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Development of an Assetless Internationalization Plan for 3DWAYS – Selection of Target Countries and Niche Markets

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ABSTRACT

This thesis develops an internationalization strategy for 3DWAYS, a Portuguese supply chain management company, to expand into niche markets in Europe's sustainable manufacturing sector. Utilizing an assetless model, 3DWAYS provides tailored solutions to clients addressing supply chain transparency, efficiency, and sustainability challenges. Combining internal and external analysis and competitive insights, Germany and the UK are identified as target markets in the medical technology and smart home niches. A go-to-market strategy details positioning, partnerships, and marketing initiatives, concluding in an implementation roadmap. A financial impact assessment quantifies incremental profits, offering actionable insights to establish 3DWAYS as a European supply chain intermediary.

Keywords: Internationalization, Market Selection, Go-to-market Strategy, Financial Impact

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0. CONTEXT – GROUP PART

0.1 Introduction

In today's global economy, resilient and innovative *Supply Chain Management* (SCM) is vital for competitive success, especially amid disruptions like geopolitical tensions and sustainability demands. 3DWAYS, a Portuguese company, addresses these challenges by offering its clients sustainable manufacturing and supply chain solutions, thereby providing a hands-on end-to-end service ranging from material sourcing, supplier selection, and production supervision to project management and product development. It does so by acting as an intermediary between hardware-selling firms (its clients) and suppliers or manufacturers while leveraging an asset-light business model. Having built a broad supplier network over time, 3DWAYS provides transparent, resilient, and sustainable services to firms of all kinds of sizes from industries such as medical devices, consumer electronics, and micro-mobility.

The core of 3DWAYS' business model is built around mediating between corporations – 3DWAYS' clients – and a robust network of suppliers, focusing on sustainable sourcing, procurement, and manufacturing practices while implementing supply chain optimization measures without engaging in prototyping or direct manufacturing itself. By outsourcing production to the most suitable supplier partners and overseeing the end-to-end supply chain, 3DWAYS ensures efficiency and sustainability while reducing costs for its clients.

3DWAYS, currently active in Portugal, aims to scale its operations across Europe through an assetless internationalization strategy. This thesis develops a strategic roadmap by analyzing market opportunities, competitive landscapes, and industry trends in key European countries. It evaluates 3DWAYS' internal capabilities and external conditions to provide actionable insights on segment targeting and market entry, positioning 3DWAYS as a relevant manufacturing and supply chain intermediary in the chosen niches.

0.2 Project structure and scope

As *Figure 1* outlines, this thesis is structured into five phases, beginning with an internal assessment of 3DWAYS' current operational strengths and weaknesses, followed by an external analysis of its macroeconomic business environment, market conditions, and competitive landscape. Subsequently, a shortlist of potential countries and industries for market entry is identified, setting the foundation for a targeted *Go-To-Market* (GTM) and positioning strategy for the selected market segments. Eventually, a financial potential assessment is conducted that illustrates the viability of this expansion plan.

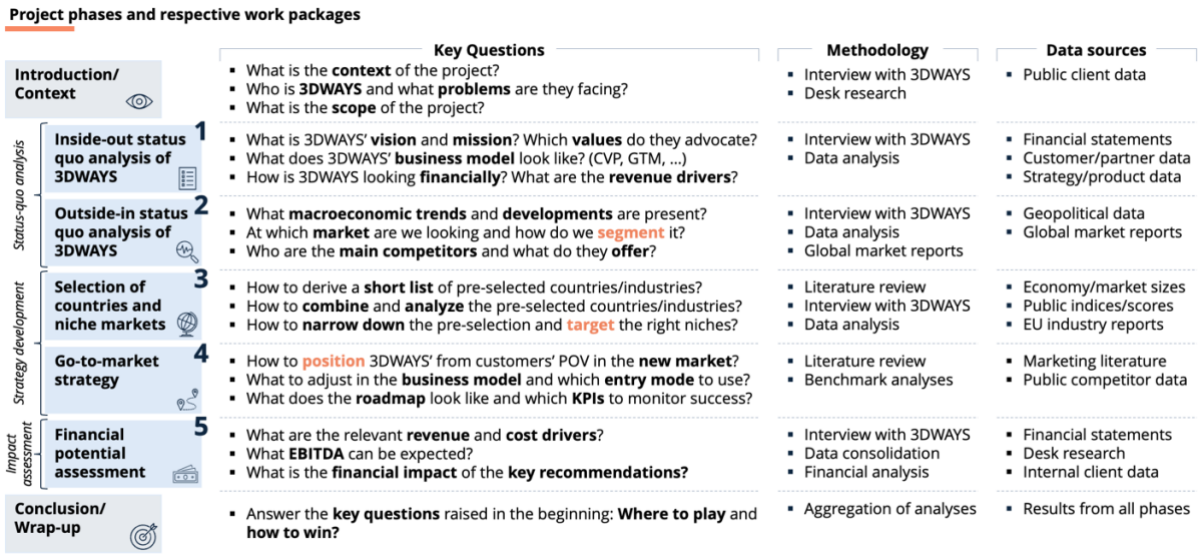

Figure 1: Project structure and respective work packages

The research draws on primary and secondary data, incorporating insights from client interviews, financial data, and industry benchmarks as well as literature reviews, ensuring a robust and evidence-based approach. By systematically evaluating 3DWAYS' potential for European expansion, this thesis aims to offer a roadmap that aligns with the company's mission of fostering sustainable manufacturing practices as well as efficient and resilient supply chains for its customers.

This project analyzes key internal and external factors for 3DWAYS' European expansion. Objectives include assessing current capabilities, analyzing market landscapes, selecting target countries and industries, and developing a GTM strategy with financial recommendations for a

profitable entry. The scope is limited to status-quo analysis, strategic planning, and an impact assessment, excluding certain activities.

Specifically, the project excludes significantly adjusting the current services offered, designing new service offerings, and considering countries or industries outside of Europe. It also does not cover the actual implementation or long-term monitoring of the proposed market entry strategy. Having a clear definition of the scope ensures that the project remains targeted and achievable within the given timeframe and resources, focusing solely on strategic situation analysis, internationalization strategy development, implementation and monitoring planning to support 3DWAYS' European market entry aspirations.

0.3 Target picture

The solution framework for 3DWAYS' internationalization strategy, as demonstrated in *Figure 2*, shows how the five phases build upon and interlock with each other, each contributing to a comprehensive plan aimed at achieving profitable market entries in selected European niche markets. This structure enables a systematic exploration of critical decision points – *"Where to play"* and *"How to win"* – by leveraging 3DWAYS' resources and capabilities as well as its assetless model within the European context.

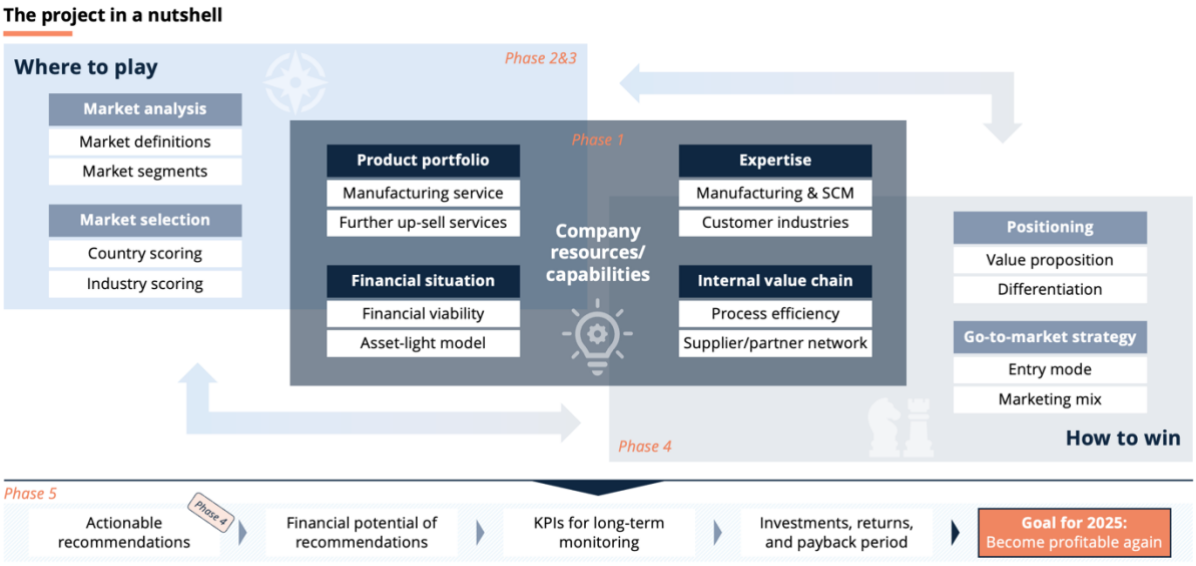

Figure 2: Solution framework for 3DWAYS' assetless internationalization plan

The first phase focuses on evaluating 3DWAYS' internal resources and core competencies, including its product portfolio, expertise in industries like medical devices and consumer electronics, its asset-light business model, and internal value chain. Moreover, its financial statements from past periods are analyzed to gain a better understanding of the firm's current financial situation. This analysis identifies strengths and areas for improvement, forming the foundation for aligning internal capabilities with the external environment in the GTM strategy.

Phases two and three focus on identifying *"Where to play"* by first analyzing and segmenting markets in scope before scoring potential European markets and industries based on quantitative and qualitative criteria. Phase two assesses macroeconomic opportunities and defines key segments, while phase three evaluates their attractiveness based on criteria such as market potential, industry fit, and cultural distance. This approach yields a shortlist of target segments aligned with 3DWAYS' strengths and strategic goals.

Phase four focuses on *"How to win"* by developing a tailored GTM strategy for the selected segments. It emphasizes strategic positioning, demand-generation strategies, and different entry modes. The plan includes building partnerships and distribution channels to overcome trust barriers, secure initial contracts, and establish a long-term market presence. Finally, an implementation roadmap and a risk assessment analysis are provided.

The final phase evaluates the internationalization plan's financial potential through revenue, cost, and profitability projections supported by scenario and sensitivity analyses to ensure robust financial targets.

At an overall level, these interconnected phases aim to achieve 3DWAYS' overarching objective of becoming profitable by the end of 2025 through successful expansion into at least two strategically selected European niche markets. Each phase is built upon the insights derived from previous stages, forming a cohesive, evidence-based roadmap that aligns with 3DWAYS' mission to facilitate efficient, resilient, and sustainable supply chain solutions across Europe.

