it right now. We will launch it sometime in, it's a case study of Nairobi. It's an inclusive infrastructure project where we were looking at the built environment of Nairobi in itself. And exploring the current state of infrastructure provision. And the recommendations for opportunities to enable access and inclusion. So, we have Nairobi as that. We have Nairobi. We have other countries and countries as well. So, I think this will be very interesting in your research for you to be able to see, you know, how people navigate Nairobi. Mostly Nairobi. We didn't go to other environments. To the environment. But you'll be able to see the built environment, accessible infrastructure, the drainage, things like that. And some recommendations from that as well. I think this will be very helpful. And these are some of the project... And we have some of the project partners mentioned as well. Like KDI, Orkili, Manjaro Blind Trust Africa. But I think you'd also want to look at the work that they're doing. KDI, they're called Konkni Design Initiative. They mostly work in the informal settlements around Nairobi. I think this would be a great non-profit to link up with as they work a lot within such areas. Oh, Okay. That's just a good point.

- That's maybe interesting to further dive into. Furthermore, I'm thinking. Maybe you don't have a specific answer for it. But what are the criteria in case we are indeed looking into setting up a sort of local factory for these type of modular wheelchairs we want to produce? And we want to do research for it. What type of criteria do we need to take into account before maybe getting in touch with you on what is possible within Kenya? Are you looking at it from the government perspective? Are you looking at it from when you look at it? What kind of requirements are you looking for? Okay. The goal of what our company is looking for? into is looking forward to because they're just design agency and not really a manufacturing company or something like that so they're mainly looking into having some kind of um they want to further develop this type of modular wheelchair they're thinking that it could be more cost-effective and that it could be better adjustable to the user and that it also is improving shipment so that um shipping parts to Kenya and that maybe with some aluminium tubes that you can bend the tubes yourselves and then put some parts connected to it and then build your own wheelchair fairly simplified and that's a little bit that's a little bit their idea of development uh and however they are not uh looking into making their own production facility or manufacturing facility they want to have another organization or something or someone or a group who can implement the development of this concept into a country like Kenya.

I'm happy to link you with our innovation manager whom I think would have a better idea on how to go about that so he's not in I think for the next week or so but I'm happy to write him an email when he comes back and get back to you and link you up you guys up since he would have much better ideas or you know forms of engagement further past this um so I'm happy to do that but I believe he'll be of more help in that regard than I am as I have more focus on the communication side but the innovation and you know things like that he would he would have more ideas and be more knowledgeable than I am in that area.

- Okay well that's that sounds at least uh good I was I was hoping that indeed these this research area of you that is that it would I was I was hoping you need to maybe talk to someone indeed to see if our goal of making this type of research and development of this new type of wheelchair if that maybe was a one way or the other for you I think it was a good point wasn't fit to the Global Disability Innovation Hub.

However, indeed, what you maybe also still, , we are also still looking into having a second partner so that we can do the development and then someone else is executing the product in manufacturing and in maybe distributing it as well. So there's still lots of interesting things to further dive into. Okay.

- What do you think, I don't know, how much projects have you maybe even done in the wheelchair and in assistive technologies? Have you executed some projects there as well or?

That's a tough one. Just because there's a lot we have done. I wouldn't have the exact numbers. But I think just going through the AT2030 website will give you a more, a huge glimpse of what we've been able to achieve. , that's a tough one. I think the innovation manager would have better answers for you.

- But you've been able to- I was more- Sorry? I was more wondering on how many projects you yourself have done in Kenya with different type of wheelchairs or different type of assistive technologies.

We worked with Motivation at some point. You're right, actually. , I believe. I don't have the right numbers. I have not been here for very long. So I'll just be here for about a year. So there might be a lot more that has been done way before I got here. Most of my projects are mostly global. Though I'm in Kenya, they're mostly global. And I would say, Tai is one of the most recent ones that we have worked with in that regard. I can't think of- I can't... by anyone else uh for now.

- Okay I'm just I'm also I don't know if you maybe know someone within the LDS church uh wheelchair um do you know LDS church let today mind sending me a link to them um let me see because I'm also still looking into because we're uh focusing on uh LDS church they're a fairly large corporation so they have just a small part of them is doing wheelchairs uh however they still provide like 20k wheelchairs a year they donate to different areas and also to Kenya and then I'm also looking to maybe potentially see if there's a collaboration possible but maybe if you haven't heard of it then you don't know someone who is working there I do not have a direct link to them okay and then it's uh that's okay and I will find myself once again unfortunately I do not have any direct link direct link to anyone here. Let's see what did I have some other questions for you how are these how are these projects you're executing um how are these being financed so you say you're from the UK uh and those are financing all the all the research projects all around the world or is it also through charity or through governmental funding.

So we are we are founded through the UK government uh through FCD that is how we've mostly been funded and that is why 80 20 30 is UK aid funded um and that is how we've been mostly able to do the project that you're doing so and that has been our largest funder for a while now and um those are the projects we've been working on uh mostly funded through FCD which is formerly UK aid. I think that's a little bit different now for all the questions I have uh okay if it is possible for you to maybe indeed send an email to your innovation manager or um okay that that I would also be interesting to have a talk with him to also see what our goal is and what and how we can maybe assist us in in our target uh that would be very interesting do you want me to send an email about what our company is doing and that you can send that to your innovation manager maybe that's a little bit easier that that that would be easy that would be perfect I was actually going to ask you to do the same just um and you can do it on my official work email um do I have your official that's it that's my official work in and then I will forward the message to today to the innovation manager when he's back he'll be able to see it and you will you guys will have a conversation that that that would be amazing that's all right okay um I hope this has been helpful indeed is it is a this is a also very nice to speak to you and also to look into what type of project you're currently doing and what type of good work you're working on so that's good and I hope.

Motivation

Childs, C. (2024, 28 March).

INSIGHTS:

1. People travelling to obtain a wheelchair
2. Some aim to minimize costs, such as Free Wheelchair Mission, while others like Motivation focus on offering durable products, with wheelchairs lasting over 15 years.
3. People travelling to obtain a wheelchair
4. Compact wheelchair package to minimize costs in shipment and storage
5. Wheelchairs are purchased in large quantities for distribution projects, and many customers have long-standing relationships with manufacturers
6. Some manufacturers, such as Motivation and Latter-day Saints Church (LDS Church), are conducting further research to explore how local production could be established
7. Motivation has a small design team for product innovation
8. Years of no innovation of wheelchairs
9. Difficult finding fundings for R&D
10. Wheelchair education needed
11. Motivation focus on offering durable products, with wheelchairs lasting over 15 years.
12. lot of these products will be stored outside depending on the size of the dwelling or the home that people live
13. Motivation has long-standing relationships with customers.

Transcribed Interview Text:

Hi, shall I give you just the very elevator pitch, short history of motivation? Shall I try and condense 30 years into a few minutes?

- Let's try it.

So the reason we're always keen to engage with students and universities is because motivation came from a university project, a student project. So our three founders worked at the Royal College of Art and they were given a last year student project to try and develop a wheelchair that's suitable for rough terrain and regions of low income and produce it for less than 100 or around $100.

Now, the three people that won that project founded Motivation. And they went to Bangladesh to try and put their design into reality, which they did. And their idea was always to produce both a social enterprise and a charity running parallel. So that one could produce the products, sell them globally, use them in our own projects and activities. And that's what we've done ultimately.

But I guess the main thing and the thing I want to pick up with you is, and having spoken to UNICEF and ICRC in particular, [INSIGHT 1] you will know that the service delivery point is a major influencer over product design in that you may have people who are traveling many days to reach a wheelchair service or it certainly influences our design. Put it that way in our design philosophy, which is products should be really robust. And we're able to cope with terrain, not just for a short amount of time, but for a minimum of five years.

[INSIGHT 2] But earlier this week, I spoke to a gentleman in Zimbabwe who's been using the same product in his rural location for 15 years. And he's been able to find bearings, inner tubes, tires in the local market because that's how we design things.

Really poor business proposition, right? We design products which can be maintained locally. Without genuine parts from the manufacturer, because we believe that's one of the ways that the products can keep being the brilliant mobility aid that they need.

But our design philosophy is also influenced by the services that provide them and Motivation is a training organization as well, right? So we collaborated and helped the WHO write the guidance on wheelchair provision in low income settings. So that was something, you know, we and others collaborated on to develop a set of guidelines of not only what a product should be, but what and not just our products, I may add.
We advocate for a range of products, as long as they're appropriate and meet these minimum requirements, but also that they should be provided through a service. And as you'll know, in Kenya, people have a right to these products. But they don't necessarily have the access. Which is why we manufacture a range of, I don't know, 10 or 12 different products, including sports wheelchairs. We collaborated with the International Paralympic Committee and others to develop low cost, easy to use, high quality sports wheelchairs, as well in the last 15 years as well, which has been my focus. But I cover both everyday and sports products.
But one of the key requirements for the wheelchair services has been that these products are so flexible that they can suit a real mass of different participants, different users of these products. [INSIGHT 3] Cause people may be traveling many miles to reach the service and they need to have in stock what is going to suit them. So that's why the modular piece is really interesting that you're talking about.

So for us, that means that we have, exactly as you said, we have dedicated rough terrain, peri-urban or dual terrain and urban products. And obviously in Kenya, all of those are required in various places across the country. But what drives also our design philosophy is that those products can be highly adjustable. So most high income nations, you would have a prescription taken of what you need. The product would be built and then would be adjusted to your needs, etc. So we advocate for a similar type.

It doesn't matter whether the person is paying for that service or not. They should still expect to be assessed, have a product selected from a range. It be fitted to their needs and that they should be trained on how to get the best out of it and maintain it. So those are sort of the four pillars that you may have seen as well. That UNICEF, the WHO advocate for and we are.

- I already spoke also with the ICRC and they also mentioned that you have, if I'm correct, one specific type of wheelchair, which can be adjusted. You don't have a small, medium, large type of wheelchair. Or do you also have that differentiation and then you have adjustable parts added to it?

So you're right. So what we've got, we have a number of products which can be ordered in a specific size. But even then, if you order an extra-large rough terrain, because [INSIGHT 4] we supply these products flat packed to minimize impact of delivery costs and also storage and onward transport, because, you know, the last mile might be many thousands of miles from the port or where these products are coming in. But they can, even if you buy an extra-large rough terrain, you can resize that to be a large, a medium or a small product.

Even the pressure relief cushion can be cut down and the cover adjusted. It's designed for that purpose, which, as you know, pressure care is, you know, still one of the two main killers of wheelchair users globally that hasn't changed for the last 50 or 60 years. So in all of our everyday products, we supply a contoured pressure relieving cushion as standard.

- And in the context of Kenya, I've also heard from Dennis Soendegaard from the UNICEF that you're also looking into local manufacturing of the wheelchairs. Are those the same type of wheelchairs that you normally otherwise produce elsewhere? Or is that a different type of wheelchair?

Well, the answer is sort of yes to both. And I'll tell you for why. So we've always supported local production of our products. So you'll find so ICRC Maker, we help them again, poor business proposition, right, if we were a commercial organization, help them to produce a Afghan rough terrain version, which they have also manufactured over the years. But yeah, so we centrally manufacture and ship globally from our, we're registered as the manufacturer, [INSIGHT 5] but we have a manufacturer partner there that we've worked with closely for the last, gosh, 20 years. And as you can imagine, we were very picky about who we chose as our manufacturing partner.

