
How can Somitra B.V. Bridge the Gap between Potential Customers and their Product Solution within the German Market?

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Market Size & Trends

Chapter 1

1.1 Market Overview

A smart water meter measures the flow of water passing through businesses or residential sites in the same manner as a standard water meter does. Smart water meters, on the other hand, offer numerous benefits, including real-time data, wireless technology, smart water analytics, advanced analytics, and the removal of manual readings. These capabilities make it simple to track water consumption and costs in real time for residential and commercial properties. A thorough comparison of water loggers, water meters, and the variations between utility meters, AMR, and the most recent AI driven smart water meter will be illustrated in this section.

1.1.1 Standard Water Meters - A water meter is an instrument that monitors how much water flows through a certain area. A water meter, for example, can be used to calculate bills and analyze consumption through measuring the amount of water that enters a property, or a section of a property, over a period of time. Meters are also widely used to keep track of energy and gas use.

1.1.2 Functionality - Water meters operate in line with two separate concepts, rate of flow and volumetric flow.

- **Rate of Flow Meters:** In these meters, flowing water turns a propeller whose rotational speed (rpm) is measured. A certain propeller speed corresponds to a particular flow rate. The propeller speed indicator may be calibrated right away using this data. A counting device that totals the number of propeller spins is used to indicate the quantity of water consumed.
- **Volumetric Meters:** A rotating container with a predetermined capacity is continuously submerged in water and then drained in this type of meter. The amount of water that flows through the meter is indicated by the number of spins. Volumetric meters can be used to monitor low flow rates.

1.1.3 Smart Water Meters - As mentioned before, the process of estimating water consumption is known as water metering. However, Smart water meters monitor how much water is consumed in both commercial and residential sites that are connected to the public water supply. Therefore, Water utility providers recently started deploying smart meters that allow real-time monitoring of water use. Utilities can track water consumption to get more accurate billing information faster. The most common technology used by utility companies for this is Automated Meter Reading (AMR), which has the primary objective of making meter reading easier for the utility company. Those instruments are also used to figure out how much fluid is going through a certain system component. Water meters exist in a range of different forms and dimensions. They differ in terms of flow measurement, end-user type, required flow rates, as well as accuracy requirements. Smart water metering is an advanced digital application that allows water utilities to obtain usage data in real-time, which catalyzes efficiency, terminates manual meter reading, and saves significant costs. Furthermore, the Smart water metering system uses wired, wireless, and internal connection communications technologies, such as a Wi-Fi water meter, to link LAN or wide area networks, allowing for remote location monitoring and infrastructure improvements including leak detection. In addition, in the industrial, residential, and commercial sectors, the smart water metering system can be utilized to accurately bill water, energy usage, and natural gas. Furthermore, across a water utility's supply chain, smart electronic water meters are equipped with next-generation water mapping tools that provide reliable services and solutions.

1.1.4 Automated Meter Reading - Water utilities utilize Automated Meter Reading (AMR) technology to automatically obtain water use and status data from water meters as a communication medium. Walk-by or drive-by AMR systems are the two sub-categories of AMR systems. A meter's encoder register is associated with an endpoint. These devices serve as a link between the end-customer and the provider. Human meter readings are no longer required because consumption data is supplied directly from your meter to your provider. AMR can only capture data once a day, with some doing so every 30 minutes, which is insufficient given the availability of AI-powered real-time metering technology. The

ineffectiveness of AMR technology falls behind the fact that a single communication path is provided thus, the utility business reaps the majority of the advantages, not the end user, whether residential or commercial.

1.1.5 Advanced Metering Infrastructure - Advanced Metering Infrastructure (AMI) has launched a ground-breaking smart water meter system that provides the end user with optimum benefits. Once the system is installed, it provides real-time water monitoring and visibility to the end user. AMI technology, unlike AMR, makes use of Artificial Intelligence to enable the end user to have a complete control and insights about their own consumption, which can be monitored in real time rather than having to rely on manual reports. In a nutshell, AMI technology provides a two-way communication path which is the ultimate differentiator between AMI and AMR technologies. Major players in the industry are now turning to AMI technology.

1.1.6 Smart Metering Advantages - As water is a finite commodity, consumers must be more attentive to their usage. This is one of the main reasons why smart water meters are gaining popularity on a global scale. These instruments, in general, aid in better water management, enabling end-users to cut costs on water bills. Some of the main advantages of smart metering are listed below.