1. SELECTION OF TARGET COUNTRIES AND NICHE MARKETS – JAN STELZ

While the first two chapters provided an in-depth understanding of 3DWAYS' status quo by evaluating the company's internal capabilities and resources and comprehensively analyzing the market environment in which 3DWAYS currently operates, the following subsection aims to answer the first guiding question raised in the introduction to this thesis: *"Where to play?"*. This analysis builds upon the previously introduced market segmentation framework and involves ranking countries and industries – two of the three introduced segmentation criteria – based on their attractiveness for 3DWAYS. The goal of this analysis is to identify the optimal combination of countries and industries for 3DWAYS' international expansion. This is then further refined by incorporating the third segmentation criterion, company size and complexity, in a deep dive into the selected country and industry combinations. The findings will help identify the most promising niches to target for which, in the next step, the GTM strategy will be developed in *Chapter* ***Error! Reference source not found.***.

1.1 Literature review

3DWAYS' internationalization strategy requires a structured approach to identify foreign market opportunities. With international expansion being a common business challenge, various case studies and frameworks offer guidance on assessing market attractiveness using economic, cultural, and operational criteria. These approaches enable businesses to make informed decisions about where to expand.

After reviewing the literature, a shortlist of three peer-reviewed papers was selected for detailed analysis. Based on this list, the literature review evaluates three approaches – *Multiple Criteria Decision Analysis* (MCDA), an indexing approach for emerging market potential, and a combined clustering and ranking method – drawn from works by Beim & Lévesque (2006), Cavusgil (1997) and Cavusgil et al. (2004).

The reviewed literature highlights that the selection of new international markets often involves

a balance between quantitative and qualitative factors. Beim & Lévesque (2006) present MCDA as a structured decision-making tool that incorporates both objective measures and subjective judgments, while Cavusgil et al. (2004) offer a clustering and ranking approach using aggregated market attributes to group similar countries and evaluate their relative attractiveness. In contrast, Cavusgil's (1997) indexing approach combines key dimensions into a compounded score to evaluate the potential of certain markets. The frameworks highlight the importance of assessing a country's economic potential, political stability, infrastructure and cultural compatibility to optimize the internationalization decision-making process. The following paragraphs introduce the three approaches in more detail.

Beim and Lévesque (2006) introduce MCDA as a structured approach for evaluating potential countries based on both objective measurements (e.g., GDP growth) and subjective factors (e.g., cultural compatibility). This method allows decision-makers to weigh various factors such as political stability, economic environment and cultural compatibility using the so-called swing-weight method. This method weighs the criteria based on their relative importance, creating a structured process for ranking countries for new business ventures. The study highlights MCDA's flexibility through sensitivity analysis, showing how small changes in criteria weights can shift rankings, emphasizing the need for adaptive market selection (Beim and Lévesque 2006).

Cavusgil (1997) introduces indexing to rank emerging markets using factors like size, growth, infrastructure, and economic conditions, producing a customizable overall score based on industry priorities. The approach combines economic, social, and political indicators. While effective for preliminary assessments, indexing should be complemented by qualitative analysis, particularly in emerging markets with inconsistent data (Cavusgil 1997).

Finally, Cavusgil et al. (2004) propose combining clustering and ranking for foreign market assessment. Clustering countries into groups with similar economic, political, and cultural traits

enables consistent strategies, while ranking identifies the most attractive markets within each cluster based on metrics like market size and growth. This approach balances structural similarity with market potential (Cavusgil et al. 2004).

Both MCDA and the indexing approach provide valuable frameworks for ranking markets by allowing criteria to be weighted based on their importance. However, these methods rely heavily on comprehensive and reliable data, which may be unavailable or inconsistent, particularly in emerging markets. Similarly, clustering and ranking methods may oversimplify complex market dynamics by treating countries as homogeneous units. Future research should explore ways to integrate quantitative and qualitative methods more effectively to capture market potential holistically, considering country- and industry-specific nuances.

The three reviewed methodologies collectively offer a robust foundation for assessing new markets. While the indexing approach and the clustering/ranking methods are distinct, they share a common reliance on macro-level quantitative indicators and complement each other in narrowing and prioritizing markets. Together with MCDA, which incorporates both quantitative and qualitative aspects, these frameworks inform the methodology applied in assessing 3DWAYS' new markets, as detailed in the following chapter.

1.2 General methodology

In the following chapters, a market selection model – including an industry ranking, a country ranking, and a combined ranking model – will be presented. This approach is grounded in key insights from the three previously discussed papers and has been tailored to 3DWAYS' specific circumstances and requirements.

The market selection model was conducted in four consecutive steps. First, an independent industry ranking was conducted to identify the three most attractive industries for 3DWAYS. Second, an independent country ranking was performed to shortlist 15 potential countries for entry. Third, a combined ranking was created to determine the most promising country and

industry combinations for 3DWAYS. Finally, an in-depth analysis of the top-ranked country and industry combinations was conducted to eventually identify the niche segments to target. Each ranking process (country, industry, and combined) follows the same three steps: *(i) starting with a longlist, (ii) evaluating each option against certain weighted criteria*, and *(iii) narrowing down to a shortlist. Figure 3* illustrates the methodology applied.

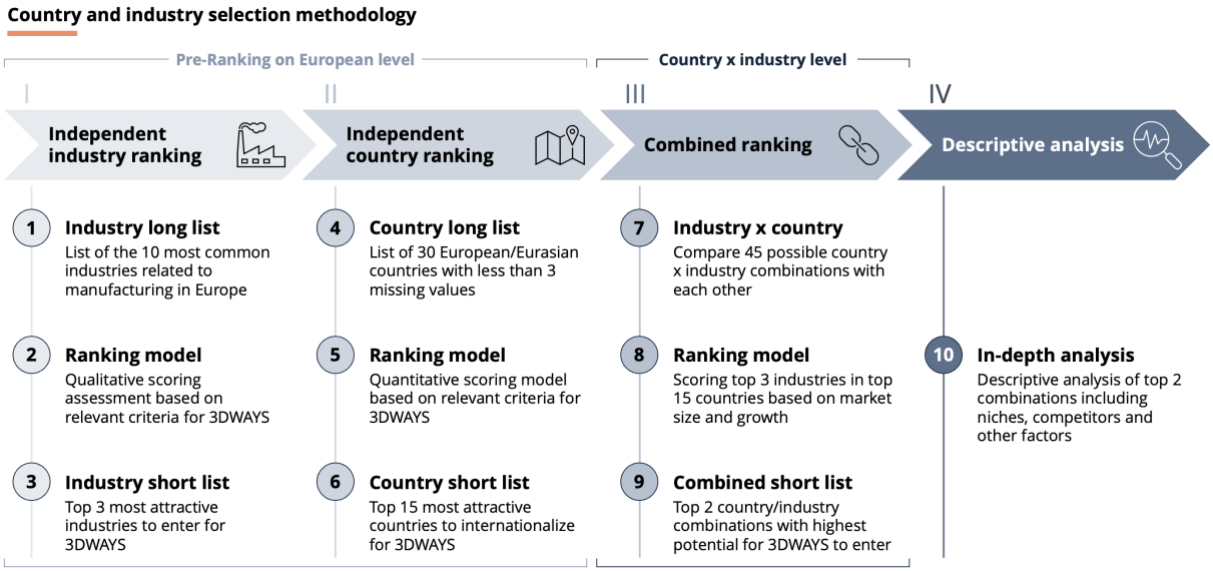

Figure 3: Methodology for Chapter 3

Each of the three ranking models as well as the subsequent descriptive analysis of the selected industry and country combinations – the result of the combined ranking model – will be explained in detail in the subsequent chapters.

1.3 Industry ranking

An independent industry ranking was conducted as the first step in selecting the final target markets for 3DWAYS. The longlist, which served as the starting point for the ranking model, was derived using MSCI's industry classification (MSCI 2023). Only industries engaged in manufacturing activities were included in the longlist. Non-manufacturing industries, such as software and media, were excluded as they fall outside the scope of 3DWAYS' service offering. *Figure 4* presents the industry longlist, along with a description of each industry and a mapping of the pre-prioritized niches mentioned in *Chapter* ***Error! Reference source not found.***.

Industry long list

	Industry name	Industry definitions and descriptions	Pre-Prioritized Niches
1	Automotive & transportation	Design, production, and sale of vehicles, including cars, trucks, and public transportation systems	Micro mobility; Smart cities
2	Healthcare & pharmaceuticals	Development, production, and distribution of medical devices, drugs, and healthcare products and services	Medical devices
3	Logistics & warehousing	Transportation, storage, and distribution of goods, ensuring efficient supply chain operations	
4	Electronics & technology	Production of consumer electronics, semiconductors, and IT hardware/software for various sectors	Consumer electronics; Smart cities
5	Renewable energy	Generation and distribution of energy from renewable sources, including solar, wind, and hydrogen	
6	Chemical & materials industry	Production of basic and specialty chemicals, as well as advanced materials for industrial use	
7	Construction & building materials	Construction of buildings and infrastructure, and production of materials like cement, steel, and glass	Smart cities
8	Aerospace & defense	Design, manufacturing, and maintenance of aircraft, spacecraft, and defense-related systems and equipment	
9	Consumer goods	Manufacturing and sale of products for personal use, including clothing, household goods, and beauty products	Consumer electronics
10	Food & beverage	Production, processing, and distribution of food and drink products for consumption	

Figure 4: Industry longlist (based on: MSCI 2023)

As outlined in *Chapter* ***Error! Reference source not found.***, key considerations for assessing industries' attractiveness for 3DWAYS include industry growth, compliance requirements, and demand potential. Therefore, seven categories were used to determine the attractiveness of each industry from the longlist. Each category was assigned a respective weight corresponding to the relative importance of the category compared to the others. The weights were defined based on the team's experience and inputs from 3DWAYS. For instance, the criterion category *industry fit with 3DWAYS* was deemed the most important and, thus, weighted at 25%. It includes factors such as the level and complexity of supply chain and manufacturing activity within the industry, as well as whether 3DWAYS has prior experience in the respective industry. The latter plays a crucial role in 3DWAYS' internationalization as those references can be leveraged to attract potential clients in the new markets, justifying the higher weighting. Conversely, the criterion category *geographic presence in Europe*, describing whether one industry is more evenly distributed across Europe or concentrated in specific countries, was considered least important. It was assigned a weighting of only 5%, as it is more relevant for subsequent expansion phases within Europe after initial internationalization has been achieved. Additionally, the impact direction of each criterion was defined. While, e.g., higher industry fit increases an industry's attractiveness, entry barriers reduce it. For the full list of categories and

weights, see *Figure 5*.