We don't want to, when you're improving the lives of some people who receive these products, you don't want that to be the determent of the people that are manufacturing them. So we took our time and we're very careful about who we partnered with. So we ship those globally. But we're also working with the company. We have a

cohort in Kenya. And just so you know, we have teams in Kenya, Uganda, Malawi, and a India, but we provide our products globally. [INSIGHT 6] So in Kenya at the moment, we're just in the second design iteration of a rough terrain, Kenya-made product. And to answer your question, which is, is it the same as the product that we produce centrally? Yes. And the reason I said yes and no is that we feel that we can, we've designed a product for central mass production. That can be tweaked and improved for what's required in Kenya and also what's available, right? The materials might be slightly different. We still may need to import some key components while the manufacturing point picks up. But actually the design of the rough terrain, the second iteration of the Kenya rough terrain product is, has more and better and different features than our standard rough terrain product.

- And what are those features actually? Because then I'm quite curious on, because I also am specified and looking to in the market of Kenya, but what are differences of the Kenya environment compared to other developing countries?

It's not because of the environment. It's often driven by the production process.

- Materials wise?

So that so that can be the driver rather than the environment so we know in Kenya you will need a rough terrain wheelchair depending on where you are um but it it's more to do with the process of manufacturing you know um where we're asking people perhaps to be outside of the standard wheelchair manufacturing because Kenya doesn't have a lot of that going on it has some as I'm sure you you've seen with APDK and others. We want our products to be ISO tested and meet international standards and it to be a product that you know Kenyans can be really proud of and serves that whole east Africa region. So we're building in some levels of flexibility different ways that the footrests adjusts and also trying to take a bit of weight out of it and because it might not have the size flexibility because it might not need it right if we're manufacturing in the country so that drives a number of modifications that the product will have just by the nature of it not needing to come you know thousands upon thousands of miles from where it's being manufactured.

- And how is that different in the manufacturing costs because I can imagine that maybe outsourcing it somewhere in Asia could be maybe more cost-efficient. I have already spoken to someone in Kenya itself who was making the safari sheets of the accessible institute and he mentioned that they were almost looking into outsourcing the manufacturing process to Asia but what can you say about the manufacturing in Kenya compared to doing it somewhere else? So it it's different and you know that needs to be brought into the whole holistic viewpoint of design and manufacture so what safari seat are looking to do is what we currently do right which is centrally manufacture and take some of the costs out we know both ends of what it's like to produce locally and to produce centrally and we're trying to make one more sustainable. Ultimately putting products on a boat and traveling thousands of miles with you know as we've seen just in the last 12 months with the challenges in the red sea and before the Suez canal let alone the environmental impact obviously of shipping products that far.

Assistive technology as you'll have found out you know is our glasses our walking aids our hearing aids our wheelchairs that which can be sent you can send a million pairs of prescription glasses in a relatively small 20-foot container whereas you know you might only have 50 100 150 wheelchairs in that space so that that's why we're looking at a local manufacturer and also because the production prowess, knowledge and intellectual activity around manufacturing is a different place than it was 10 or 15 years ago.

Just so you know motivation isn't we don't parachute people from the UK out to the regions where we work in all of those countries I've mentioned they're driven by local people delivering services to their country men and women so it's not a case that we're going to be a regional organization and stepping back it's driven by our regional teams and we're about resourcing those regional teams as opposed to it being a UK organization where we're working for our own demise on that, if that makes sense.

- And how is the because I've already spoke with the UNICEF and they mentioned that that some type of wheelchair is also from motivation itself that they're already quite a long time in the in the production and there are not that many and I can imagine because as it's an NGO there's not a lot of money going into the R&D but how is the development of your wheelchairs going and are you still looking into improving the wheelchair?

I think it's a good question, we're a really small organization uh so we're less than 50 people globally and in the enterprise so that has responsibility for the design we're five people and of those [INSIGHT 7] one's a designer and one's a technical expert who's you know; When we were producing products in Sri Lanka they set up the production line there and have a huge knowledge on the service provision that is in inextricably linked to good quality wheelchairs reaching its population. If the isn't there that's but that has a major problem so we're really small a lot of our products [INSIGHT 8] while they've been tweaked perhaps over the last you know um 10 or 15 years we haven't really gone in for a hard redesign. We're doing that now for some key products and we're also looking to expand our range as well as we look at these sort of older population as well so we're in the midst of that. But you're right we're finding cash to support R&D, but it is not always easy [INSIGHT 9].

- I can imagine that of course. I've also been looking for example within my company if there are some fundings to dive into because overall our goal is more about improving the wheelchairs than providing or realizing an NGO for ourselves so we're purely driven by improving the design itself. And seeing if there's any funding to even work with. Indeed a motivation like you and that's also why uh you also probably ask your colleague to also join in the meeting to see if there is any potential in funding and see how are we going to find a way of working.

So no you're 100 right so of course we've been working on the development, it's actually quite prevalent in the Netherlands called frame running I don't know if that's something that's come into your eye line before so um it's a recreation activity for predominantly for persons with cerebral palsy and I think that that's what we're doing as well so it's, if you can imagine, a bit like a jumbo trike with a balance seat that allows people that wouldn't normally be able to walk or run unaided to do just that. And it's a track sport, but also has a lot of applications for inclusion, play, mobility. So I'm just trying to give you an example of how we work with other people and other funders and how we collaborate. So these products are brilliant, but there are some design flaws. And also, especially in the sports space, not in the everyday product space, but in the sports space, we're really good at producing products which can be shared by different participants. And the reason that's really important is if you're a Paralympic committee that's in a very low income setting with limited resources. If you're a club, you may need to stock and store products that will suit a range of different people. So we think we can produce something which is around $1,300 as opposed to $2,500. And that it has some tool-less adjustments that allow different participants to use the same product.

So, The focus lays in the adjustability of individuals. So you need the wheelchair to have a range of people being able to use it.
So we're partnering with the University of Alabama, Birmingham, and the RecTech team that works out of the Lakeshore Foundation, which is a Paralympic and Olympic training center in the South of America. And they're our partner design cohort and funder in that instance. We'll be going live with this product in probably Q1 of next year. Oh, okay So through a connection I had in sport, that's how that connection came about. And with that funding, it's meant that we've been able to dedicate some time to.

Generally, with any new product that goes through a two design iteration is the ideal. And obviously, we're just doing the finalizing of the design before we go on to the final testing. We're trying to break the prototypes that we've made, right? See where the stresses and strains are. And, you know,

because that's how you learn. You don't learn when it goes well, do you? You need to know the breaking points, the weight limits and things like that. So that's what we're and the potential misuse. You know, you need to anticipate those sort of things as well. So that's what we're working on currently as a new product development. So that's been a really rewarding partnership. And but obviously we're looking. Yes. We'll sell these products globally. Yes. We'll sell them in high income settings as we do with our sports. The current range of sports products. But our eyes are always on that low income setting. And how can we have a benefit and add some value to people who have a right to exercise. You know, it's underpinned by the UN Convention. People with disabilities should have exactly the same access points, opportunities to play as anybody else. And that's where we try and sort of move forward and I guess, you know, thinking about some of the organizations you've mentioned who do some amazing work, getting a lot of products out to a lot of people, I guess where motivation is also trying to have an impact and make a difference. And specific Kenya is a specific example of this. It's about changing the systems by which people can access these products. Right. So it's great that.

People write that, you know, sign the Rights of Persons with Disability Convention CRPD as it's called, I'm sure you've, you've come across it as well in your, your research and work, but actually, what does that mean for people on the ground? How can we engage with governments to support, you know, the difference between receiving thousands of products free of charge and from well-meaning organizations to people accessing this because it's their right and that they don't have to have a photograph taken with the donor of these products because this is what they should have as a right. That's where we spend a lot of time and energy, [INSIGHT 10] we do a lot of training with wheelchair services trying to uplift those with partners delivering those types of services with the educational institutions who train to try and push you know wheelchairs often aren't necessarily included in P&O training services and engage with the government so that they're on board so when you were saying about stakeholders I guess that's a really important vital one. Are they investing in the services that help provide these products across their nation? How can we help them change the system that means that they go thanks ever so much for the opportunity to have these free of charge products but they can't be maintained locally they're only going to last a year um and actually we need to prioritize our own population's needs. Not necessarily just for our products but to help grow the developing markets there so people have a choice and they have they know what they need they know what's available and what's acceptable.

- And also in terms of the Kenyan government, do you also collaborate with them on the projects you're working on?

No they're part of the stakeholders so you'll see um if you go through motivations website and also our linkedin page you'll see details of stakeholder meetings and um you know it's a really large cohort that we've tried to bring together um to go through this because you know the African saying 'if you want to go fast go alone, if you want to go far go together' and you know that's really what we're trying to do here

- Okay it's also interesting because I also have this afternoon I have a meeting with APDK to also see indeed what they're working on and I've already spoken to quite some NGOs that are working on this and who are also indeed using instead of their wheelchairs they're purchasing yours where they mentioned also that the quality of the APDK wheelchairs are not that high and you mentioned specifically the ISO standards because what I've heard is that a normal wheelchair you're producing is around is around 100 euros or dollars.

It's much more than that

- I thought it was a little bit a little bit more indeed um and I was wondering how much is going into delivering or how much is going into manufacturing or maybe you don't have the specific numbers for it but it's also interesting because when we're looking into uh realizing this modular type of wheelchair with where you only have some connection parts and then the complete frame you can maybe buy or you can just buy a long time tubes of aluminum and then adjust it a bit to form a frame for a wheelchair. Just to make sure those are just some examples of what we've been thinking about on what is possible because our company is specialized in plastic engineering and also what my what the CEO of our company also said is that plastic engineering that is quite tough and it can handle quite a lot of shock and also indeed for the for the rough terrain he said it will probably just be fine and it can maybe be more efficient in the in the manufacturing of the of new wheelchairs um so that's a little bit what he gave me as an insight and well that's it's also what we're further looking into

Got you so um so with what we're doing in Kenya we're obviously looking at the so that the cost piece is obviously vital right is one of those elements we're considered less quite expensive but [INSIGHT 11] I would argue product per year of use we're the cheapest so that's how I would describe it of course I would you know I tell motivation products so I've been here nearly 14 years because I've worked for other manufacturers and um you know this is where I'm um set up camp and I truly believe in what we're trying to do. So um in Kenya we're looking at the cost so I'm sorry I won't be able to share these because the study is supplied by one of the funders for phase one so um but normally you know we're up for sharing whatever helps and this information may be available at a later time if it is I'll make sure that you receive it. Um but of course we're looking at okay what's our product cost for the price, delivery, import versus local production cost which might be well higher versus you know so we're looking at it in the round because it has to make financial sense right people might pay a premium a product which is Kenya made that there might be value in that. But this whole sector is so poorly financially resourced when you look at the international development um investment even though I'm sure as you've seen the return on investment is massive isn't it? It's nine to one uh for every one dollar in you get you get nine dollars out uh for the provision of 80 assistive technology so we're looking at that in the round in regards so just to give you an indication of cost right so our product our rough terrain wheelchair um you know of course there's minimum order quantities and we produce to order but we also stockhold in India as well we sell those for around 316 dollars. Now speaking to Terence in Zimbabwe of course it would have been a different price not that he would have paid that it would have been supplied through one of our projects or activities. There it would have been free to him at the point of need that's given him 15 years of mobility in some of the toughest terrain that you tend to find so that that's what we're looking at. Looking at price points and the rough terrain I guess is the product we're most well-known for. You mentioned about aluminum tubes and potential plastic elbow joints for the connection pieces. So we did do a project in Kenya.

I think it was Google if it if um memory serves around tubular products with um 3D printed. So it's been a resin perhaps more so than a plastic um joints so that you could do exactly what you just said you know you find the aluminium of this grade this diameter and then you can print what you need and here's the materials to do it um but again there were difficulties in maintaining the quality of provision there and also linking it to a service where you know hard wheelchair technicians don't necessarily have the time and resource to print what they need. What they need is in a box at their hand to be able to support that person coming through that service that day um one thing I will mention as well is often as I'm sure you've found um the quite [INSIGHT 12] a lot of these products will be stored outside depending on the size of the dwelling or the home that people live in so you've got um high heat dryness but you know humidity often and it is something to consider um as well.