- **Precise Readings:** Compared to traditional water meters, smart water meters deliver accurate readings. This signifies that if you install a smart water meter, you'll only be charged for the actual amount of water you consume each month. This is both economical and reliable.
- **Water conservation & Sustainable Development:** End-consumers are more aware of how much water they consume when they install smart water meters. These devices can also notify customers if your water use is abnormal. They may identify leaks and notify end-users as well as utilities about excessive water usage. In this manner, if there is a leak, the water valves seal automatically.
- **Costs Reduction:** Water conservation entails lowering end-consumers water usage. Water use reductions will be reflected in bills as well. End-consumers can access their water consumption statistics at any time when using a smart water meter. Smart water meters can lead to cost savings on water bills by providing real-time data on end-users' consumption. In other words, Smart meters enables end-users to change their behavioral patterns in terms of consumption.
- **Leakage Detection:** Water leaks might go undetected for a long period until a hefty water bill is received. With the aid of smart water meters, end-users may notice surges in their water usage as soon as possible.
- **High Return on Investment:** Smart water meter installation costs would be more than offset by savings in leakage treatment, network administration, and the removal of the requirement for alternate water suppliers. Due to the attractive return on investment, overall expenses paid to water suppliers would be reduced, resulting in decreased water bills and maintenance expenses over time.

The growing rate of urbanization and industrialization is likely to generate more opportunities for global market players in the coming years. Moreover, many supportive government initiatives across the European region are raising consumer awareness of the benefits of smart water meters as well as the sustainable use of water, which is expected to boost the global water meter market in the near future. In addition, the integration of multiple technologies such as IoT – *Internet of Things* in the water metering industry is adding to the region's widespread use of smart water meters. In the next years, this is projected to tremendously boost the expansion of the regional water meter market.

1.2 Market Size

The global Smart Water Meter Market Size is currently booming and is estimated to increase at a 11.9% CAGR - *Compound Annual Growth Rate* from 4.55 billion EUR in 2020 to a steady rise of 5.84 billion in 2021 and is expected to reach 11.12 billion EUR in 2027 as shown in *figure 1*. In 2020, the European smart water meter market has reached a market value of 556 million EUR. In 2020, the German market led the European smart water meter industry, and it is projected to remain so through 2027; the German market is estimated to be valued at 2.0 billion EUR in 2027.

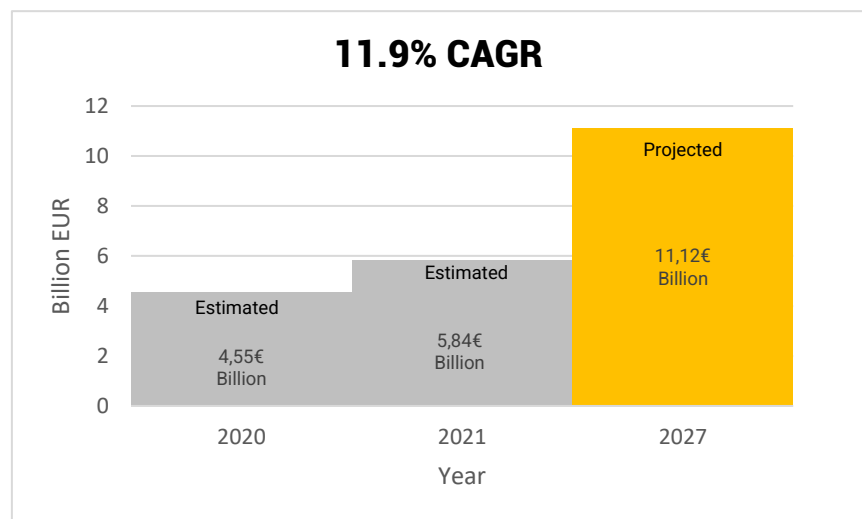


Figure 1 - Compound Annual Growth Rate - Global Market

1.3 Market Drivers

1.3.1 Sustainability - Governments in various countries, particularly in Germany, are taking the necessary steps to improve water sustainability. These measures are being taken as a result of an exponential increase in water demand over the previous decade, with a growing German population of 83.24 million people and increased urbanization, resulting in a drinking water network length of 500,000 km, indicating a residential consumption of 122 l/cap/d. As a result of the rising water demand, new businesses and employment opportunities have emerged. Sustainable use has become a key aspect in meeting current and future water demands. These systems can track water consumption across a water utility's supply chain and are currently the best available option on the market. As a result, the number of water utilities adopting this new technology has significantly increased, propelling the smart water metering market forward on a global scale.