The seven criteria categories used to assess industry attractiveness

Category	Rationale for relevancy	Direction of impact	Potential qualitative criteria (Non exhaustive)	Weight of criteria metrics	Weight of criteria category
Industry fit with 3DWAYS	It ensures 3DWAYS can effectively deliver its core services in that industry	↑	• Supply chain and manufacturing activity and complexity • Pre-experience in that industry	***No individual weighting due to lack of comparable data availability***	**25%**
Entry barriers for 3DWAYS	It ensures that industries with low entry barriers for 3DWAYS are considered while industries with high entry barriers are avoided	↓	• Certification standards		**20%**
Industry potential	High industry growth potential creates opportunities for 3DWAYS to scale its business and secure long-term revenue streams	↑	• Industry size • Future growth potential		**20%**
Profitability	Profitability in the industry indicates the financial viability and revenue opportunities for 3DWAYS' services in the market	↑	• Costs and CAPEX • Revenue potential		**10%**
Sustainability & regulation	Increasing focus on sustainability and regulatory compliance drives demand for 3DWAYS' expertise in building transparent and sustainable supply chains	→	• Industry emissions • Sustainability investments • Regulatory scrutiny		**10%**
Digital & technological readiness	A digitally advanced industry is more likely to adopt 3DWAYS' supply chain automation solutions, driving efficiency and innovation	↑	• Degree of digitalization • Degree of automation		**10%**
Geographic presence in Europe	Industries with a strong geographic presence in Europe align with 3DWAYS' internationalization scope, providing a solid base for expansion	↑	• Distribution across Europe vs. concentration in a few strong countries		**5%**

Legend: Positively correlated with attractiveness ↑ Negatively correlated with attractiveness ↓

Figure 5: List of criteria categories for industry ranking

After confirming the list of criterion categories and their respective weights with 3DWAYS, an industry ranking model was developed. Industries were rated on a one-to-five scale (with five representing the highest attractiveness) based on market research, client input, and the team's expertise. A qualitative approach was used due to the limited availability of comparable quantitative data, whereas a quantitative approach was used in the country ranking, presented in *Chapter 1.4*.

The individual ratings were then weighted according to their respective weights using *Equation A-1* (found in the appendix) to calculate an overall attractiveness score for each industry. Detailed ratings for each criterion and the resulting overall industry attractiveness scores are presented in *Figure A-1*. The high-level rationales behind each rating are provided in *Figure A-2* and *Figure A-3*.

The longlist was subsequently sorted from highest to lowest, and the three industries with the highest scores were selected for inclusion in the combined ranking. The top three industries identified are *(i) electronics & technology*, *(ii) healthcare & pharmaceuticals*, and *(iii) consumer goods*. These industries were found to align closely with 3DWAYS' business model

due to factors such as pre-existing experience, high levels of supply chain and manufacturing activity and complexity, significant growth potential, and strong digital and technological readiness. Together, these attributes present promising opportunities for 3DWAYS' internationalization strategy.

1.4 Country ranking

As a second step, the independent country ranking was conducted to narrow down the countries for the combined ranking and thus reduce research efforts for countries that do not show basic requirements for 3DWAYS' market entry. Similar to the industry ranking, the country ranking model starts with a country longlist. For this list, 30 European and Western Eurasian countries were selected, with countries showing more than two missing criterion values eliminated from consideration. The country longlist can be found in *Table A-1*. Subsequently, the ranking model was set up. Similar to the process in the industry ranking model, criteria were identified to determine the attractiveness of a certain country. As already outlined in *Chapter* ***Error! Reference source not found.****,* key considerations for a country's attractiveness for 3DWAYS' internationalization plan are factors such as regulatory landscapes, economic stability, and market readiness. Therefore, the criteria were clustered into six main categories: *(i) market potential, (ii) society & workforce, (iii) regulation & legal, (iv) sustainability & environmental standards, (v) innovation & digitalization,* and lastly *(vi) risk.* The weighting of these criteria was again conducted in close consultation with 3DWAYS and by leveraging the project team's experience and expertise.

Out of these categories, market potential, which includes metrics such as GDP, GDP growth (both of the past and projected five years), and the size of the manufacturing market, was deemed most important with a total weight of 34%. Conversely, risk – including political, country, and investment risk – was found to be the least important with a weight of only 9% (3% for each type of risk), since the regulatory frameworks in EU countries generally provide

favorable and safe conditions, as outlined in *Chapter* ***Error! Reference source not found.***. The complete list of criteria metrics, their direction of impact, and their respective weights is presented in *Figure 6*.

The six criteria categories used to assess country attractiveness

Category	Rationale for relevancy	Direction of impact	Potential quantitative criteria metrics	Weight of criteria metrics	Weight of criteria category
Market potential	Helps identify countries where there is sufficient demand and potential for 3DWAYS' services, ensuring the scalability of the business	↑	Size of manufacturing market	13%	34%
			(real) GDP growth	7%	
			GDP growth projections	7%	
			GDP per capita	7%	
Society & workforce	Helps determine whether a country has the right demography and culture to support business operations and growth	→	Cultural distance	7%	17%
			Labor costs	5%	
			English language	5%	
Regulation & legal	Vital for smooth market entry, as unfavorable regulations can create significant barriers or increase costs	→	Ease of doing business	8%	15%
			Legal environment	3%	
			Trade regulations	3%	
			Corporate income tax (CIT) rates	1%	
Sustainability	Countries with strict environmental standards and strong sustainability incentives align well with the company's value proposition	↑	Sustainability	7%	14%
			ESG	7%	
Innovation & digitalization	Indicates the readiness for adopting advanced supply chain solutions and manufacturing technologies	↑	VC funding	4%	11%
			Logistics index	4%	
			Digital readiness	3%	
Risk	Crucial to assess the likelihood of disruptions or adverse events that could impact business operations	↓	Political risk	3%	9%
			Country risk	3%	
			Investment risk	3%	

Legend: Positively correlated with attractiveness ↑ Negatively correlated with attractiveness ↓ Correlation depending on respective metric →

Figure 6: List of criteria categories for country ranking

In the next step, the model was populated with the researched data for each criterion metric[1]. After the model had been populated, missing values for each country were evaluated individually. For some missing values, where reasonable, assumptions or proxies were used to fill in the gaps. For example, the English language level for Ireland and the United Kingdom was manually set to the highest value, as English is their native language. Similarly, the English level of Cyprus was set equal to that of Greece, while for Latvia, the average of Lithuania and Estonia – the other two Baltic states – was applied. After manually adjusting some missing values, all remaining countries with more than two missing values were, as mentioned earlier, discarded from the model to ensure comparability of the country scores and prevent biased or inaccurate outputs.

For the scoring model, unlike the industry ranking model, the country ranking was performed

[1] (Dealroom 2024; Education First 2023; European Commission 2024a; IMD 2023; IMF 2024; Macrotrends 2023; OECD 2023; PWC 2024b; Risk Watch Initiative 2023; SDSN Europe 2023; The Culture Factor Group 2023; Haken et al. 2023; Tholos Foundation 2023; World Bank 2020; 2023; 2024b; 2024a; World Bank Group 2024)

using a quantitative approach on the criterion metrics level rather than the category level. This means that for each of the criterion metrics within the criterion categories, quantitative data was researched and put individually into the model. However, this also implies that the raw data in the model lacks comparability due to different measurement scales and directions of impact. To achieve comparability across all the criterion metrics, data standardization was conducted. For positively correlated criteria – those that increase country attractiveness for 3DWAYS – *Equation A-2* (see appendix) was used for standardization. This formula ensures that the highest value within each criterion is assigned a score of *100* (most attractive), while the lowest value is assigned a score of *1* (least attractive). An example of a positively correlated criterion is real GDP growth. Higher growth over the last five years makes a country, ceteris paribus, more attractive for 3DWAYS to enter. Conversely, for criteria with a negative effect on country attractiveness, *Equation A-3* (see appendix), was applied. In this case, the lowest value in the data set of a certain criterion equals the highest attractiveness for 3DWAYS. Hence, it is assigned a score of *100*, and the highest value in the data set is assigned a score of *1*. An example of a criterion with a negatively correlated impact is cultural distance. The lower the cultural distance from Portugal, the more attractive the target country becomes for 3DWAYS due to higher cultural similarities, all else being held equal.

Once the data set was standardized, the same scoring approach as for the industry ranking was applied. Each standardized value was multiplied with the respective criterion weight before summing up these products for each country, as previously shown in *Equation A-1*. The country scoring model helped reduce the number of countries, to be considered for further analysis, by 50%, resulting in a shortlist of 15 countries, which is presented in *Table 1*.

Rank	Country	Score	Rank	Country	Score
1	Germany	58.09	9	Iceland	48.00
2	Ireland	57.36	10	United Kingdom	47.87
3	Norway	54.47	11	Netherlands	46.55
4	Denmark	50.58	12	Estonia	45.65

5	Finland	50.13	13	France	45.45
6	Sweden	49.92	14	Lithuania	45.35
7	Switzerland	49.28	15	Belgium	44.60
8	Luxembourg	49.06			

Table 1: Country shortlist

The rationale for including 15 countries in the next step was to avoid being too narrow in the selection of countries and running the risk of analyzing the three selected industries in countries where the respective industries are of no or little importance or have only a minimal presence. For example, if only the top three countries had been selected (instead of the top 15), the combined ranking in the following chapter would have analyzed only the three selected industries in Germany, Ireland and Norway. However, it could be assumed that the healthcare & pharmaceuticals industry in Ireland is likely much smaller than in the UK, which only ranked tenth in the model. This would have resulted in the exclusion of the healthcare & pharmaceuticals industry in the UK from the subsequent combined ranking. By selecting a broader shortlist, this issue was avoided, ensuring that major European economies such as Germany, France, and the UK were included. Thus, the country shortlist serves as a pre-selection, ensuring that the basic country requirements mentioned before are met.

1.5 Combined ranking

To derive the final selection of the most attractive country and industry combination, a combined ranking was performed using both shortlists from the previous steps – the industry shortlist and the country shortlist.