- That's also a good one indeed. I also heard that indeed the three wheels the rough terrain that you also manufacture that there that the rotation of the wheelchair is quite large and that sometimes indeed people only can use it outside and not inside their houses.
So that indeed that uh often wheelchairs

need to you need to be adjusted to the to the environment and to the climate and also of staying outside sure is that helpful.

- I think so I think that I think that's a good thing to to keep in mind but also we want to further uh see what type of plastics and if plastics are maybe a solution in because what I've also heard is that welding of metals and such that can also be quite costly in those these areas when I spoke to the to the accessible institute he mentioned that welding of these metals that those people are very costly and that maybe if you can reduce that production process cost or not having to weld anymore a metal frame then that could maybe also reduce a little bit in the in the costs of the of the product itself. But I still need to validate this.

Look if we can help you do that I mean obviously we're looking at welding because we believe that over time that offers the best long-term option currently available but our eyes are always open and forward right um what's right today won't be right tomorrow necessarily so that's really interesting feedback. Welding's should always be a premium because it it's the difference between a product lasting and not lasting in that context but if you can take out that cost um and reliably have something that that serves the same period of time that you'd be happy to send your you know loan daughter out into the fields and return home by dinner time on every day that's got to be the benchmark isn't it.

- Okay that sounds really interesting we're also already looking into a modular type of wheelchair and how to uh because so we have a small prototype it's not really worked out yet but we have a 3d CAD-model of how this wheelchair could even look like so we are already quite invested in into what the possibilities are however it's not even a physical prototype so we still need to do a lot of research in in how that will indeed also be sufficient and even more actually because the rough terrain is demanding even more of these wheelchairs.

Oh, for sure. I mean, good luck. As we know, the world of CAD is different to reality, isn't it? , of course. Unfortunately, because everything works on CAD. Oh, brilliant. Any other questions from you that I can answer?

- Yeah, I'm a little bit thinking about because I'm now doing and this is also more of the making it a little bit more logical on how the whole market environment looks like in Kenya itself and what your added value is to it. My company itself is, however, also still looking and that's also a little bit part of my end goal is to see if there's sometimes some way of financial funding or collaboration that I can do. I think that is possible between our specified goal of trying to formulate in a modular wheelchair collaborating with a company such as you or a different type of R&D. Or I've already spoken with the Global Disability Innovation Hub, which is also located in Kenya. And they were also interested in having a chat sometime. But maybe if I have a little bit more time, I can do that. Maybe I can get a little bit more information on what my company specifically wants. And I think it's maybe interesting to have another chat and also maybe with, I still forgot her name. Was it Samantha? Yes, exactly right. Because then we can maybe also see how concrete, how specified our request is. And also maybe they (PEZY) can also elaborate a little bit further on what their view is as a company to dive into this type of collaboration. And also maybe see together on how maybe some type of funding is even possible. So I think that's maybe a little bit more for over a couple of weeks to see if you're open to have maybe a little bit more of a more elaborate chat on what we can provide.

Yeah, sure. No, look, always open to that. And I'm sorry if I was a bit over qualifying the reasons for the call. We're just, as you can appreciate, just such a small organization trying to have a really big impact. Yeah, of course. And, you know, we've just got to be careful where we spend our time. But the people that you've, well, same as you, but the people that you've spoken to feel like the main, you know, players that put mobility in reach for a lot of people. Some people have, you know, we all have different, perhaps, end games. We've all had. We've also worked closely with GDI Hub and AT Scale and those others that work there.

And one thing, sure, if we continue to work, well, we don't work in isolation, but without collaboration, people who don't have a wheelchair today won't have one tomorrow. So I think that's really valuable. So we're always open to collaboration if it means that people's rights are received. So, , please keep the door open. And if there's more information that I can share around the Kenya product, I will. I guess, , we're in the second design phase of that now. And, , GDI Hub, I'm sure, may have mentioned that as well, given their involvement at UCL. Oh, well, thanks for telling me a bit more about what's going on with you and talking to me. And I'm sure you'll be able to pick it up a bit more. If you have any wild or wonderful questions, if I can answer them, I will. If I can get another resource to give you a better answer, I will.

- I maybe have a small question left. And I don't know if that's most suitable for you or for Samantha, because she is also specifically focused around funding. Yes. How are you currently doing your R&D? Because I can imagine that's more based around funding you get from different organizations. How do you collect your fundings at the moment?

Got you. So firstly, so the social enterprise hands over 100% of its profit to the charity. Okay. So everything that we sell, you know, helps us fund and finance the things which are tough to fundraise specifically for. So, you know, colleagues, health insurance. In Kenya and things like that, they should have access to the same health care options that I do here in the UK. And we make that possible through that sort of insurance.

Our R&D funding specifically. So for like the development is all sort of self-funded in-house unless it's specific to a project. So we have some project funding associated with the Kenya National Manufacturing Project. And as I mentioned, like with the frame runner that we have. We're collaborating with the University of Alabama on. But how Motivation is more widely funded is that we have individual donors. And we also have trusts and foundations who might fund, again, ring fenced specific project activity.
So whether that's peer training, you know, where we have wheelchair users delivering training to newly disabled people. Telling them about their rights. How to. Remain healthy. How to use. How to pop a wheelie. How to. You know, all of those different things. We may have people that fund very specific avenues of our activity. But as a social enterprise, of course, we're self-financing as well, aren't we? Through our product sales. And the sales is going to.

- Are those sales to, for example, also the Red Cross and UNICEF? Those are the companies you sell the products to, right?

So they do utilize some of our products along with other people's as well. But, , so quite a lot of our market is through those large international development organizations who are delivering, you know, expert services throughout. And we may have done training with them. [INSIGHT 13] ICRC we've worked with for nearly 28 years, I think. So that's not just on product provision. You know, our relationship runs deeper than that. But, , so our clients are perhaps considered the funders as well, of course, of those organizations. But I guess as well, when they buy products from us, they see it as a double donation. You know, they're doing some massive activity in the regions where we can't and don't have people to deliver services.But also then we'll use the modest profit from everyone. And then we'll use that to, you know, we'll put that to work as well.

- I think I have no questions left for now. But, , well, thanks for the time. And still looking forward to having a chat once every while to see. Also to keep you updated on what we're working on and what the progress is. And also maybe, indeed. Set up a meeting for in a couple of weeks. So not to maybe also with Samantha. And then I will also maybe have my either the CEO or one of the lead of our company also maybe to join the meeting as well. To also give a little bit his vision on what we are looking into and also to see what is maybe possible between our corporations. Awesome. That's fantastic. Well, thanks.

Thanks for your time today. It's really nice to connect. I look forward to speaking to you again in the future. Okay. Bye for now.

APDK

Nzuki, A. (2024, 28 March).

INSIGHTS:

1. In distribution projects there are only some villages in which this religious stigma is still around.
2. There are no to limited private customers
3. Transportation of wheelchairs primarily occurs to local hospitals or rehabilitation centers located in urban areas. With sometimes outreach clinics to better reach the user.
4. Disabled individuals must bear the costs of transportation to these locations to receive a wheelchair
5. Users often face challenges reaching these hospitals or rehabilitation centers due to their distance
6. APDK produce wheelchairs and execute projects in collaboration with governments
7. If it does not fit you properly, then you can even get more harm than help from that.
8. In Kenya itself, wheelchairs are made from mild steel due to financial reasons. However, one of the drawbacks of this is that it is heavy, which hinders the wheelchair's ease of use.

Transcribed Interview Text:

I can just start. By the way, do we call you Oege or how do you pronounce your name?

- It's quite a difficult name. It is Uge. Sorry? Uge. Oh, Uge. , that's it. Uge. Uge, Uge. Ah, okay.

Because you see the way it's spelled, it can pass for what we call a Luo name in Kenya. You know, there's a tribe called the Luo. And they spell their names with O, O, O, O something. But now I think yours is Uge. And how do you pronounce it in Kenya? What would you say? Oege. You say every four words, Oege.

- Ah. Okay, good to know.

Yeah, so my name is Anthony. I'm the CEO for the administration for the physical disability Kenya (APDK). Basically, this is an old organization that began, a local organization that began in 1958. That time Kenya was not even independent. So the aim of the organization was to provide assistive devices to persons with disabilities and to carry out rehabilitation. That time was immediately after the pandemic. So it was a lot of work. And there were a lot of war veterans who needed someone to take care of them.

At the same time, the movement for freedom in Kenya was also very hot. And there were a lot of people who were fighting and getting hurt, fighting the colonial guys, and they needed a lot of rehabilitation services. [INSIGHT 1] At the same time, disability in the country was seen as a pass from God. Or somebody was seen to be very different. And, you know, the reason why they have a disability is maybe because God has passed them or somebody has bewitched them. So there was a lot of misconception. And so the people who began were wanted, first of all, to do their rehabilitation, secondly, to provide assistive devices to persons with disability, and also to tell people that being disabled is not a curse from God. It is just a normal diversity in the way people are created. And so we started a long time ago, and the organization has grown now to cover a very big part of the country.

We are in ten branches of the country. And what we are known for is mainly production of wheelchairs and other assistive devices for persons with disability. We are, in fact, one of, at the moment, although many people are coming on the market, we are one of the greatest. We are one of the greatest producers of wheelchairs in Kenya and in the region. And we have, you know, distributed our wheelchairs to locally and also within the region. [INSIGHT 2] Normally, the people we serve are not able to afford our wheelchairs, but because we work with donors and people who support us to produce the wheelchairs and then distribute them. And we have to do that. in different branches. Normally what we do is we see persons with disabilities in clinics inside APDK. [INSIGHT 3] Other clinics are within government hospitals because we have also established our offices within government hospitals. We work very closely with the government of Kenya. So we have those clinics where people come to us but we also have what we call outreach clinics where we go to where the people are because [INSIGHT 4] quite a number of people who have disabilities cannot afford to travel with their children or [INSIGHT 5] the transport system is not friendly to persons with disabilities. So oftentimes they benefit a lot when we go where they are and we take the devices to them, we fit them and all that. You said that you'd like to speak with us so I'm hoping that my technical team has joined me so that at least we can hear you out but I decided before they join I can just give you a brief introduction of the organization and if you feel you need more information I can still give you uh the information. So let me just find out whether they are there. I'm with you from APDK my other two colleagues can you introduce yourselves to Oege I will call him for the time being. thank you sir, I'm Christine Muteti as Nairobi branch manager APDK and I have my colleague here Bernard Diogo, production APDK.

- Um let's go ahead, I'm currently at a design agency in the Netherlands and I am still a student so I'm just doing a project to see if there are some improvements to be made in the wheelchair design so in the production of the wheelchairs. Therefore I'm currently looking into the current market in Kenya, so how are wheelchairs produced through the ADPK and how are they distributing to the people in the country itself. And my company is thinking about looking further into developments in terms of modularity. So there are, how do you, how could I explain it as well as possible. Currently there is still, from what I've found in my research, is that there are still a lot of people who are in need of a wheelchair but don't have one. And production is not always the same. It's not always as cheap as possible. Often different types of non-profit organizations are exporting them from Asia and providing them in Kenya as well, such as the UNICEF and the ICRC. I also spoke to Motivation just two hours ago, for example, who is also producing wheelchairs and they are also looking into producing them locally in Kenya itself. And our company is interested and maybe get a better understanding of what a wheelchair, , what needs to be included in a wheelchair in Kenya so that it is suited for an all-terrain, so it can be suited for everywhere. Also in the urban as well as in the rural areas. And we are looking into if we can maybe assist a company like you, ADPK, in seeing how we can maybe together improve the type of wheelchairs that are currently are being produced. And we also have some. , our company has some expertise in plastic engineering. And we're now also looking into if we can maybe simplify the wheelchair a bit or at least, , avoid the amount of welding that needs to be to a wheelchair to make it a firm, rigid frame. So we are a little bit searching for a way of developing and a new sort of certain type of wheelchair. And that's also a little bit why I wanted to meet up with you to to get maybe a better understanding of what type of wheelchairs you produce, how much, well, what are the difficulties in producing these wheelchairs? What do you need to take into account when designing a wheelchair? What your R&D are? What your research and the development is within ADPK? And also maybe a little bit about your collaboration with the government, because I think that's maybe also interesting that if we want to do some type of development of a wheelchair, that it's maybe also interesting to see how the government can be somewhat included.

There you go. Yes, I think we can continue. Okay. Sorry, I just stepped out a little. No problem. So thanks a lot. Maybe on the technical bit, I will ask Bernard to speak, but I think I find it. I find it interesting. Well, who did you talk to in Motivation? Was it Motivation here or Motivation in the UK?

- It was Motivation in the UK. I just that's the first contact I had with Claire and they have some. They're now looking into local production of the wheelchairs in Kenya itself. And they're still also looking into how to optimize wheelchair production by using the materials in Kenya, but also try to see how we are. What type of products they need to export from elsewhere. But the ideal goal also, , in our point of view is to enable better local production of wheelchairs and also maybe try to make it. Cheaper in that sense. To maybe be better to, , better able to finance all the wheelchairs you're manufacturing, for example.

Thank you so much. Okay, because we also had a meeting with the Motivation here locally yesterday. Okay. Yes, we are aware that they are producing, they are trying to make, to partner with one of the universities, local universities to produce wheelchairs. In fact, the guy who is the leading Motivation in Kenya used to work for APDK. Okay. Used to be in our workshop. While I produce, in the production section. And I find your, your way, you know, what you want to achieve out of this meeting very interesting in that it actually, it is also what we want to do. I think Bernard will explain to you how we make our wheelchairs. And we have been doing this for a very long time. But we really want to make innovation. We want to improve our product. The only problem that we have been having is that we do not have a full-fledged research and development, you know, department.

And we have been trying all along to make partnerships with local universities to see whether they can actually come in handy to help us. But that has not really blow, it has not grown into a full-fledged association. In fact, the innovation that we had recently was with one of the local universities to see whether we can produce a solar-powered bicycle. But it is still under development. We have done several prototypes and we are still innovating on it. But the process is very slow. Because it depends on the engineering students who are available, who are also doing other courses, and they are also doing other academic, you know, programs related to engineering. So it doesn't move as fast because that is not just the core business. There are also students at the end of the day. But we are very keen to see that we improve our line, to see that we improve our product, to see that we make innovation. And this collaboration, if it actually works, would be very welcome, because for us, what we call North to South cooperation is very important, as well as South to South cooperation. And this is a very important one. [INSIGHT 6] We, as I told you, we work very closely in collaboration with the government, because actually a lot of our offices, apart from Nairobi and Mombasa, maybe one of these days you'll visit us, those are two locations. All the other eight branches are within government hospital facilities, and some members of our staff... Actually, more. Most of the members of our staff in those branches are seconded to us by the government, meaning that we work very closely with the government. And I don't know whether you have heard of AT Scale.

AT Scale. You have heard of AT Scale? So, we are also trying to work with them, and they have chosen... They want also to see our systems in APDK and see how it works. I think it is not as direct as the way you want to work with us. Having said that, I think I'm just trying to underscore the fact that we are very anxious and very enthusiastic to see whether we can do this together. And it's very encouraging to see that you are affiliated to a University in the Netherlands, and number two, you also have a company that is involved in the production of the wheelchairs.

Yeah, so what I'm saying is we are also happy to hear that you're also associated with a university and also a company. So, that's a very nice combination because it shows when it comes to research, you are there, you have the facility. When it comes to now the production, you are also there.

Christine, if you have a way of reproduction and say something and then I can take it over and tell what we do in the production and what kind of wheelchairs we make. I'm sure that is something he's very eager to hear so that we can see where we correlate. Thank you, Mr. Anthony.

Now, I don't know how to pronounce it. O-E-G-E. Thank you. We learned how to pronounce that, it's a bit difficult for now. So, ours is to say thank you. I'm Christine Moteti. I head Nairobi branch, APDK. As our CEO has said, we have quite a number of other branches. Actually, 10 in number. So, we are one of the branches here in Nairobi. So, we are really grateful to have you. Of course. Thank you for joining us for the development. Our product development, we really want to really run with you and see how much we can also learn from you during the time we'll be with you. , because as Mr. Anthony has said, we don't have a fully-fledged research and development line in our organization. But we really want to have our products. We want to improve on them.

If it's our local Tough rider wheelchair, we see how we can improve on it in terms of maybe it's a bit heavy.

Is there a way we can make it lighter, even in terms of foldability? Yes, it's foldable, but it cannot be as foldable actually as an input to have you join us as far as... know we'll be able to learn a lot uh in the process and be able to have a new products in line or improve the existing ones so thank you um I now invite uh uh the workshop supervisor mr jobu to say something in in in terms of our products you can explain to how we produce them. Thank you uh director mr Nzuki and uh how are you team fine my name is Bernard and uh I'm the supervisor production workshop for wheelchair and uh our production is actually based on a field assessment and we're going to be working on a new product called uh a new product of our clients and uh when we get the measurement we are able to go ahead and do production of wishes and special seats and uh our production is uh we actually doing on mild steel and which is a bit heavy as my colleague Christina said it's a bit heavy and uh we also have uh some limitation in like we would like to use stainless steel. Okay hospital use because we also have client in the hospitals and also aluminum for that when we don't have capacity for stainless and aluminum production the other a is about just talked about the training telling we have we need which is affordable number two which can have rubber wheels rubber tires whereby the client is not required to inflate the wheels and we will have to have them in different sizes like we have size 26 says 24 size 20 and the size 16 for different sizes of which yes and maybe tricycle it has got to be lighting rate that will can be enabled and achieved by use of stainless steel and aluminum

- And how adjustable are these wheelchairs and do you have sizes? do you have small medium large?

We have different sizes in which yes we have size 26 18 16 or size 14 and says 12 we shall based on client measurement they can use the by different clients so we have different sizes which are also derived from the client. We have to have reliable source of spare parts for the wheelchairs. After distribution, you have to follow up with the, you have to have the spare part with you so that once the wheelchair is crowded in the field, the client can also get spare part. The client gets spare parts. That is one of the challenges we also have around.

The client gets spare parts with the wheelchair. , with the wheelchair, all they can be available at the nearest shopping center. , on the ground. I just ability to suit a various sizes of the client. The wheelchair has got to achieve that. And so that, you know, in disability, we have different adjustment. You have different requirement. Like, I mean, you have to have a wheelchair, but the wheelchair for an amputee is not the same as wheelchair for somebody with two legs.

The one for amputee, actually, the amputee rely on the backbone to stabilize the wheelchairs. So it has got to have some anti-tip behind, and maybe a long frame for stability. The R&D department, we've got to build capacity. We've got to have funds to establish the department and its resources. We have to have resources. And the other point is the challenges in getting raw materials for wheelchair. Actually, at the moment, it's very hard to get. The right gauges for wheelchair materials locally, we don't have, like, we don't have the right gauges

Can you maybe repeat that a bit? Sorry, our connection is a little bit poor. I don't know whether you guys would like to switch off your cameras so that at least from our end you see whether the bandwidth would be a little bit better. Because I think, the cameras. Just explain the last part.

So the last point was like, we've got to create capacity in production of local, of wheelchair production materials in our industries here. Like we have to get the right sizes, specifications, and have them being produced locally. For us to be able to produce there. They required weight of wheelchair and the sizes.

- And I have a question for you. , that we can do. When you need to have a specific wheelchair for a user. And how do you do that when you distribute it to some other place? How do you know which type of wheelchair you need to make for somewhere else in Kenya? In Kenya, outside of Nairobi, maybe.

APDK has got partners. And also the partners can forward the measurement for the clients. And we are able to do the production. The partners say what is needed. We have partners and the APDK has got staff countrywide. We have branches across the country. And measurement can come from far away and then can be brought here. And then we are able to do production of the appliances there.

- And who are these partners?

Okay. First of all, let me put it this way, Oege. So we have got branches. Okay. And these branches, persons with disability, either go to where we have our clinics and they get fitted for their wheelchairs. Or our branches will go outside. Outside of what we are calling outreach clinics. And they fit people there. We also have the government body that is called National Council for Persons with Disabilities, which is also spread all over the country. And they also take measurements of the wheelchairs and they fit clients. Because most of our wheelchairs are fitted. For us to produce, we have to get measurements. The person, the user is fitted. And then the measurements are either fitted in our workshops or in our branches or by another qualified person who is a technical person in rehabilitation.

They fit and they set up the measurements. Okay. And then we do the fabrications. Okay. So that is our model. But of course, Bernard is saying that we also have sizes of wheelchairs, which can be used for different users, which can, but we like to do it as a, to make it so that it is fitted to the person who is going to use it. Because we realize if you use a wheelchair, which does not fit. [INSIGHT 7] If it does not fit you properly, then you can even get more harm than help from that.

- And who is paying for these wheelchairs then? So, because you are, is the government paying you to manufacture these wheelchairs or do you get money somewhere else from, or how does that work?

So, there is that body of the government that is called the National Council for Persons with Disabilities, whose mandate is to provide wheelchairs for the Kenyans. So, what they do is, when they fit in clients who need wheelchairs, they will often bring the measurements to us and we fit for them and then they will pay for us to make the production. But then, that body has got very poor funding from the government, very little funding, so it is not enough, there is still such a great need for wheelchairs. At the same time, we have non-governmental organizations like Humanity Inclusion, which used to be called Humanity Inclusion. We have the UN, we have other bodies that also, the Kenya Red Cross, for example, they also go ahead and facilitate for fitting of wheelchairs and they pay for the money and we come and produce ourselves.

And of course, we have got clients who come in and they are able to come and just, very few of them can be able to fit our wheelchairs and they pay for them. We also have a shop where we also stock wheelchairs. There are those who can walk in and walk out and buy ready-made chairs, either which are locally produced in our workshop or they are not ready-made. They are imported from other places in the country. But maybe another thing to add on what Bernard was saying, our production line is rather manual. It is not automated as such. And it is one of the areas that we would like to see improved so that the line is well improved and all that. I think I heard you ask about adjustability of the wheelchair. Bernard, what did you say about whether our chairs are adjusted? What did you say? We have different sizes to suit different sizes of clients. And I will say that they can be able to be adjusted.

- Okay, that is good to hear indeed. Let's see if I have some other questions. You mentioned something about the type of steel or metal. What is the type of metal you use currently in the wheelchairs? What is it?

Once again. Mild steel.

[INSIGHT 8] We use mild steel. That is a bit heavy material. Making the product a bit heavy.

- But is that because it is cheaper?

Yeah, it is a bit cheaper also. It is cheaper and then, you know, it is locally available. And when we send the wheelchair, we distribute the wheelchair to very far parts of the country where it can be attached locally in a local welding place in the rural areas. I don't know. Because if you use very complicated, like you use stainless steel, they may not have that in the village.

- And you also weld the mild steel together, right? To weld it as a frame? How is that being done? Is that an expensive process?

We have fixtures. We have machines and we are able to do production of wheelchair framework. And those two are the first three of the wheelchair we are able to do in our workshop. So you do the welding as well in the workshop? Yeah, we do. Oh , okay.