The starting point for the combined ranking model was the longlist, comprising all possible combinations of the industry shortlist (electronics & technology, healthcare & pharmaceuticals, and consumer goods) and the 15 most attractive countries (as shown in *Table 1*). This resulted in 45 potential combinations, such as healthcare & pharmaceuticals in France or consumer goods in Norway. The complete longlist of these combinations is provided in *Table A-2*.

For the combined ranking model, two scoring criteria were considered: *(i) market size* and *(ii)*

market growth. Market size refers to the revenue generated in the respective market (industry and country combination) within a given year, measured in USD billion. For the model, the most recent actual (not projected) value, 2023, was taken. It is important to note that this market size figure reflects revenue from the sale of the finished product, representing the final step in the value chain. Therefore, it is not exclusively tied to manufacturing value in the respective market, as products could be manufactured elsewhere and then sold in that market. However, it can be hypothesized that added value from manufacturing constitutes a significant portion of the final value due to the high manufacturing activity in these industries, making market size a suitable proxy for 3DWAYS' attractiveness assessment.

The second criterion, market growth, was manually calculated by computing the CAGR using the 2023 market size values and the projected market sizes for 2029[2], as detailed in *Equation A-4* (see appendix).

The two scoring criteria – market size and market growth – were weighted at 40% and 60%, respectively, reflecting the assumption that 3DWAYS can more effectively attract new customers in fast-growing markets, where competition for market share is less intense. Regarding market size, it can be argued that due to 3DWAYS' size and growth ambitions, smaller markets can still be financially highly promising, which is why the easier entry associated with higher market growth outweighs the market size criterion.

Furthermore, to understand the combined ranking model, the composition of the three markets must be understood. To paint the most relevant and realistic picture of the markets for 3DWAYS, only niches exhibiting manufacturing activity and falling within 3DWAYS' scope were considered for the respective industries. For instance, in the healthcare & pharmaceuticals industry, only the medical technology niche was considered, as the other niches – such as

[2] In some cases, 2029 was not projected. In these cases, the CAGR until 2028 was computed.

hospitals, pharmacies, or pharmaceuticals (drugs) – either lack manufacturing activity and are therefore out of scope for 3DWAYS or were explicitly put out of scope by 3DWAYS (e.g., drug manufacturing). The final niches considered (and aggregated to calculate overall market size) and those excluded from the combined ranking model are detailed in *Figure A-4*.

Once the niches were defined, the model was populated using market reports from Statista Market Insights (2024)[3]. To derive the total market size and growth values for the top three industries in the top 15 countries, the sizes and growth rates of all niches deemed relevant before were summed up. Similar to the country ranking, the data was standardized using *Equation A-2* and *Equation A-3* to ensure comparability between the two criteria. Subsequently, scores were calculated in the same manner as in the two ranking models (industry and country) before.

Regarding the final combined ranking, it can generally be observed that most of the major European economies rank at the top. Notable exceptions include *Iceland* and *Belgium*. Reasons for this are that Iceland's *healthcare & pharmaceuticals* market is expected to grow the fastest among the countries considered, while Belgium's *electronics & technology* market demonstrates both relatively large size and strong projected growth, particularly in the robotics subsegment. Aside from these exceptions, *healthcare & pharmaceuticals* and *consumer goods* in countries such as *Germany*, the *UK*, and *France* emerge as the most promising markets to enter. The top ten country and industry combinations, along with their respective scores, are presented in *Table 2*. For the complete ranking, refer to *Table A-3* in the appendix.

Rank	Country	Score	Rank	Country	Score
1	Germany X Healthcare & Pharma	76.20	6	France X Consumer Goods	50.80
2	UK X Healthcare & Pharma	73.15	7	Belgium X Electronics & Technology	50.59
3	UK X Consumer Goods	69.10	8	France X Healthcare & Pharma	50.59
4	Germany X Consumer Goods	61.24	9	Germany X Electronics & Technology	47.39
5	Iceland X Healthcare & Pharma	60.40	10	UK X Electronics & Technology	47.19

Table 2: Top 10 combined ranking

[3] (Statista Market Insights, 2024a, 2024b, 2024c, 2024d, 2024e, 2024f, 2024g, 2024h, 2024i, 2024j)

Focusing on the top of the ranking, the top four combinations are healthcare & pharmaceuticals in Germany and the UK, as well as consumer goods in Germany and the UK. Since these combinations represent two industries in the same two countries, it was decided to include all four combinations in the subsequent in-depth analysis. This concludes the first part of the targeting process by having identified the four most attractive market segments for 3DWAYS based on the first two segmentation criteria introduced in *Chapter* ***Error! Reference source not found.***: geography and industry vertical. In the next step, these four markets will be analyzed in detail and further narrowed down to the industry vertical niche level. Moreover, the third and final segmentation criterion – company size and complexity – will be incorporated to finalize the targeting process before proceeding with the positioning and GTM strategy in *Chapter* ***Error! Reference source not found.***.

1.6 In-depth demand side analysis of selected markets

In the following subsection, the four selected country and industry combinations – place one to four in *Table 2* – will be analyzed from the demand side, focusing on customer preferences, trends, market conditions, and key players in the market that represent potential customers for 3DWAYS. This analysis examines each of the two industries – healthcare & pharmaceuticals and consumer goods – and further breaks them down by the two target countries, Germany and the UK. Subsequently, *Chapter 1.7* will analyze the supply side of these selected markets.

1.6.1 Healthcare & pharmaceuticals

As previously mentioned and shown in *Figure A-4*, the healthcare & pharmaceuticals market was tailored to align with 3DWAYS' business model and scope, focusing exclusively on the medical technology niche. This sector encompasses diagnostic, therapeutic, and health-improvement technologies and has experienced substantial growth in recent years, driven by high demand, favorable market trends, and supportive healthcare systems. Within the medical technology niche, two sub-niches were identified: in vitro diagnostics and medical devices.

Given 3DWAYS' prior experience and the significant size of the medical devices sub-niche, it emerges as a promising segment for 3DWAYS (Statista Market Insights 2024f).

1.6.1.1 Germany

The medical technology niche in Germany is experiencing notable growth and plays a significant role in the national economy. In 2023, this niche market generated €33.3 billion in revenue, with a CAGR of 3.9% since 2016, reflecting consistent and steady growth. The sub-niche in vitro diagnostics accounts for 10.6% of the total market, while medical devices comprise 89.4% of the German medical technology niche (Statista Market Insights 2024f).

Customer preferences in Germany indicate a strong inclination toward high-quality medical technology products that emphasize reliability, ease of use, and patient safety. Advanced features and precise diagnostic capabilities are also highly valued, creating an environment that supports innovative solutions. Digital health technologies, including telemedicine, wearable devices, and health-monitoring applications, have become prominent trends, further accelerated by the COVID-19 pandemic, which underscored the importance of remote healthcare services. Additionally, the growing focus on personalized medicine, including demand for tailored treatments such as genetic testing and precision diagnostics, continues to drive market growth (Statista Market Insights 2024f).

However, this market is also highly regulated, posing significant entry barriers. Companies must meet stringent standards, such as the EU's *Medical Device Regulation* (MDR), which requires comprehensive documentation, rigorous quality assurance, and extensive testing protocols to ensure patient safety and product reliability. These regulatory barriers make it difficult for new entrants to establish themselves quickly and require a deep understanding of compliance frameworks (International Trade Administration 2023). On the other hand, these challenges present an opportunity for 3DWAYS. Ensuring regulatory-compliant supply chains could become a key value proposition for clients navigating MDR requirements.

The competitive landscape in Germany includes several prominent players, with Johnson & Johnson, Abbott, Medtronic, Danaher, and Siemens Healthineers collectively holding approximately 26% of the market. Johnson & Johnson and Abbott lead with market shares of around 6% each. These companies contribute significant resources and large-scale innovations to the sector, fostering a competitive environment that drives further advancements in medical technology (Statista Market Insights 2024f). Moreover, these players are of interest to 3DWAYS, as they represent potential clients.

Looking ahead, the medical technology sector in Germany is projected to grow, with the market size expected to increase from €35 billion in 2024 to €45 billion by 2029, representing a CAGR of 4.9%. The medical devices sub-niche is anticipated to slightly outpace in vitro diagnostics, growing its relative share to 90.7% by 2029, see *Figure 7* (Statista Market Insights 2024f).

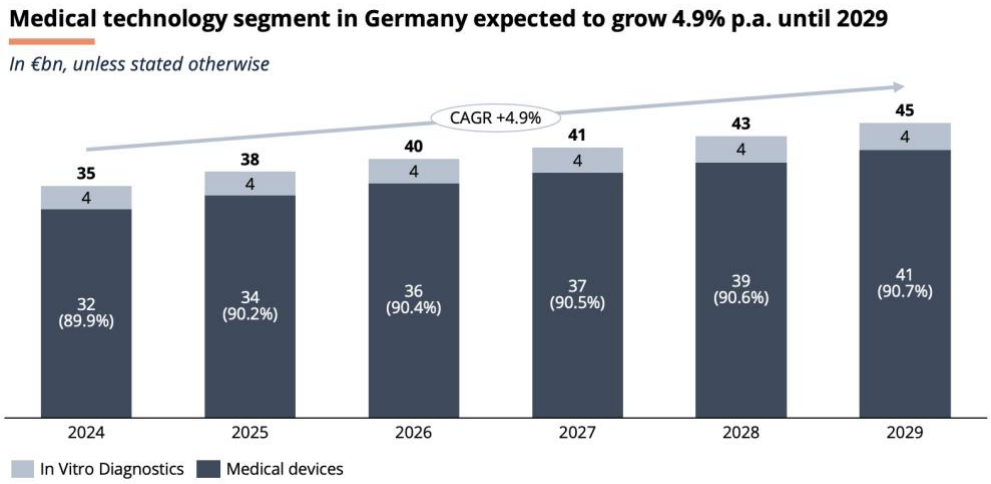

Figure 7: Projected market medical technology segment in Germany (based on: Statista Market Insights 2024f)

1.6.1.2 The United Kingdom

Similarly, the medical technology niche market in the UK is experiencing significant growth, driven by increasing customer demand for innovative healthcare solutions, emerging digital health trends, and the substantial influence of the *National Health Service* (NHS). In 2023, the UK's medical technology niche market generated €17.5 billion in revenue, with 90.7% attributable to medical devices sub-niche. A CAGR of 4.4% from 2016 to 2023 underscores the sector's steady expansion over the past years (Statista Market Insights 2024f).