- Let me see. Because the interesting thing is, is that the welding is done in the workshop. So we are not looking into manufacturing the products ourselves. Our goal is to see if we can improve your position as well. To maybe improve your position in Kenya itself to maybe manufacture these wheelchairs with the good quality, which are maybe cheaper and also adjustable to the user. So that's a little bit. But what we are, what we're looking into, however, we are also interested in, because you have now a current wheelchair you are making. How is that? How is that wheelchair being? That is in some way also designed, right? Or is that just a basic wheelchair you're manufacturing?

It is exactly a basic. It is a basic wheelchair. It is foldable, right? Foldable.

- And maybe for you, Anthony, I have a question about what type of projects does ADPK do with the government. Because I think the most interesting way of realizing some sort of collaboration, I think it's also to include the government and to see, what they think of it. Our development in wheelchairs for ADPK and maybe also for other wheelchair manufacturers. I don't know specifically, but what is, what are you currently doing with the government in terms of projects and how are you getting your funding, for example?

So our funding is mainly from donors. For example, we have funding from ADPK. We are the Christian Blind Mission (CBM) of Germany. We, they are one of our funders. And what they fund us for is to be able to carry out rehabilitation activities within the country through different type of processes. For example, they may fund us to improve various clinics, to be able to go out to the world and do what we are calling outreach clinics. That is what they've been actually funding us a lot about.

And to also produce assistive devices like wheelchairs and crutches for those clients who we go and meet in those clinics. You know, you go and meet somebody who has never used a wheelchair. They have been crawling all their life. Or they have never seen a crutch. They have all just been using some funny kind of stuff. So CBM would use to fund us so that we are able to actually help that person to get an assistive device. Other things that we do with the government is we cooperate with the government to do advocacy. You know, to kind of like talk about disability in the country. To talk about accessibility for persons with disability within the country. To educate people on matters of disability and to ensure that there is inclusion. Because one of the great things that happens. Is that persons with disabilities are totally, you know, left out in a lot of things. So the government cooperates with us.

Not necessarily the entire government, but even departments of the government. You know, departments of the government. When they want to understand. So they cooperate with us a lot in programs of persons with disability. Not necessarily. What we are trying to do right now is to tell them. We want them to include budgets within. Because the Kenyan government has been divided in what we call counties. We want all

the counties or the federal governments to start budgeting for persons with disability. In matters of health. In matters of income.

In matters of education. But we are not yet there. So what we are doing is we are doing advocacy and the government is supporting us. To do so. So in simple terms. They are supporting us in rehabilitation. Provision of assistive devices. And advocacy. And as well as. Often times you find that the government will give us materials.

Because I told you some of our offices are in the hospitals. So those good. Some of the hospitals will give us things like a plaster. Or batteries to prepare. Maybe cast to, you know. To do rehabilitation. Or they will give us some materials that we use in those workshops of ours. To ensure that we do this. Yes.

- Okay. That's good to know. Thanks. Let's see if I still had some other questions. I don't have any specific questions from now on. I'm. I'm. I'm just curious about. Because. Okay. Let's explain maybe a little bit more. The goal of my company is to. To find some sort of. Some sort of way. And I don't know if that can be done. Done through ADPK. But some way of enabling some. Either partners or governments or. Or someone else. To see if they're interested in what we can provide. As a sort of. A product development. So an improved wheelchair. If we can. If there. Do you know. Maybe any interesting partners or. Or the government itself who. Maybe interested in hearing about this. Potential development or. Or do you think they're. They're not really interested in that. In. These. These. Innovations. I don't know. What is your view on that?

First of all. You know. Right now. Our interface with you. Is. On the wheelchair as a product. So. I think it will depend on what other innovations are you talking about.

Because maybe we don't know much about where to innovate on. I think at the moment we are talking about. The wheelchair. Or the. Product development. disability. So if you use our wheelchair as an entry point, and then we get to learn about what other innovations you have, that would be very possible because in fact, there is a body that is called Global Disability Innovation, GDI. GDI, I have spoken to them yesterday,

Yes, oh , it seems like we, so we have, they even have a branch here in Nairobi, and they are also interested in matters of innovation. So it is not difficult to, I mean, I'm thinking it's something that is doable, that, you know, we do that. Number two, there is that AT scale I told you about. You know, AT scale, which is funded by FCDO, it is funded by UNOPS, it's funded by UN and all that. They have come in a big way in the country, and what they want to do is they want to see production of assistive devices that are actually very highly innovated and, you know, very user friendly and which are answering to the space which we are in.

We also have other players, like, who are coming with technology, like 3D technology in production of prostheses, you know, and things like that. So there is a lot of appetite for innovation in the country at the moment, and using technology, and this country happens to be one of the countries that has got a very great uptake of innovation.

And so I'm sure this will be very, very important. Okay. That's... Hello? We've lost him. We lost him. We lost him. Oh. Oh, you lost him as well?

Maybe now I should ask you a question. The person you are talking with... I know there's a guy there at GDI hub in Kenya. He's called Bernard. I don't know. And Bernard Shearer. Bernard Shearer.

- Oh, I spoke to Kamau Macharia. That's the one I spoke to.

Well, I think they could be working together because we were also exploring the same kind of possibility. So, in other words, what I'm telling you is you will find that the local GDI is not a stranger to APDK, and we have actually spoken with them. And, in fact, Bernard came the other day. He uses crutches, so he came recently to have his crutch repaired here at APDK. If we are talking of the same guys, then they are also known to us, and we have also worked with them in other circles in matters disability. Okay. And for us, anything innovation is exciting because we feel we have been doing the same thing a long time ago, for a long time. What you are mentioning about cost is something we want to see. How can we bring the cost of our product down? Because you know, I'm looking forward to that day when somebody from the village can walk into our shop and order a wheelchair without having to rely on a donor. Because, you see, , if you can confirm... , that is what we want, you know. Yes. , that would be best indeed. , that would be a nice goal.

- How much is a wheelchair now? How much do you sell a basic wheelchair for?

Yeah, we sell the basic wheelchair, that is a Tough rider wheelchair, at 24,700. That is, like, how many dollars now? Assuming the dollar is 130... that is, like, $190 around there. That's not easy. That's not cheap. That's not cheap at all. But that is also a nice goal to see if we can maybe improve it in some sort of way how much of this price that's maybe an interesting one for you Christine um

- How much of this price is the cost of the materials how much is the cost of manufacturing it how should I see it

We usually have a way of doing uh coming up with the costing uh we have the BOM which is a bill of materials um so that is actually done by mr. Bernard and uh total cost of materials for that um that wheelchair is around 19 000 and now there's also waste there's also um the other uh the electricity energy use the labor so we all yes those form a part of the costing that is also in the electricity is also in the in the BOM included or not that's okay that's fine.

- Sorry repeat again if the electricity was included in the in the BOM the bill of materials?

No no not, only the materials itself is 19 000 Kenyan shilling okay 18 something oh

- All right okay also good to know because then we can also good compare what we can maybe think of a solution compared to what is currently being uh the costs of such a wheelchair and how much is costs the production of the wheelchair actually because the build materials is the materials you buy for the wheelchair and how much is producing it so how much is the man hours of welding the steels and such? How many wheelchairs can you produce how many wheelchairs can somebody produce in a day in a working day of eight hours?

It's about 10 wheelchairs, not by one person. It's a team a group of people, because they take different operations.

- And what uh and how large is the group?

The team it's about 20 staff but the ones who are in the line of one chair if you are producing one wheelchair there are 20 of them about 20. from the from the beginning of cutting the steel to assembling to so that it's a finishing product.

- Okay let's see uh for now I'm thinking I think I think the most interesting part is if I still I am still trying to plan a meeting with the global disability innovation hub and I also maybe mentioned that that that I spoke to you and that there is indeed maybe some sort of interest if I can tell in maybe potentially collaborating so that they also know that there is um that we are looking at that we maybe that there is maybe potential collaboration between the two of us to see if there is some way of funding this research and development. um if that's okay by you Anthony?

It is very okay we told you we had actually also done the same uh either through default or design we had also done the same so it will now just be having you also in fact we need to set a date for a meeting with them but now that you're coming it even makes it better.

- I think it's also interesting as well I also need to see I don't know specifically what this company I'm working for I don't know what they also expect from how much funding that there needs to be to realize a well-designed new wheelchair so that's also from my part

something I need to find out or at least work out a bit but I think maybe it's interesting also to see if we can if we can together go to the global disability of innovation hub then I think there's maybe more of a case to ask for some sort of funding and oh also you still haven't mentioned AT scale right. because maybe yes I'm also I'm also maybe trying to set up set up a meeting with them, to see what is possible.

Yeah the CEO from AT scale has come here very many times okay and as I told you they have even the at scale has focused on APDK to understand how APDK has been carrying out production of assistive devices uh in since its inception in 1958 and seeing how they can with the aim of maybe improving that but right now they don't have much of a budget for that it's just like they may have kind of like a study about APDK to see what they are producing and how they are going about it so that they can see how to build I with the technology and so that's what they're doing and that's what we're doing and that's what we're doing and that's what we're doing and which other players could be interesting to look for in terms of maybe try to fund this uh research and development of wheelchairs do you know something in Kenya or maybe other partners or corporations who are looking into this uh into two developments which do you have any idea of is it mostly at scale and uh okay Bernard uh these could these more university guys what do they tell you they are doing about. Because I know my university is also doing that but they are already they are already partnering with motivation locally more university what are they doing with the wheelchair they brought around they were actually doing a product development their final year project on improving a local locally produced recycle solar powered to solar powered oh solar powered okay um that's also quite interesting um

- I think this meeting was quite nice um I don't have any questions left do you have any questions for me?

Yeah and what did you just anticipate to be your next steps from here now and are you thinking of coming out to Kenya one of these fine days?

- Oh I have not specifically looked into directly going to Kenya yet um my goal or my perspective is for now is to see what is possible in terms of collaborations so our company is willing to dive into improving wheelchairs also in the context of Kenya and for now it's my task to see which type of interesting corporations, wheelchair manufacturers are indeed interested if there's any funding possible to make this really happen. And what I'm now slowly trying to do is try to get, , to see if I can get in contact with companies like you, also with different types of funding companies who do funding for research, such as the Global Disability Innovation Hub, to see if there could be some form of a collaboration. And my project from the university is more of a strategic product. It is a strategic product plan. So I will advise my company which stakeholders or maybe already have some sort of collaboration set up between companies to further develop. , a new type of wheelchair. So that's those are a little bit the first steps I'm looking into. I'm also going to try to contact AT Skill to see if there's anything possible. But for now, I think it's most interesting to keep close contact. And also I will keep you updated once every while to see what we are currently doing and what this may be interesting. And maybe also for you.
When you talk to the Global Disability Innovation Hub to also mention that that we are at least talking, , seeing if collaborations or at least that there's that there's clear interest in wheelchair developments.

- I think that is for now the most interesting part, because the company I'm working for, those are those are mainly focused on. On making a good product, so they are quite technical, so they really know how to design the wheelchair itself. And my task is more to make , to show the market environment and tell them where the most chances are in really developing this. This this this improved wheelchair.

So I think that is a good way. Definitely. There are quite a number of people and organizations that are willing to fund what you may call north south cooperation and also south cooperation. This is a potential one.

The fact that you have also seen you have I've mentioned names here that are ringing bells to you like Global Disability Innovation Hub. I've told you we have reached out to them. And I've also mentioned AT scale. So those are names that are resonating now at the moment. And it's a big thing. Inclusion is a big thing. And the products like the wheelchair, the crutches and all those that make persons with disability able to get included are very, they are very current topical issues and we are involved in them. We are part of it. We are in need. So let's keep talking as you're saying. I will definitely be reaching out to that team of Global Disability Innovation Hub and now I'm meeting and I'll definitely tell them that we had a meeting with you. And there it goes. That sounds good. That sounds good. It's.

The International Committee of the Red Cross

Morgan, P. (2024, 2 April).

INSIGHTS:

1. Limited funds for these disability projects.
2. Not everybody gets a wheelchair.
3. Need for wheelchair education.
4. Well-user adjusted wheelchair otherways more harm than improvement.
5. Motivation China production.
6. Max wheelchair price 300-400-500 euros.

Transcribed Interview Text:

- hello Philip, hi can you hear me yes I can hear you oh great. Join cameras on or off it doesn't matter it doesn't matter. How's it going? Hey good well thanks for meeting and no problem with that you uh forgot a little bit about it.

That's good I know I was to pick up my kids from school so I took half a day off and went to pick up my kids from school and I completely forgot about it so anyway we're here now so we're all good okay good thanks

- Where are you where are you located right now actually?

I'm just no I'm based in Nairobi you're based in Nairobi and what's this uh what's up what's this you're doing a masters in something or other?

- I do a masters in a strategic product design which sounds very uh very exclusive however it's uh I'm now doing a project for this design agency basic group I can show a little bit about the company itself to get a little bit of a clear vision of what our what this company is doing and I'm doing it in collaboration with the university as well so this is the company I I'm now looking into they have their expertise in product developments and they also have some expertise in plastic solutions um right as well as circular product development smart product development and they have also and next to this they also have a venture company which is this company of four wheelchairs uh this is a fairly high-end wheelchair

which is extremely personalized with every measurement of your body is being adjusted to the wheelchair itself and they still have this knowledge within this company and they were thinking about how can we maybe look into different contexts of where we can make a difference in wheelchair designs and that's right that's a little bit where I came into the project is that as that they already had some ideas of what could be possible of new solutions for in the context of Kenya in more developing countries uh and my research is about getting a better view on what is possible which key players are active in this market, which key players we also need to get in contact with to maybe show them that we can maybe provide some product development for them and that's also why I think it's very interesting. I also already spoke with Didier Cooreman and he mentioned that I should also talk to you as well as maybe to get a better view on the context of Kenya. The context of Kenya I chose specifically because the university says in order to design a suitable product, you also need to dive into a specific area because otherwise you're designing for everyone and then it's not really well adjusted to the user.

So in this context, I am going to look into the context of Kenya also because LDS Church as well as Motivation are also looking into more local manufacturing there. So there's also maybe some chances to see if we can also assist there. So that's a little bit the first piece of my introduction of what my project is a little bit about, my final goal of this project is also to present for this company, PEZY, as a potential collaboration or maybe a specific strategy to maybe further develop a well-adjusted wheelchair to the user within the Kenyan context.

Well, I think I sent you a message. I've applied to your message before and fortunately, I'm actually, while I'm based in Kenya, I don't really have much activities in Kenya. But ICRC generally works in places where, you know, there are conflict or post-conflict areas or post-conflict issues and things like that where Kenya has been reasonably, you know, reasonably. past 20, 30 odd years or whatever, say for a couple of political problems and things like that, but nothing as serious as causing any major problems in terms of international humanitarian law, in terms of, you know, issues concerning the Geneva Conventions, so on and so forth. And this is the reason why we tend to have a regional base here, but we don't really have much in terms of operations, or rather, we do have a little bit of operations, but not much. I mean, we just focus mostly on wash projects more than anything else. However, having said that, wash is water and sanitation. So, that's as much as we go in terms of our input in towards Kenya and everything else. For me, I'm actually based here, but working out of Somalia. Now, unfortunately, because I don't, because of the security issues in Somalia, I'm actually working remotely more than I am on the field. So, I tend to go into Somalia maybe once a quarter and so on and so forth, just to see how the projects are working and how they're developing and what are the elements that we're putting in place. For them to actually follow and try to achieve any objectives that we put forward.

So, in terms of the physical rehabilitation program, I don't know how much Didier spoke to you about the physical rehabilitation programs, but he should have told you a little bit about it. No?

- He told something about it.

So, our focus is mostly rehabilitation for people with disabilities. As a result of conflict-related injuries and also non-conflict or indirectly related disabilities that have been indirectly related to the conflict as well. So, things like in times where there's vaccination, in times of conflict, the vaccination programs tend to be either cut short or suspended or completely stopped. And then that's when we get sort of developmental delays. And we then get chronic diseases and things like that. And that's one of the reasons why we provide, you know, assistive technology and assistive devices and things including, but not exclusively wheelchairs to the disabled population. So, that's pretty much us from our perspective. In East Africa, I mean, we work out of Somalia, we work out of Ethiopia, we work out of Egypt, south Sudan, Congo. I mean pretty much everywhere except for Kenya which is a little bit annoying for you I would imagine but at least it gives you an idea and a context of what we're working in give me an example generally speaking. I think one of the issues that you need to look at is the disability issue within Kenya there are a lot of similarities between the context that we work in and actually Kenya as well because I mean in many areas [INSIGHT 1] there's very limited funds for these things and the reason is because disability comes under usually the ministry of social affairs and ministry of social affairs as in many contexts including in Europe as well is essentially the runt of the litter so you end up having the ministry of defense takes a significant chunk of the national budget then you'll have the police joint down where you'd have education the health and then it would go down the prime minister's office and so on and so forth until you get down to the ministry of social affairs near the run to the letter so they'll just get a little bit of money just to spend on whatever they can and so when it comes to providing services for people with disabilities it's very low cost sort of assistive technology that they try to look for. But this is where ICRC comes into its own so actually we can provide it with an artificial leg or the components for less than a hundred dollars which is which is great and similarly with Motivation wheelchairs that we pay I think about 250 for the wheelchairs to be manufactured. Presumably you're aware of the motivation wheelchairs?

- Yeah, I already spoke with uh with Claire Charles of motivation itself. We also have been have been investigating a little bit which type of, because our company is mainly uh focused around optimizing wheelchair distribution, so you can take a few weeks to get your wheelchair but we're not executing the manufacturing process or and also the distribution of the wheelchairs itself so it's mostly we're focusing on trying to find some way of funding if that's possible to maybe in collaboration with a motivation develop or further develop or improve their wheelchairs they currently have so we're aware of them indeed

No I spoke with it's funny actually because a couple of weeks ago it was only about two or three weeks ago I spoke with their regional director here and one of the biggest issues that I had when I was project manager in Ethiopia was the fact that we were importing pretty much. All the wheelchairs that we needed and it was a serious cost because I mean everything was coming from China and our budget at that time was about 200,000 we're still only producing about 400 wheelchairs per year for the clients and just I mean the economics of that is completely askew like crazy and so I did while I was in Ethiopia. I suggested that maybe we could try to find um a standard model of design um and then and then manufacture them locally. So the idea is that you create a design for Ethiopians, um manufactured by Ethiopians, used by Ethiopians and that was pretty much it and that was the idea of the wheelchair Consortium that I put forwards and I actually identified maybe about five I think there was about four or five uh organizations that were distributing wheelchairs not necessarily distributing but also manufacturing as well and it was loosely based on the rough terrain. A world made three wheelchair and in in turn it's very suitable for um uh for lots of things, you know particularly in the villages that you use them [INSIGHT 2] I think one of the biggest problems that we have is there needs to be a lot more in terms of education on how to use the wheelchairs in in these villages and things because of the fact that they can be quite challenging at times no matter how big your front wheel is if you if you haven't got the power to push it so if you don't know how to maneuver the wheelchair well then you're always going to be stuck basically.

- That's why you see because you now have some projects in Somalia uh do you know maybe also when distributing these wheelchairs is that in more rural areas is it the more urban ones is it uh and how and how do you distribute these wheelchairs are they well they put into a truck and then driven to where it can be driven to and then distribute it?

No well no what happens was is that the ICRC supports the rehabilitation structures themselves and so we set up a rehabilitation center in a particular strategic area which isn't very strategic quite frankly but what they do is they set up the workshop and

that workshop becomes the rehabilitation center so people migrate there and then they receive their assessment and then they determine whether they need just a crutch or a simple insole or a or a full blown wheelchair or whatever and then if that's the case then they'll have a stock on site and then they'll just unpack it and then cut it to size and so on and so forth [INSIGHT 3] it doesn't necessarily mean that everybody gets a wheelchair. It's important that we try to make sure that uh [INSIGHT 4] the assessment done is correct it's done correctly and making sure that the fitting is done correctly because obviously I mean it causes more problems if it's not fitting well um than it does uh than if it did so and then and then of course there's the issue of making sure that it's used for specifically for that purpose and if you drive around addis ababa sufficiently you'll actually notice that a lot of the people who are selling chewing gums and cigarettes are usually pushing wheelchairs so they use it as shops more than anything else. So you have to be a little bit concerned, well the concern so much but careful about who you provide these wheelchairs to, and it also depends indeed what you would just say is that not everybody is able to get to these rehabilitation uh locations or at least where they're being measured so that's also sometimes difficult not really? No not really I mean the ICRC provides the funding for accessibility so the ICRC programs are built on the three pillars of access to services quality services and sustainability access to services just doesn't mean there's a ramp that goes into the building we make sure that people are able to actually attend the rehabilitation sentence. So we can do that by providing subsidies and support for their transport costs we're providing with accommodation if they're very low income or what we call destitute disabled and then we can make sure that they've received all the services they get and one of the issues that I don't have is the question is whether they are safe enough to actually go home. Is it safe enough in the sense that they're able to manage themselves when they get home um and uh whether they're able to actually navigate around their home or whether they're able to uh perform any other activities of daily living as such so I mean there's no occupational therapy component that we have.

There now I was actually working in Bangladesh there's a lovely center there called center for the rehabilitation of the paralyzed huge hospital of a hundred beds but on top of that when they're ready for discharge they go to a halfway house and that halfway health is basically a reconstructed village for them to actually mobilize around to see whether they're safe to practice a little bit on how to use a wheelchair right. Not just that but also the other elements as well can they cook can they clean can they wash dishes et cetera et cetera I mean it's a full it's a full spectrum of what is required and that's something that we're lacking I think in the um in the ICRC not for the want of thinking about it but at least you know but we just don't have the resources to be able to.

- I also heard from Didier that the three-wheeled wheelchairs that they sometimes also have some difficulties in movability within homes. What is your experience with the type of wheelchair or would you maybe know the whirlwind wheelchair.

I don't know so much about wheelchairs, to be honest. This is not really my topic, but I do know a little bit in the sense that the rough terrain wheelchairs are reasonably okay over rough terrain. The four-wheeled wheelchairs are reasonably good, but I think if a person is in a house, then ideally they should get two wheelchairs, one for internal, one for external use. So, it's quite a challenge, I think, to try to marry everything that you can get, put it all together into one package. But it's got to be robust enough to be able to deal with the day-to-day, particularly in the rural communities and over the rural ground, basically. Now, one of the things that we were thinking about was the wheelchairs. One of the things that we were thinking about was with the T-bar shape of the Motivation, it seems to be working very well, but the problem is it's non-adjustable. And as a result of that, then it's quite cumbersome and you can't move around so well in it, unfortunately. If you could actually adjust that T-bar a little bit.

- That is a three-wheeled one, right? You mean? The T-bar?