Customer preferences in the UK closely align with those observed in Germany, as there is a high demand for advanced, user-friendly medical technologies. Digital health solutions, such as telemedicine and remote health monitoring, have also gained popularity in the UK, as patients and healthcare providers increasingly value accessibility and convenience in healthcare services (Statista Market Insights 2024f).

The NHS plays a key role in shaping the medical technology segment in the UK. As one of the world's largest healthcare systems, the NHS influences the adoption and reimbursement of new technologies. It has increasingly invested in digital health solutions and innovative medical technologies to enhance patient care and control healthcare costs, fostering a favorable environment for the introduction of new medical technologies (Statista Market Insights 2024f).

The competitive landscape in the UK mirrors that of Germany, with key players such as Johnson & Johnson, Abbott, Medtronic, Danaher, and Siemens Healthineers collectively capturing approximately 18% of the market. Additionally, SMEs contribute substantially to maintaining a dynamic and competitive market environment, promoting innovation and diversity in the UK's medical technology sector (Gov UK 2022; Statista Market Insights 2024f).

Projections for the UK medical technology sector indicate continued growth, with the market size expected to increase from €19 billion in 2024 to €26 billion by 2029, representing a CAGR of 6.7%, as shown in *Figure 8* (Statista Market Insights 2024f). While smaller than Germany's medical technology sector, the UK market is expected to grow faster over the next five years.

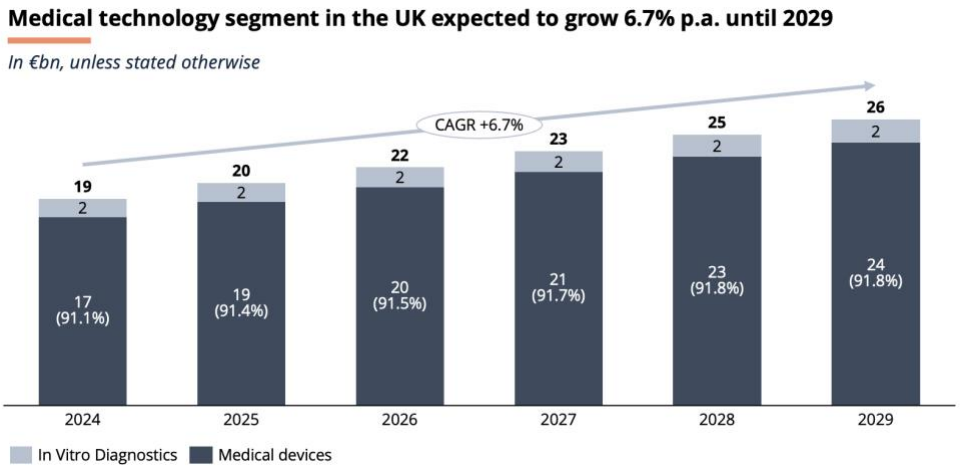

Figure 8: Projected market medical technology segment in the UK (based on: Statista Market Insights 2024f)

1.6.2 Consumer goods

As mentioned before, the consumer goods industry has also been tailored to align with 3DWAYS' scope. Only niches that align with 3DWAYS' service offering and include potential customers were considered. The included niches are *eyewear*, *accessories*, *household appliances*, *smart home products*, and *DIY & hardware store*.

1.6.2.1 Germany

In Germany, the consumer goods market generated revenue of €89.5 billion in 2023, achieving a CAGR of 5.9% since 2016. This growth has been driven by high disposable incomes, a strong emphasis on sustainability, and an increasing shift toward digitalization (Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h).

The German consumer goods market displays diverse growth trends across its niches, as shown in *Table 3*. The eyewear niche is expanding due to an aging population and rising screen time, increasing demand for vision correction and UV-protected glasses. Household appliances benefit from IoT-enabled features and energy efficiency, while DIY products see growth fueled by eco-consciousness and the rise of e-commerce. The smart home niche leads in growth, driven by enhanced device compatibility and 5G adoption. Accessories remain a stable niche too, supported by Germany's robust retail environment and evolving consumer preferences (Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h; Mordor Intelligence 2024).

Niche	Eyewear	Accessories	Household appliances	DIY & hardware store	Smart home
Market size (2023)	€7.7 bn	€10.2 bn	€12.6 bn	€51.2 bn	€7.2 bn
CAGR (2018-2023)	3.0%	2.0%	5.9%	5.7%	19.1%

Table 3: Market size and growth of consumer goods segments of Germany (based on: Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h)

Major players in the German consumer goods market include companies such as Amazon, Miele, Varilux, Esprit, LG, Siemens, Hoya, and Pandora. Additionally, SMEs account for approximately 50% to 60% of the market, contributing to a diverse and highly competitive market landscape that fosters both innovation and variety in product offerings (Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h).

Looking ahead, the German consumer goods market is projected to reach around €9 billion in eyewear, €11 billion in accessories, €16 billion in household appliances, €62 billion in DIY & hardware stores, and €13 billion in smart home products by 2029, as shown in *Figure 9*. This results in a total market size of €110 billion by 2029, representing a projected CAGR of 3.5% (Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h).

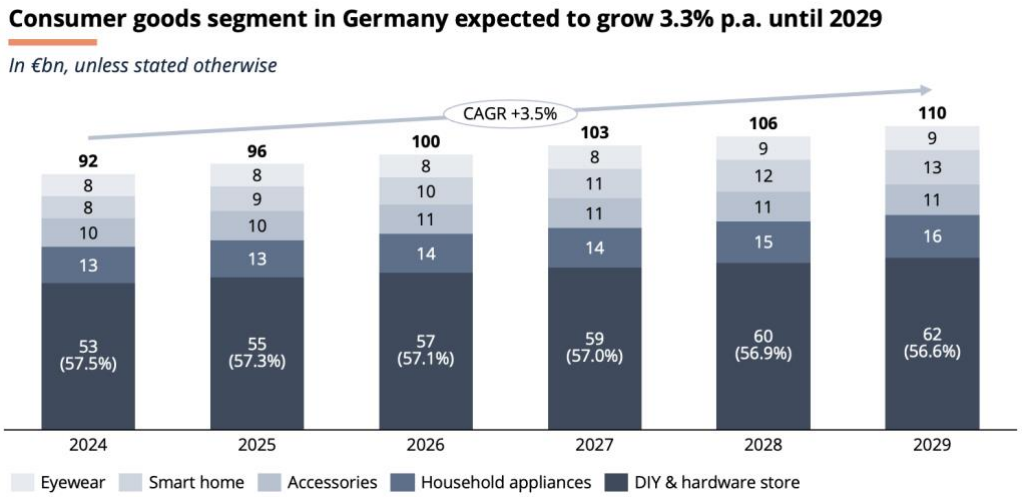

Figure 9: Projected market consumer goods in Germany[4] (based on: Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h)

1.6.2.2 The United Kingdom

[4] Projected market size of smart home of 2029 was extrapolated using the 2024-2028 CAGR due to missing value

The consumer goods market in the UK generated €69.1 billion in revenue in 2023, with a CAGR of 5.5% since 2018. Key market drivers include a growing focus on sustainability, increased wellness awareness, and an accelerated shift toward digitalization (Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h).

The UK's niche markets for household appliances, DIY & hardware stores, and smart home technologies are experiencing steady growth, as shown in *Table 4*. Post-pandemic trends, such as increasing sustainability awareness and digital innovation, are key drivers. In the household appliances niche market, consumers are increasingly investing in IoT-enabled devices that enhance convenience and technology integration, which also influences the smart home niche. The DIY niche benefits from a strong tradition of home improvement, with rising demand for eco-friendly and durable products alongside a notable shift to e-commerce. The smart home niche is expanding rapidly, exhibiting significantly higher growth over the last five periods, fueled by advances in interoperability and 5G networks. These developments are driving the adoption of energy-efficient and security-oriented solutions (Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h; Mordor Intelligence 2024).

Niche	Eyewear	Accessories	Household appliances	DIY & hardware store	Smart home
Market size (2023)	€5.2 bn	€13.8 bn	€9.4 bn	€31.8 bn	€8.8 bn
CAGR (2018-2023)	3.4%	5.4%	5.3%	3.2%	21.7%

Table 4: Market size and growth of consumer goods segments of the United Kingdom (based on: Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h)

Similar to Germany, the UK consumer goods market has global giants like Amazon, LG, and Siemens dominating the market (Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h).

Moreover, as *Figure 10* shows, it is projected to grow steadily, reaching €6 billion in eyewear, €16 billion in accessories, €12 billion in household appliances, €36 billion in DIY & hardware, and €17.4 billion in smart home products by 2029, with smart home leading at 12% growth (Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h).

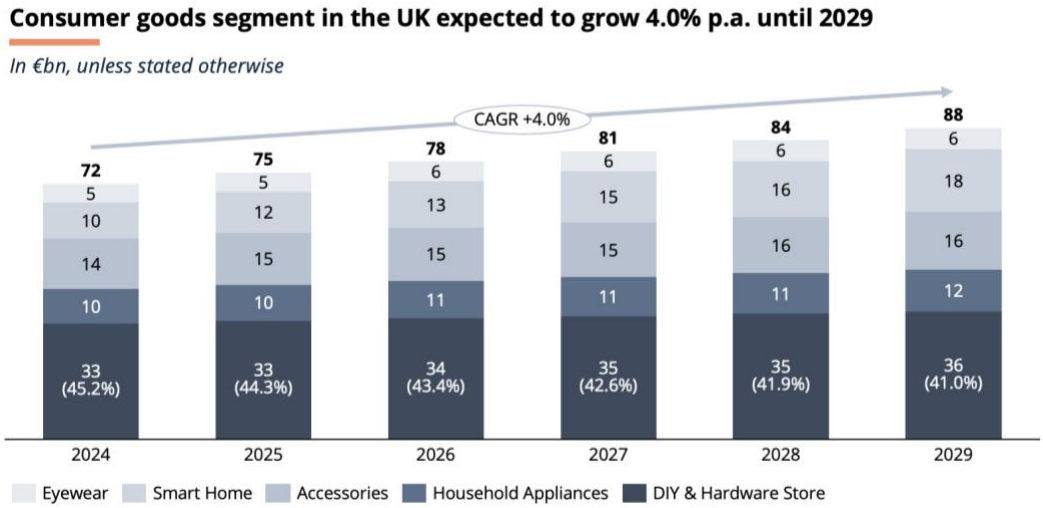

Figure 10: Projected market consumer goods in the UK[5] (based on: Statista Market Insights 2024a, 2024c, 2024d, 2024e, 2024h)

1.7 In-depth supply side analysis of selected markets

To fully understand the selected country and industry combinations, the conducted comprehensive analysis of the demand side – including customer preferences, trends, and key players – may not be sufficient. It is equally important to analyze the supply side, focusing on competitors to 3DWAYS. The next section addresses this by providing, first, a detailed benchmark of Xometry, one of the key competitors due to its size and overlap with 3DWAYS' business model, and second, brief overviews of three additional competitors active in the targeted markets and the end-to-end solution provider cluster.

1.7.1 Benchmark analysis of Xometry

This paragraph highlights in more detail 3DWAYS' closest competitor in the end-to-end solutions provider cluster, Xometry, which has already been introduced in *Chapter* ***Error! Reference source not found.*** and ***Error! Reference source not found.***. Xometry is a leading on-demand manufacturing platform that connects customers to a global network of manufacturers, targeting industries such as medical, aerospace and automotive, offering capabilities such as CNC machining, sheet metal fabrication and 3D printing. Xometry operates

[5] Projected market size of smart home for 2029 was extrapolated using 2024-2028 CAGR due to missing value

with a two-sided market model that generates revenue from both customers (buyers) and suppliers, which distinguishes its business model within the end-to-end solution providers cluster (Craft 2024; Xometry 2024, 2023).

Xometry's value creation lies in its speed and flexibility, leveraging an AI-driven instant quoting system for transparency and efficiency. Its global network offers a wide range of manufacturing services to meet industry needs (Craft 2024; Xometry 2024, 2023).

The company accesses value through a digital platform that enhances market visibility and simplifies access to suppliers. It uses online marketing, partnerships with large firms, and platform integration with engineering software to connect seamlessly with industry tools and its target market (Craft 2024; Xometry 2024, 2023).

Value is delivered through an AI algorithm that matches customer needs with ideal manufacturers, ensuring efficiency and quality (Craft 2024; Xometry 2024, 2023).

Xometry captures value through multiple revenue streams, which are fees from suppliers for client access, premiums for express services, and paid supplier memberships for enhanced platform visibility. This diversified model sets it apart from traditional manufacturing platforms as well as from 3DWAYS' monetization model (Craft 2024; Xometry 2024, 2023).

Overall, Xometry's global production network with over 10,000 manufacturers and diverse revenue streams paired with a broad service offering makes it a strong competitor. While 3DWAYS differentiates itself by offering more customizable services and a comprehensive one-to-one customer support with high vertical integration within the clients' supply chains, it relies primarily on a 10% supplier commission as its main source of revenue. This reliance is a limitation, as already mentioned in *Chapter* ***Error! Reference source not found.***, and worth to be re-evaluated in the future.

1.7.2 Other competitors

In addition to Xometry, more local competitors in Germany and the UK are Protolabs, Facturee,

and Kreatize which will be briefly introduced in the following.

Protolabs operates through a hybrid manufacturing model, combining its own digital production facilities with a network of vetted manufacturing partners. This approach allows them to offer rapid prototyping and low-volume production services, including 3D printing, CNC machining, sheet metal fabrication, and injection molding. Its in-house digital factories are located in the United States and Europe, enabling them to produce high-quality parts with quick turnaround times. To enhance its capabilities and provide greater flexibility, Protolabs also collaborates with a global network of over 250 manufacturing partners. This network allows them to offer advanced manufacturing options, tighter tolerances, and volume pricing for larger orders. Compared to 3DWAYS, Protolabs offers a more digital prototyping and manufacturing approach while 3DWAYS focuses more on individualized full-cycle services (Protolabs 2024).

Facturee is an online manufacturing platform connecting clients with over 2,000 vetted European suppliers. It specializes in CNC machining, sheet metal processing, and additive manufacturing, catering to industries like industrial equipment, consumer goods, and electronics. Facturee emphasizes flexibility and cost-efficiency, offering semi-automated quotations within 48 hours, valid for 14 days. Summarizing, Facturee employs a similar model to Xometry taking the position of a platform "agent", while 3DWAYS offers higher customizability as each customer is served individually on an end-to-end basis (Facturee 2024).

Kreatize is a cloud-based platform for the digital sourcing of custom parts, offering services like CNC machining and 3D printing. It streamlines supply chains, reduces time-to-market, and enhances efficiency for industries like manufacturing, electronics, and clean tech. With a subscription-based model and project-specific pricing, Kreatize provides detailed cost breakdowns, real-time tracking, and quality control, promoting transparency and sustainability. Like Facturee and Xometry, Kreatize operates solely as a platform provider and lacks the ability to deliver as tailored end-to-end solutions as 3DWAYS (KREATIZE 2024).

This concludes the high-level analysis of the most relevant competitors in the target niche markets. A positioning map including these four competitors is presented in *Figure A-5* (see appendix). While 3DWAYS already distinguishes itself through more individualized one-to-one solutions with higher vertical integration within the clients' supply chains, *Chapter* ***Error! Reference source not found.*** will further refine the positioning to ensure a clear differentiation from the four competitors. However, the project team faced limitations in terms of research and access to detailed data, which constrained the analysis of monetization and pricing models, industry and customers focus, market shares, and other points of differentiation. To address these limitations and gain a more granular understanding of the competitive landscape, it is recommended that 3DWAYS engages a market research institute or a SCM consultancy in the future. These organizations possess significant expertise in the industry, developed through numerous projects and have access to proprietary data sources that could provide critical insights.

1.8 Niche selection

After having analyzed the respective industry verticals and their niches in the two chosen countries in a detailed manner, the final niches to be targeted can be selected.

For healthcare & pharmaceuticals, only the medical technology niche was considered within the scope of 3DWAYS. This niche demonstrates both significant market size and above-average future growth (Statista Market Insights 2024f). Additionally, it aligns well with 3DWAYS' proven track record in medical devices. Therefore, medical technology was selected as the target niche for the healthcare & pharmaceuticals market in both Germany and the UK and will be considered for the GTM strategy in *Chapter* ***Error! Reference source not found.*** (3DWAYS 2024c).

In the consumer goods industry, from a market size perspective, the DIY & hardware store niche emerges as the largest in both countries. However, when looking at the future growth of

that niche, it only ranks among the lower-performing niches. Since it is assumed that acquiring customers is easier in fast-growing markets, and market growth has already been prioritized over market size in the combined ranking in *Chapter 1.5*, market growth was again given precedence over market size in this selection. Accordingly, the *smart home* niche was chosen as the target niche in the consumer goods industry vertical, as it is the fastest growing niche, with double-digit growth predicted for both countries (Statista Market Insights 2024a, 2024h, 2024c, 2024d, 2024e). Furthermore, 3DWAYS' pre-experience in both consumer electronics and smart cities can be leveraged, as it is assumed to have overlaps in needed competencies and capabilities with the smart home niche. *Figure A-6* shows a summary of all the analyzed niches and the highlights per niche and country.

1.9 Final targeting

To finalize the targeting process, the market segmentation criteria introduced in *Chapter* ***Error! Reference source not found.*** *– (i) country, (ii) industry vertical* and *(iii) company size & complexity* – need to be recalled. As outlined in the previous chapters, the criteria *(i)* country and *(ii)* industry vertical have already been addressed, with the industry vertical analysis even further refined to the industry niche level. This leaves defining *(iii)* company size & complexity as the remaining component.

A differentiation can be made between large corporations with complex supply chains, large corporations with simple supply chains, SMEs with complex supply chains, SMEs with simple supply chains, and others. As noted in *Chapter* ***Error! Reference source not found.***, 3DWAYS currently exhibits a high customer concentration. While this inherently poses a potential concentration risk, it also presents an opportunity for future expansion. Therefore, large corporates are recommended as the primary target for 3DWAYS to capitalize on their revenue potential. However, to mitigate the concentration risk, SMEs and startups should also be targeted to diversify 3DWAYS' customer portfolio. Consequently, large corporates should be

prioritized as the primary target to drive revenue, while smaller accounts should be assigned secondary priority to balance customer concentration. Regarding supply chain complexity, 3DWAYS can add value to both companies with complex and simple supply chains. However, it can be assumed that companies with complex supply chains face greater challenges and are thus more receptive to 3DWAYS' services. Accordingly, companies with complex supply chains are recommended to be targeted.

In summary, this results in a third targeting layer comprising large corporates and smaller accounts with complex supply chains. Finally, a comprehensive target for 3DWAYS can be drawn as shown in *Figure 11*. For these targets, the GTM strategy will be built in *Chapter* ***Error! Reference source not found.***.

Figure 11: Final targeting recommendation

2. CONCLUSION – GROUP PART

This thesis raised two guiding questions – *"Where to play?"* and *"How to win?"* – in the context of 3DWAYS' ambition to expand into the European sustainable manufacturing market. Through a structured analysis presented in five project phases, a comprehensive internationalization strategy has been developed. This has been achieved by, first, properly segmenting the sustainable manufacturing market, second, targeting the most promising market niches through ranking models and in-depth niche market analyses, and third, by choosing a suitable entry mode combined with a positioning and marketing strategy that differentiates 3DWAYS from its direct competitors and raises awareness among potential customers in the target markets.

The inside-out analysis highlighted 3DWAYS' core strengths in helping startups and large companies identify optimal manufacturing solutions, secure competitive prices, and achieve sustainability goals. Transitioning to an assetless model enhances flexibility and efficiency but increases reliance on partners. With a 29% EBITDA margin, the company demonstrates profitability, however still financially constrained due to high financial leverage and slim cash reserves. Furthermore, its concentrated customer base underscores the need for diversification. Additional challenges are the trust barrier faced by clients and the inflexible 10% commission.

The outside-in analysis identified favorable macroeconomic conditions for international expansion into the sustainable manufacturing market, with strong growth in Europe in industries such as healthcare, electronics, and consumer goods aligning with 3DWAYS' expertise. However, challenges like geopolitical risks and stricter regulations require proactive management. The outside-in analysis was concluded with the segmentation of the sustainable manufacturing market using three segmentation criteria, *(i)* country, *(ii)* industry vertical and *(iii)* company size and complexity.