And we were thinking about doing something like that in the wheelchair consortium in Ethiopia, but actually it doesn't really work either because you can't really have an adjustable bar because it just becomes very, very weak. And there's a lot of – unless you have a very, very tight seal on it, then it becomes quite weak and it'll move over time. , that's right. So, you have to be a little bit careful with what's going on there as well. And you also need to watch out with your center of gravity when sitting in that wheelchair as well. But that's also – I already looked into how you needed to sit into it when you have a three-wheeled one compared to a four-wheeled wheelchair. So, there's indeed also some complications, but there's a lot of opportunities, I think, here, but , trying to get away from that T-bar shape is quite challenging. And, you know, you need to ensure that kind of robustness within the thing as well. Of course, electronic wheelchairs and things like that don't really work here, even though they'd be quite useful. Obviously, they can't power up and you need to recharge them on a regular basis unless you put solar panels on them. So, it's a little bit hit and miss, really, when it comes to things like that. So, going back just quickly.
I mean, all our wheelchairs, we actually manufacture in – or Motivation manufacture in China [INSIGHT 5]. And Motivation now are actually looking to manufacture in Kenya itself, and it's probably best to actually speak with them about it. And I think they're working with the Jomo Kenyatta University. Yeah, they work with them in Kenya. I think they're called. And, of course, they're getting sponsorship, I think, or they're getting some kind of financial support from this grubby little organization called AT Scale. I don't know whether you – I don't know whether you're talking about AT Scale or AT Scale, but they're working with Motivation on that.

- Yeah, I also was looking into maybe getting in contact with them, but maybe they also have their connections with Motivation as well.

No, they probably do. And they, you know, I call them a little grubby. I call them a little grubby thing because, I mean, they're basically – their attitude is basically, we're going to provide you with – we're going to provide you with half a billion assistance. Which, I mean, is fine, but unless you actually, you know, ensure that the quality is correct, then it's – you know, then you're not doing really – oh, that's beautiful, Dan. You're not really doing a – you're doing a disservice for the people that you're trying to provide, not actually having a service at all. So, , if you know what I mean. I mean, they tend to be cutting some kind of corners. Which I'm a little bit –

When it comes to things like that, and especially when it comes to quality, so there's a company over here at the moment that's doing 3D printed technology for artificial limbs, which I think is a fantastic idea, but it's basically a couple of engineers from Belgium who are doing this kind of thing, and they don't really consider all the machinations that go into how do you get a person to actually walk properly and things like that. So, they don't incorporate all the elements necessary in the rehabilitation process. And for this kind of thing. So, as engineers, it's great that you're doing these kind of things, but at the same time, you've got to think of the end user and also to make sure that they're actually safe and they're able to use these things properly, you know, rather than just give them a leg and say, thank you very much, we're off to stick another leg on this person now. And then – And then they're completely stuck.

- And in terms of motivation, do they also ask feedback for – From the ICRC on the – on different new adjustments they made on their wheelchairs?

I know their wheelchairs are quite – , they have their designs of wheelchairs for almost like 10 years or something like that, but – I'm not sure, to be honest with you. So, it's – David Constantine was the, you know, the initiator of the motivation wheelchair. He's not with them anymore, but I think we're still in working with Motivation in that sense, and certainly we've got the contract with them to actually provide us with wheelchairs, but if you can come up with something better that we can use, that'd be great. I mean, that's just a little bit of what we're looking into, because

there are different types of manufacturers who are already active in these developing countries.

So, we have, indeed, a free wheelchair mission. I don't know if you know. Do you know them? They are producing these blue wheelchairs. Free wheelchair mission. No, I haven't heard of them. I'll have a look. I think if it was me, I'd probably have a look at the tires. You know? For some reason, I've got this issue that the tires are a little bit too thin on the Motivations, and I think they need to be bigger. A little bit. But, of course, if you add weight. If you add weight, or if you need them bigger, then you add weight to it, and then it becomes a little bit cumbersome. So, that would be useful. You want a little bit more mountain bike-like wheels.

It's still quite bulky, and it doesn't really close down into something. So, if you want to transfer onto a bus or whatever, that becomes a challenge as well. And I think transport outside of... Outside of your area of residence, by public transport, is always going to be an issue. What else is there? Yeah, the fact that the seat is made of wood, you know, and it doesn't really collapse into anything, particularly on the three-wheeler, is very challenging as well. And quite frankly, I think the generic sports wheelchairs are a little bit overpriced as well. How much is that one? That's 350. I think it's about 350. 350. 350 a pop. I was actually trying to... When I was in Cambodia, we bought some beautiful wheelchairs from this guy in Thailand, and they're still using them now. But the idea was that we'll make some generic wheelchairs in Cambodia, because there were skilled metal workers there. But we couldn't really get them to actually roll straight. Oh. Which is a shame, because they always used to steer off to the side or whatever. So I think it was just about the casters more than anything else, you know? That was good.

It was quite interesting to actually see how they worked. Of course, I mean, as prosthetists and orthotists, we don't involve ourselves with wheelchairs, particularly in the UK. I mean, it's bioengineers that deal with that, because they have special seating as well. So when it comes to special seating. So when it comes to special seating and things, they would basically have a beanbag, and then it would sit the child in the beanbag, find the right comfortable position for them, and then they would add some kind of a glue and then suck all the air out, so that it would become a beautifully fitted design for them, you know? And that's how they used to do it. I don't know if they do it anymore. They probably found some other way of doing it.

- But it's good, the initial idea of my company? That's maybe quite interesting to also get a little bit of your feedback about it, because they were of the opinion that indeed, when looking into manufacturing processes, that everything is being done outside of Africa and in these areas. And now we're also looking into these manufacturing with Motivation in Kenya. But they had the idea that also because our company has some specific knowledge in engineering with plastics, is that they want to try to investigate at least. What is possible in having modular parts and then metal frames to click sort of having an IKEA like wheelchair, which is really challenging, I can imagine, because you say it needs to be really tough and it really needs to be able to be used in a rural terrain, rural rough terrain. Do you maybe also see some other challenges in? Investigating this because what our idea was, is that aluminum tubes or mild steel tubes, which you can buy in Kenya, that local manufacturers can just make them the right length. And then and then shape them in a wheelchair like and then have a couple of tubes which you can put on to sort of make a simplified wheelchair out of it.

Yeah, no. Absolutely. In fact, what are the things that I was thinking about doing for the wheelchair consortium? I started it. Unfortunately, I couldn't continue with it. But one of the things I wanted to do was actually have local engineering, local tech schools to come up with the manufacturing process. So basically we come up with the design and we're happy with the design. And then what I suggested was let's go to the TVET colleges, you know, the technical vocational training colleges, and I said, and it was basically going to be a. And it was basically going to be a. Competition who could produce the fastest wheelchair or the wheelchair, the fastest and the most technically minded and so on and so forth. And that basically pits everyone against another. And then you basically pay them like, you know, we'll say of when it when it gets, you know, a thousand dollars or whatever for the team. And actually they come up with new types of tools, new types of designs, new types of welding mechanisms and things. And by doing so, it actually gets people. To start thinking about these things as well. So it wasn't just about just going to a normal engineering company and coming up with ideas. But I'm sure there's a lot of really clever youths out there who would be really interested in doing this kind of thing. So, I mean, in terms of the manufacturing process is equally as important as trying to get the design right in the first place.

So, I would advise that you try to look at what we have locally or what is available locally, because, you know, the competencies of the engineers, while there's going to be some really super clever engineering people out there. But they're going to you're going to pay through the nose for that kind of service. So you got to try to make it. It's not just about easy, simplified manufacturing, but it's got to be super low cost as well, because people aren't going to afford. [INSIGHT 6] You know, three, four or five hundred dollars for a wheelchair. You know, you have to be really think about how can we make this for less than one hundred dollars? It's just like David Constantine did with Motivation. Unfortunately, he never managed to do it. But again, I mean, it's something that you need to think about. Let's try and make it as low cost as we possibly can and simplify it as best as we possibly can as well.

- And also in terms of because we're also a little bit trying to orient you have to do to have some. Orientation about where we can receive some kind of funding. And you also mentioned that AT scale is maybe interesting. We also are looking into GDI Hub, Global Disability Innovation Hub. Do you also maybe know? They got their money. They got their money from AT scale. Oh, AT scale. OK, so if we're if we're going if I'm going to talk to GDI Hub, then it's actually the money of AT scale. Exactly. OK. That's a good thing to know.

You can try them. You can try them. They might say, oh, you don't talk to us. Go and talk to the GDI. So what kind of money are you looking for, by the way?

- More of the research and development costs because our company itself, it's their goal is not designing this thing for free. But they're looking into if there's any way possible to not make money out of it, but compensate for this line for the engineers working on this project. So they don't want to have any profit out of it, but they're just looking into how can we partially fund this, this development and maybe that's and it's quite difficult to do that with a motivation or with other wheelchair manufacturers within these environments because they have also limited money available for their own research and development projects. So therefore, it's also why I'm also looking into what is possible in terms of financial funding. And that's also why I found with another local manufacturer, APDK, that we're maybe both together going to ask with GDI for some type of funding so that we are already collaborating with a local manufacturing there.

But we were now I'm also looking into if you , if there are some other ways to maybe. I don't know. Realize this research and development project, but if there's not, then I will look myself.

Yeah, you come at the worst possible time. The humanitarian sector is just it is worse. It's hemorrhaging money at the moment, so it's not really the best time to actually start asking for money. But at the same time, I mean, there's got to be some people out there with a bit of capital. Actually, you can look to spend. I just don't know who at the moment. I'm trying to look around at the moment. So we work in partnership with the Somali Red Crescent Society, who are quite frankly, terrible and Transparency International puts Somalia at 180 out of 180 countries in terms of transparency and corruption. And so we're really, really struggling to try to maintain any level of service here because people just well, they haven't got any money to spend, first of all, and they just can't trust giving it to the

Somalians. So they've got to put it through. They've got to put it through somebody and somewhere and some through the ICRC, it's more than likely to go through the ICRC because we're a reasonably trusted partner. And by the end of this year, the funding that we're going to get from the Norwegian Red Cross is going to be run out. And that's they've been funding it for the past 30 years, a million dollars a year. And that covers staff salaries for this, for the whole sector. So, I mean, it's not quite cheap, you know, for that three to run three physical rehabilitation sectors, including staff salaries and the operating costs. It costs about one million dollars per year, which is nothing, really. But at the same time, I'm still trying to say, look, you have to cut costs, you have to cut costs. So I'm looking for a new provider at the moment. But at least they can even if we can cover the staff salary costs, then then ICRC will pay for the operating costs, in which case then we'll have we'll have them by the balls, basically. We can say, look. Right now, you know, you're going to have to reduce your costs. Now you have to cut this. Now you have to cut that. So, you know, and it's things like we can do, like, you know, Somalia is like one of the hottest places on the earth. And yet they still use diesel engine generators to actually produce their power. And it's things like that, you know, that we could say maybe forty thousand dollars a year just on using solar panels. It's there. And then there's lots of little things. Little elements like that, that we can actually put forward to them and say, look, I mean, let's try and save a little bit of money here and there and stuff. So in answer to your question, it's quite challenging to find right now. But I think global disability would probably be the best people to go to. And in other ways, in other ways, indeed, also through AT scale. But I know they're quite prevalent here in the Joma Kenyatta University at the moment because they said they do know they did. They basically designed the motivation wheelchair. And then and then the guy came and he took a lovely picture, smiled and things like that. And then he went off again. And that was the end of that. And, you know, it's just basically a PR stunt for them. But at the same time, I mean, you know, they're going to they're going to invest in them to try to come up with something different, something new and novel and things like that. So it might actually be worthwhile you kind of engaging with the J.K. University and see what comes up. I don't know anybody there, unfortunately, but I know that the regional director for Motivation is in contact with them. And I can certainly give you his contact details if you want. That would be interesting. I think so. , that's maybe an interesting one to also get in contact with him to also see. I've spoken to someone within the UK with Motivation, but maybe it's also more interesting to see what they're doing with their local manufacturing facilities. So and also their collaboration with the university and also see how we can maybe help them out in a certain way. Where are you based now? In the Netherlands. Utrecht?