The targeting process identified the most attractive market niches by leveraging qualitative and

quantitative attractiveness scoring models for industries, countries, and a combination of them. This resulted in targeting the medical technology and smart home niche in both Germany and the UK with a focus on large corporates and SMEs/startups with complex supply chains.

The go-to-market strategy centers on building credibility through partnerships, leveraging networks for client acquisition, and adopting tailored entry modes and marketing tactics to meet the specific needs of each market. These steps, paired with a refined positioning strategy, are designed to overcome trust barriers, ensure alignment with the overall business strategy, and differentiate 3DWAYS from competitors. Moreover, a robust risk management framework addresses the dependencies of the assetless model.

Finally, financial projections highlighted the attractiveness of the proposed strategy, forecasting profitability from year one, with robustness being tested using scenario and sensitivity analysis.

While the strategy and methodology are believed to be robust, this thesis also shows some limitations. Firstly, the chosen approach relied primarily on secondary data, limiting the precision of insights. Conducting primary research, such as interviews with potential clients and suppliers, would enhance the depth of the analysis. Additionally, the financial decision-making process for funding the expansion was not covered, leaving a critical aspect of strategic planning for future action. Finally, the implementation and monitoring phases were beyond the scope of this work, necessitating further efforts to validate and refine the proposed roadmap.

In conclusion, the strategy provides clear answers to *"Where to play?"* and *"How to win?"*. By targeting specific niches in Germany and the UK, leveraging its assetless model, and implementing a structured roadmap, 3DWAYS is well-positioned for sustainable growth. With further validation and execution, 3DWAYS can successfully tackle these niches and strengthen its position as a reliable partner in sustainable manufacturing and supply chain solutions.

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4. APPENDIX

Appendix Overview

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Appendix A. Table of contents

Appendix B. List of figures

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Appendix D. List of Abbreviations

AI.....*Artificial Intelligence*

CAGR.....*Compound Annual Growth Rate*

GTM.....*Go-To-Market*

IoT.....*Internet of Things*

MCDA.....*Multiple Criteria Decision Analysis*

MDR.....*Medical Device Regulation*

NHS.....*National Health Service*

SC.....*Supply Chain*

SCM.....*Supply Chain Management*

SM.....*Sustainable Manufacturing*

STP.....*Segmentation, Targeting, Positioning*

Appendix E. Formulas and explanations

$$Score = \sum_{i=1}^{n} (Criteria_i * Weight_i)$$

Equation A-1: Scoring formula

$$\sigma = (\frac{Variable - Min.\ Value}{Range}) * 99 + 1$$

Equation A-2: Data standardization for values with positively correlated impact

$$\sigma = (\frac{Max.\ Value - Variable}{Range}) * 99 + 1$$

Equation A-3: Data standardization for values with negatively correlated impact

$$CAGR = (\frac{Size\ 2029_{projected}}{Size\ 2023_{actual}})^{\frac{1}{6}} - 1$$

Equation A-4: Computation of CAGR

Appendix F. Industry ranking results

Industry attractiveness scoring

Industry	Industry fit with 3DWAYS' business model	Entry barriers for 3DWAYS (certification)	Industry potential (size and growth)	Profitability	Sustainability & regulation	Digital & technological readiness	Geographic presence across Europe	Overall industry attractiveness for 3DWAYS
Automotive & transportation	4	1	5	5	4	5	5	
Healthcare & pharmaceuticals	5	2	5	4	5	4	4	
Logistics & warehousing	3	4	4	3	3	4	5	
Electronics & technology	5	3	5	4	4	5	4	
Renewable energy	4	3	4	3	5	3	4	
Chemical & materials industry	3	2	4	4	4	3	4	
Construction & building materials	2	4	3	3	3	2	3	
Aerospace & defense	4	1	4	4	4	4	3	
Consumer goods	4	4	4	4	3	4	5	
Food & beverage	3	3	4	4	4	3	4	
Weight	**25%**	**20%**	**20%**	**10%**	**10%**	**10%**	**5%**	

Figure A-1: Industry ranking results

High-level rationales behind the industry attractiveness scores per criterion

Industry	Industry fit with 3DWAYS	Entry barriers for 3DWAYS (e.g., certifications)	Industry potential	Profitability	Sustainability & regulation	Digital & technological readiness	Geographic presence in Europe
Automotive & Transportation	**4** - High manufacturing complexity; 3DWAYS has experience in micro mobility and clean tech	**1** - High entry barriers due to stringent and lengthy certification processes, especially around safety and emissions standards	**5** - Significant market size and growth, especially in electric vehicles	**5** - Strong profitability with high EBIT margins	**4** - Growing sustainability focus (EVs, carbon-neutral production), high regulatory pressure	**5** - Highly digitalized, advanced supply chain automation	**5** - Strong presence across Europe, particularly in Germany, France, Italy, and the Nordics
Healthcare & Pharmaceuticals	**5** - Strong fit due to 3DWAYS' track record in medical devices, high manufacturing complexity	**2** - Significant regulatory hurdles, including medical device approvals and compliance with healthcare standards	**5** - Growing global demand, especially with aging populations and innovations in biotech	**4** - High profitability potential, however significant R&D and CAPEX investments required	**5** - Heavy regulatory scrutiny and sustainability requirements (e.g., medical waste management, quality, and safety standards)	**4** - Strong advancements in digital health and pharmaceutical supply chains	**4** - Well-distributed across Europe, with major hubs in Switzerland, Germany, and UK
Logistics & Warehousing	**3** - Moderate fit with supply chain management focus, but lack of manufacturing activity	**4** - Moderate barriers, mostly around logistics certifications and regional regulations, but generally easier compared to other sectors	**4** - E-commerce and global trade drive demand for warehousing	**3** - Profit margins are narrower compared to other industries, CAPEX-heavy	**3** - Moderate regulatory pressure, but sustainability focus is increasing with green logistics initiatives	**4** - Supply chain automation and digital warehousing management are increasing	**5** - High geographic spread with critical hubs across Europe
Electronics & Technology	**5** - Perfect fit due to 3DWAYS' expertise in consumer electronics	**3** - Entry barriers exist, such as compliance with electronic safety standards, but processes are relatively streamlined	**5** - Rapid growth in all sectors, including consumer tech, AI, and IoT	**4** - Highly profitable, but shorter product lifecycles and R&D costs can reduce margins	**4** - Growing regulatory pressure, especially on e-waste and carbon footprint of tech companies	**5** - Highly digitalized and automated, leading in industry 4.0 initiatives	**4** - Strong presence across Western and Northern Europe, though not as evenly distributed as other industries
Renewable Energy	**4** - Fit due to 3DWAYS' experience in clean tech and sustainability projects	**3** - Barriers related to energy certifications and environmental regulations, but generally manageable with existing 3DWAYS expertise	**4** - High growth driven by energy transition and decarbonization goals	**3** - Profitability still developing; high CAPEX/ R&D costs and government subsidies play a large role	**5** - Strong regulatory drivers pushing the sector to grow, heavy focus on sustainability and green energy standards	**3** - Moderate degree of digitalization, but improving with smart grid technologies	**4** - Geographic spread is growing as countries in Europe adopt green energy, with strong markets in Northern Europe

Figure A-2: High level rationale for industry ranking (1/2) (based on: Bromberger and Kelly 2024; Moulton, Exarchos, and Teichner 2024; Gao et al. 2024; Adams, Alldredge, and Kohli 2024; Siegel 2024; Levy 2024; Statista 2024a, 2024b; Statista 2022; Statista 2021; Statista 2020)

Chemical & Materials Industry	**3** - Some fit due to supply chain management focus, but not 3DWAYS' core sectors	**2** - High regulatory oversight due to safety and environmental concerns, requiring extensive documentation and approval processes	**4** - Moderate growth driven by innovation in materials and sustainability needs	**4** - Highly profitable but CAPEX-intensive due to production plants	**4** - High regulatory pressure related to environmental impacts, including emissions, waste management, and pollution	**3** - Some sectors are advancing in automation, but overall slower digitalization	**4** - Strong industry presence across major EU countries, especially in Germany and Benelux
Construction & Building Materials	**2** - Low fit, not aligned with 3DWAYS' core focus on smaller technological products, less supply chain complexity	**4** - Lower entry barriers, mostly focused on meeting building codes and standards, which are easier to navigate	**3** - Moderate growth driven by urbanization, but also cyclical	**3** - Profitability is moderate with high CAPEX costs for materials and equipment	**3** - Sustainability pressure is rising, but regulatory frameworks vary widely	**2** - Digital adoption is slow in this industry compared to others	**3** - Good presence in certain markets, but highly fragmented depending on the country
Aerospace & Defense	**4** - Good fit due to high supply chain complexity, though high specialization needs to be considered when assessing the fit	**1** - Very high entry barriers with extensive safety certifications, military standards, and compliance requirements	**4** - Steady growth with high government spending, innovation in defense technologies	**4** - Highly profitable but also high CAPEX needs	**4** - Stringent regulations and rising sustainability pressure (e.g., eco-friendly fuels, materials)	**4** - Advanced digitalization, particularly in defense supply chains	**3** - Good presence in Western Europe, but more concentrated in key countries (e.g., UK, France, Germany)
Consumer Goods	**4** - Good fit due to high manufacturing and supply chain management activity, but lower complexity in manufacturing	**4** - Relatively low barriers, focused on consumer safety and labeling requirements, which are easier to handle	**4** - Strong growth in FMCG, especially in e-commerce-driven sectors	**4** - Strong profitability in D2C, moderate profitability in retail segment, though highly competitive and margins vary	**3** - Regulatory pressure varies by sector, rising interest in sustainability certifications for packaging and production	**4** - High degree of digitalization in supply chains, particularly in retail sectors	**5** - Widespread presence across Europe, particularly in Western and Northern Europe
Food & Beverage	**3** - Moderate fit, but less aligned with 3DWAYS' niche focus on technological devices	**3** - Moderate barriers, including health and safety certifications, but generally less restrictive than other heavily regulated industries	**4** - Steady growth driven by consumer demand for sustainability and health-conscious products	**4** - Profitability is good, especially for larger companies, but margins can be thin due to pricing pressures	**4** - Rising focus on sustainability in packaging and production, driven by consumer demand	**3** - Moderate degree of digitalization, but lagging behind more advanced industries	**4** - Strong presence across Europe, though fragmented across markets