- Eindhoven. Oh, okay. South. Nice. It's nice. , it's nice. That's all right. Good. Good to know. Good. Good. Okay. You have any questions you want to ask? Not specifically anymore. I think I will write everything down. You mentioned and if you can maybe also in the center send this contact and I can just send him an email about that we spoke and that I'm interested in having a chat sometime.

Yeah, if I can find it, I'll send it to you right now. Okay. What's his name? If I can find his bloody name. Peter. Peter. Yes. His name is Peter. Let me forward it to you. Okay. Let me. There you go. All right. Good. Thanks. It's a subject reasonably close to my heart. I don't know why. It's a subject. It's one of these things. Listen, just call me whenever you fancy or you just send me an email and then I'll try to respond accordingly. And I'm sorry if I ramble on a bit too much, but it's one of my. It's only good to. My traits, I'm afraid. It's good to hear a lot about it. So thanks. And if you want any follow up questions, just give me a call. You're welcome. Sounds good. Yes. Nice to meet you, Olga. Yes. Nice to meet you, Philip. Take care. Bye-bye. Take care, sir. Bye-bye now.

PEZY

Vervoorn, D. (2024, 17 April).

Meeting Summary:

The meeting with Vervoorn, D. was to gain a better insigth on the design process of wheelchairs and what to expect from the product development.

In this meeting I chose to elaborate on my strategies and what I was looking into when it comes to making a complete strategy to realize wheelchair developments. Vervoorn has both experience in PEZY designing process as well as knowledge of wheelchair design through O4 wheelchairs.

When explaining the different strategies he advised me to look at the current desiging process of Front-end innovation and New Product Development of PEZY. This graph elaborated on the different stages you go through as a designer when desiging a new product.

Het explained that desiging the wheelchair in developing countries would first and foremost demand a lot of additional knowledge about what is needed in the wheelchair and what should it suppose to be doing or handle in different terrains. In here he explained it was important to speak to all interesting parties, this could be the customer as well as the manufacterure.

After obtaining this long list of requirements it is important to have some financial resources to set-up a project like this. He mentioned that in the concept proof stage in FEI the first serious amounts of expenses are being made in order for the designers to really proof different concepts.

Lastly he futher elaborated that the FEI stage was an important stage to really set-up a functioning prototype which could be a scale of 1/10 to show that the concept could work in real size.

The FEI process he expected when having 2 designers on the task to take around half a year and the first two stages would take around 2 months.

Appendix K: Project Brief

DESIGN FOR our future

TU Delft

IDE Master Graduation Project

Project team, procedural checks and Personal Project Brief

In this document the agreements made between student and supervisory team about the student's IDE Master Graduation Project are set out. This document may also include involvement of an external client, however does not cover any legal matters student and client (might) agree upon. Next to that, this document facilitates the required procedural checks:

- Student defines the team, what the student is going to do/deliver and how that will come about
- Chair of the supervisory team signs, to formally approve the project's setup / Project brief
- SSC E&SA (Shared Service Centre, Education & Student Affairs) report on the student's registration and study progress
- IDE's Board of Examiners confirms the proposed supervisory team on their eligibility, and whether the student is allowed to start the Graduation Project

STUDENT DATA & MASTER PROGRAMME
Complete all fields and indicate which master(s) you are in

Family name	Hamminga	6964	
Initials	O.J.J.B.		
Given name	Oege		
Student number	[redacted]		

IDE master(s) IPD ☐ DfI ☐ SPD ✓
2nd non-IDE master
Individual programme *(date of approval)*
Medisign ☐
HPM ☐

SUPERVISORY TEAM
Fill in he required information of supervisory team members. If applicable, company mentor is added as 2nd mentor

Chair	Erik-Jan Hultink	dept./section	Design, Organisation & Strategy
mentor	Stefan Persaud	dept./section	Sustainable Design Engineering
2nd mentor	Mark van der Schoot		
client:	Pezy Group		
city:	Houten / Eindhoven	country:	Netherlands
optional comments			

! Ensure a heterogeneous team. In case you wish to include team members from the same section, explain why.

! Chair should request the IDE Board of Examiners for approval when a non-IDE mentor is proposed. Include CV and motivation letter.

! 2nd mentor only applies when a client is involved.

APPROVAL OF CHAIR on PROJECT PROPOSAL / PROJECT BRIEF -> to be filled in **by the Chair** of the supervisory team

Sign for approval (Chair)

Name Hultink Date 12 jan 2024 Signature EJH

CHECK ON STUDY PROGRESS
To be filled in **by SSC E&SA** (Shared Service Centre, Education & Student Affairs), after approval of the project brief by the chair.
The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total _____ EC

Of which, taking conditional requirements into account, can be part of the exam programme _____ EC

★	YES	all 1st year master courses passed
	NO	missing 1st year courses

Comments:

Sign for approval (SSC E&SA)

Robin den Braber
Digitaal ondertekend door Robin den Braber
Datum: 2024.01.19 09:46:57 +01'00'

Name Robin den Braber Date 19 jan 2024 Signature

APPROVAL OF BOARD OF EXAMINERS IDE on SUPERVISORY TEAM -> to be checked and filled in by IDE's Board of Examiners

Does the composition of the Supervisory Team comply with regulations?

YES	★	Supervisory Team approved
NO		Supervisory Team not approved

Comments:

Based on study progress, students is ...

★	**ALLOWED** to start the graduation project
	NOT allowed to start the graduation project

Comments:

Sign for approval (BoEx)

Monique von Morgen
Digitally signed by Monique von Morgen
Date: 2024.01.23 09:56:13 +01'00'

Name Monique von Morgen Date 23 Jan 2024 Signature

Name student Oege Hamminga **Student number** [redacted]

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT

Complete all fields, keep information clear, specific and concise

Project title Formulating a market entry strategy for a modular wheelchair

Please state the title of your graduation project (above). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

Key Stakeholder: Pezy Group
Pezy Group, a design agency, is exploring the potential of modular wheelchair designs, driven by assumptions. Their primary interest lies in identifying a suitable market for the distribution of modular wheelchairs, with the specific modular application aligning on market demands.

Modular Application in Wheelchairs:
Pezy Group recognizes potential in the wheelchair market, which currently consists of expensive, highly customizable options and cheaper alternatives differing mainly in size. They believe modularity could introduce innovative solutions to address current market dynamics. For Pezy Group, modularity entails enabling users to install the wheelchair themselves, whether through self-build packages or more customizable options. The specific application of modular design requires further investigation, but the overall potential of modularity presents numerous opportunities worth exploring.

Motivation for Pezy Group to Enter New Markets:
Pezy Group is well-prepared for this project, thanks to its association with O4 Wheelchairs, a venture company with extensive experience in wheelchair design and its own manufacturing facility. The machinery is not operational all day long, providing an opportunity for a new product to be seamlessly integrated into their ongoing production. In addition to this facility, Pezy Group possesses considerable expertise in mechanical engineering, particularly in wheelchair design. Their pilot factory in Groningen, equipped with a broad range of machinery, including two injection blow machines, further demonstrates their production capabilities. Pezy Group's position in this market, combined with their knowledge and lower initial production costs, distinguishes them from other companies, giving them a favorable position to explore new markets in the wheelchair industry.

→ *space available for images / figures on next page*

introduction (continued): space for images

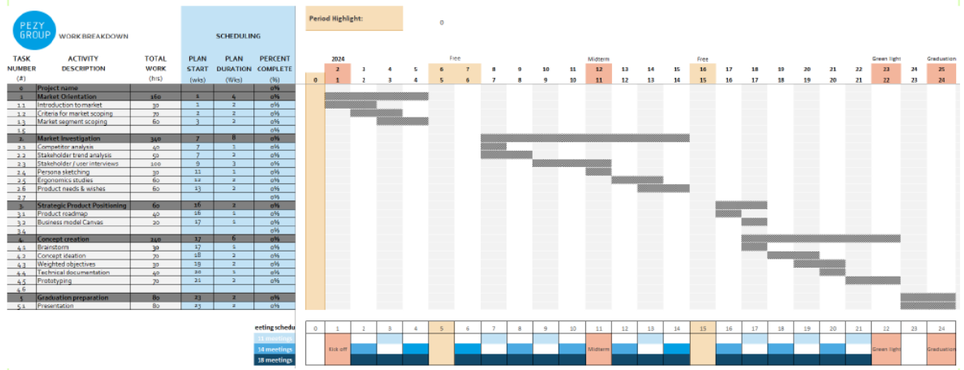


image / figure 1 Project Plan

image / figure 2

Personal Project Brief – IDE Master Graduation Project

Problem Definition

What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice.
(max 200 words)

First Challenge: Market Segment Scoping (Week 0-4)
Pezy Group recognizes a demand for modular applications in the wheelchair industry, prompting a thorough exploration of the potential benefits associated with integrating modularity. This process necessitates the effective integration of knowledge and innovation in scoping out a suitable market for further investigation.

Second Challenge: Market Segment Investigation & exploration of modularity in wheelchair design (Week 5-15)
The second challenge involves a deeper dive into the selected market segment. In addition to exploring the potential of incorporating modularity in wheelchair design, in-depth consumer, customer, and market research will unveil the products' demands and preferences. This phase culminates in providing a comprehensive product overview of the new design.

Third Challenge: Wheelchair Concept Definition (Week 16-20)
Following the market investigation, which includes insights from user and market research, the ideation phase commences. Considering the modular product characteristic, the wheelchair design must be tailored to meet the unique demands of the market.

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for. Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence) As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:

Consult Pezy Group with a **market entry strategy** for a modular wheelchair design. Identify a suitable market segment within the entire industry, executing an **in-depth market research**, and propose a **wheelchair design** that aligns with both market and user-specific demands and preferences.

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

For an overview of the methods employed within my project plan, refer to Figure/Image 1: Project Plan.

The project unfolds in three challenges over 20 weeks, addressing the demand for modular wheelchair designs. In the initial phase (Week 0-4), market entry scoping utilizes criteria and research methods to assess market segment viability. The second phase (Week 5-15) involves in-depth market research, mapping consumers, customers, and the market to uncover product demands and preferences. The final phase (Week 16-20) focuses on wheelchair concept definition through brainstorming, concept creation, and prototyping.

Design methods are applied iteratively to align the concept with market demands. Overall, the project integrates research and design methods at each stage to ensure the creation of a modular wheelchair concept that meets market expectations and user preferences.

Project planning and key moments

*To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a **kick-off meeting**, **mid-term evaluation meeting**, **green light meeting** and **graduation ceremony**. Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities).*

Make sure to attach the full plan to this project brief.
The four key moment dates must be filled in below

Kick off meeting	9 jan 2023
Mid-term evaluation	21 mrt 2024
Green light meeting	4 juni 2024
Graduation ceremony	18 juni 2024

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

Part of project scheduled part-time	
For how many project weeks	21
Number of project days per week	5,0

Comments:

Motivation and personal ambitions

Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five.
(200 words max)

In my graduation project, I am eager to engage in a real-time collaboration with the design agency Pezy Group, leveraging the collective expertise of individuals from both Pezy Group and O4 Wheelchairs. The project's focus on wheelchair design aligns with my interests, allowing me to examine Pezy's assumptions and adapt their scope as necessary for specific markets.

My primary goal is to apply the knowledge acquired during my Master's in Strategic Product Design, particularly in market research and strategic planning. The majority of my project will involve identifying a suitable market for integrating modular applications into wheelchair designs.

In addition to showcasing my expertise in strategic planning, I am excited about translating my research knowledge into a conceptual solution for the identified market. This phase will also demonstrate my design skills, obtained during my bachelor's education. Ultimately, the project will result in the creation of a well-designed final concept.

INGENIOUS PRODUCT DEVELOPERS