Figure A-3: High level rationale for industry ranking (2/2) (based on: Bromberger and Kelly 2024; Moulton, Exarchos, and Teichner 2024; Gao et al. 2024; Adams, Alldredge, and Kohli 2024; Siegel 2024, 2024b; Statista 2024a, 2024b; Statista 2022; Statista 2021; Statista 2020)

Appendix G. Country longlist

#	Country
1	Austria
2	Belgium
3	Bulgaria
4	Croatia
5	Cyprus
6	Czechia
7	Denmark
8	Estonia
9	Finland
10	France
11	Germany
12	Greece
13	Hungary
14	Iceland
15	Ireland
16	Italy
17	Kazakhstan
18	Latvia
19	Lithuania
20	Luxembourg
21	Malta
22	Netherlands
23	Norway
24	Poland
25	Romania
26	Slovenia
27	Spain
28	Sweden
29	Switzerland
30	United Kingdom

Table A-1: Country longlist

Appendix H. Combined longlist

#	Country X industry combination
1	Healthcare & Pharmaceuticals X Germany
2	Healthcare & Pharmaceuticals X Ireland
3	Healthcare & Pharmaceuticals X Norway
4	Healthcare & Pharmaceuticals X Denmark
5	Healthcare & Pharmaceuticals X Finland
6	Healthcare & Pharmaceuticals X Sweden
7	Healthcare & Pharmaceuticals X Switzerland
8	Healthcare & Pharmaceuticals X Luxembourg
9	Healthcare & Pharmaceuticals X Iceland
10	Healthcare & Pharmaceuticals X United Kingdom
11	Healthcare & Pharmaceuticals X Netherlands
12	Healthcare & Pharmaceuticals X Estonia
13	Healthcare & Pharmaceuticals X France
14	Healthcare & Pharmaceuticals X Lithuania
15	Healthcare & Pharmaceuticals X Belgium
16	Consumer Goods X Germany
17	Consumer Goods X Ireland
18	Consumer Goods X Norway
19	Consumer Goods X Denmark
20	Consumer Goods X Finland
21	Consumer Goods X Sweden
22	Consumer Goods X Switzerland
23	Consumer Goods X Luxembourg
24	Consumer Goods X Iceland
25	Consumer Goods X United Kingdom
26	Consumer Goods X Netherlands
27	Consumer Goods X Estonia
28	Consumer Goods X France
29	Consumer Goods X Lithuania
30	Consumer Goods X Belgium
31	Electronics & Technology X Germany
32	Electronics & Technology X Ireland
33	Electronics & Technology X Norway
34	Electronics & Technology X Denmark
35	Electronics & Technology X Finland
36	Electronics & Technology X Sweden
37	Electronics & Technology X Switzerland
38	Electronics & Technology X Luxembourg
39	Electronics & Technology X Iceland
40	Electronics & Technology X United Kingdom
41	Electronics & Technology X Netherlands
42	Electronics & Technology X Estonia
43	Electronics & Technology X France

44	Electronics & Technology X Lithuania
45	Electronics & Technology X Belgium

Table A-2: Combined longlist

Appendix I. Niches for combined ranking

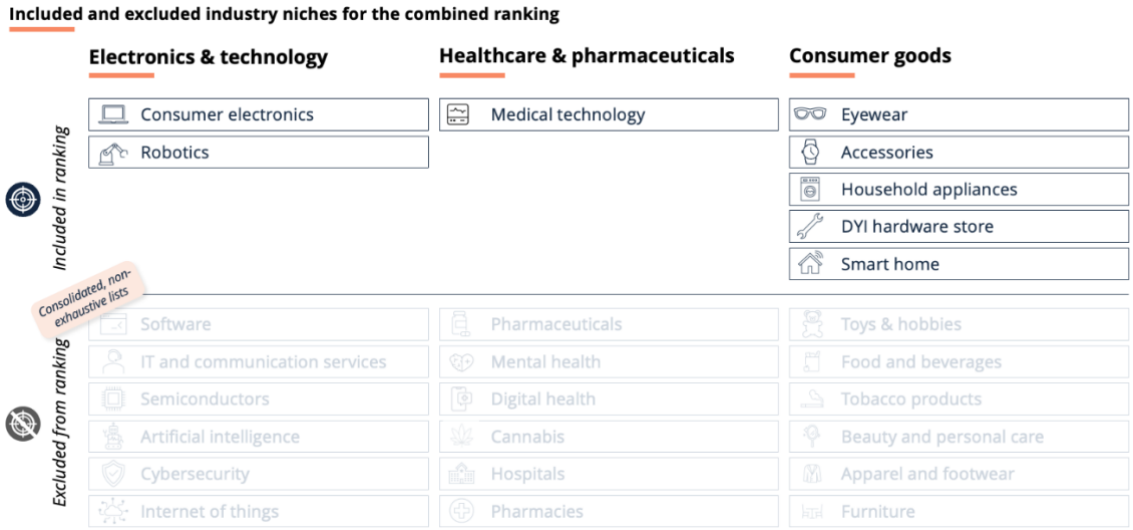

Figure A-4: Industry niches for combined ranking (based on: Statista Market Insights 2024b; Statista Market Insights 2024i; Statista Market Insights 2024j)

Appendix J. Full combined ranking

Rank	Country	Score
1	Healthcare & Pharmaceuticals X Germany	76.20
2	Healthcare & Pharmaceuticals X United Kingdom	73.15
3	Consumer Goods X United Kingdom	69.10
4	Consumer Goods X Germany	61.24
5	Healthcare & Pharmaceuticals X Iceland	60.40
6	Consumer Goods X France	50.80
7	Electronics & Technology X Belgium	50.59
8	Healthcare & Pharmaceuticals X France	50.59
9	Electronics & Technology X Germany	47.39
10	Electronics & Technology X United Kingdom	47.19
11	Healthcare & Pharmaceuticals X Netherlands	46.79
12	Healthcare & Pharmaceuticals X Lithuania	46.50
13	Healthcare & Pharmaceuticals X Sweden	45.63
14	Healthcare & Pharmaceuticals X Switzerland	45.44
15	Healthcare & Pharmaceuticals X Estonia	43.63
16	Electronics & Technology X France	39.93
17	Electronics & Technology X Sweden	39.48
18	Consumer Goods X Estonia	39.37
19	Healthcare & Pharmaceuticals X Finland	38.93
20	Healthcare & Pharmaceuticals X Luxembourg	38.58
21	Healthcare & Pharmaceuticals X Denmark	38.16
22	Healthcare & Pharmaceuticals X Ireland	36.20
23	Healthcare & Pharmaceuticals X Belgium	36.02
24	Electronics & Technology X Netherlands	33.75
25	Healthcare & Pharmaceuticals X Norway	32.01
26	Consumer Goods X Netherlands	31.69
27	Consumer Goods X Sweden	31.25
28	Consumer Goods X Lithuania	31.09
29	Consumer Goods X Switzerland	30.94
30	Consumer Goods X Denmark	30.66
31	Consumer Goods X Luxembourg	28.05
32	Consumer Goods X Iceland	26.44
33	Electronics & Technology X Switzerland	25.88
34	Consumer Goods X Belgium	24.02
35	Consumer Goods X Norway	23.70
36	Consumer Goods X Finland	22.59
37	Consumer Goods X Ireland	22.44
38	Electronics & Technology X Norway	16.56
39	Electronics & Technology X Luxembourg	15.70
40	Electronics & Technology X Finland	14.27
41	Electronics & Technology X Lithuania	10.90
42	Electronics & Technology X Ireland	8.72
43	Electronics & Technology X Iceland	7.47

44	Electronics & Technology X Denmark	6.99
45	Electronics & Technology X Estonia	1.16

Table A-3: Full combined ranking

Appendix K. Current positioning map in the target markets

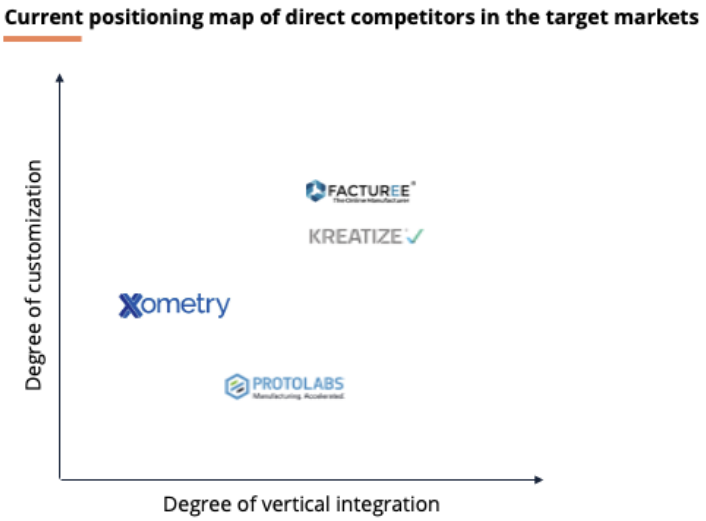

Figure A-5: Current positioning of direct competitors in the target markets (based on: Xometry 2024; Protolabs 2024; Kreatize 2024; Facturee 2024)

Appendix L. Summary of all the analyzed niches

Niche selection

Country	Industry	Industry niche	Size (2023)	Growth (2023-2029)	Highlights
Germany	Healthcare & pharma	Medical technology	€36.0 bn	5.0%	Reasonable growth, alignment with pre-experience
	Consumer goods	Eyewear	€7.7 bn	3.0%	Rather small as well as only moderate growth
		Smart home	€7.2 bn	19.1%	Fastest growing segment with tailwinds and substantial market size
		Accessories	€10.2 bn	2.0%	Only slow growth and small market size
		Household appliances	€12.6 bn	5.9%	Big market, but only moderate growth
		DIY & hardware store	€51.2 bn	5.7%	Big market, but only moderate growth
The United Kingdom	Healthcare & pharma	Medical technology	€18.9 bn	6.7%	Substantial growth and size, alignment with pre-experience
	Consumer goods	Eyewear	€5.2 bn	3.4%	Slow growth and rather small market size
		Smart home	€8.8 bn	21.7%	Fastest growing segment with significant market size
		Accessories	€13.8 bn	5.4%	Substantial market size
		Household appliances	€9.4 bn	5.3%	Both moderate growth and market size
		DIY & hardware store	€31.8 bn	3.2%	Big segment with slow growth

Legend: Selected niches

Figure A-6: Summary of all subsegments/niches regarding size and growth (based on: Statista Market Insights, 2024f, 2024d, 2024a, 2024e, 2024c, 2024h)