1.3.2 Economic Upheaval - Market growth is fueled by precise billing and a financial benefit to the customer. Smart water meters are not only efficient in terms of functionality, but they are also cost-effective for both water utilities and customers. These meters are a one-time expenditure that will last for several years with minimal maintenance. Customers are attracted to precise billing since they are being charged according to the water they have consumed only. This prevents the possibility of miscommunication between the service provider and the end-user. Moreover, these installations benefit industries that demand large quantities of water, such as the food and beverage sector, the textiles industry, and others.

1.4 Market Segmentation

1.4.1 By Application - Residential, commercial, and industrial applications are the three main segments of this market. As in previous years, the residential sector will continue to dominate the market. Due to expanding population and urbanization in many countries, the main driver of this expansion will be the increase of customers in the industry. Every region has a significant amount of municipal water; thus the residential sector uses the majority of it. The residential sector's growing consumer base will lead to its dominance in the global market. After the residential sector, the industrial and commercial sectors are the second most significant application area, with water being one of the most essential materials and coolants in many sectors worldwide.

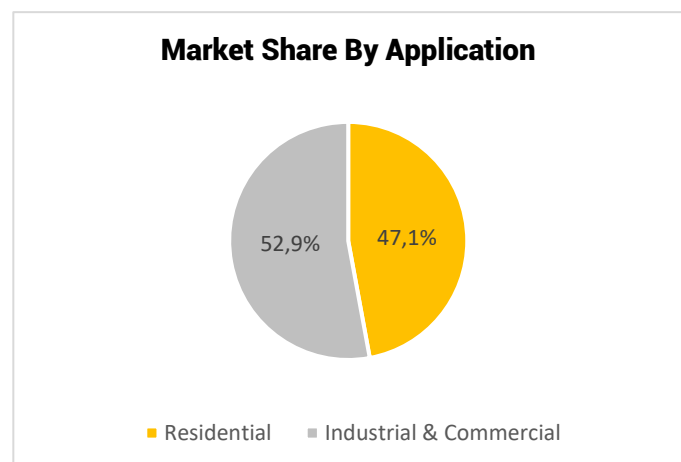


Figure 2 - Market Share by Application – Global Market

1.4.2 By Technology - This market is divided into two categories based on technologies, initially, Automated Meter Reading (AMR), secondly, Advanced Metering Infrastructure (AMI). The advanced metering infrastructure sector has a smaller market share than auto-meter reading at the moment, but due to the operational benefits of a two-way communication system and enhanced data accuracy, AMI technology will dominate the smart water meter market share in the coming years. As Automated meter reading meters only have a one-way communication system from the utility to the customer, they are not preferred in current smart water metering rollouts. As a result, major market players are currently tailoring and switching their metering technologies to Advanced metering infrastructure. The distinction between the two technologies is adequately explained in Section 6.4 of Chapter 6.

1.4.3 By Meter Type - The market has been segmented into the following classifications based on meter type Ultrasonic meters, Electromagnetic meters, and Mechanical meters. The ultrasonic flow meter market is expected to grow at a CAGR of 6.5% to 1.9 billion EUR by 2024, from an estimated 1.3 billion EUR in 2019 as illustrated below in *table 1*.

As shown in *table 1*, the ultrasonic flow meter market is divided into three sub-categories based on measuring technology, transit-time, doppler, and hybrid. Because of its bi-directional (AMI) and exact flow measurement characteristics, the transit-time is anticipated to have the greatest market share with the fastest rising market. Currently, it accounts for 80 to 85% of the global market share. In comparison to doppler and hybrid technologies, transit-time is cost effective. It is primarily used in the oil and gas, as well as the water and wastewater industries, to monitor liquid and gas flow.

Meter Type			
Ultrasonic Meter			Electromagnetic Meter
			Mechanical Meter
Transit-time	Doppler	Hybrid	

Table 1 - Market Segmentation – Meter Type

German manufacturers are gaining significant market share by offering solutions that today's consumers demand. Leakage has been a growing and common problem in recent years; in Germany, a water pipe bursts every 30 seconds. In 2019, 1.1 million cases of tap water damage were documented, totaling over 3 billion EUR. As a result, accurate flow monitoring has become essential. Devices that can maintain and display precise findings have become vital. In recent years, demand for transit time ultrasonic flow meters has increased in Germany and neighboring countries. Because of the increased popularity and knowledge of sustainable water usage, this trend will continue to improve sales figures in the coming years.

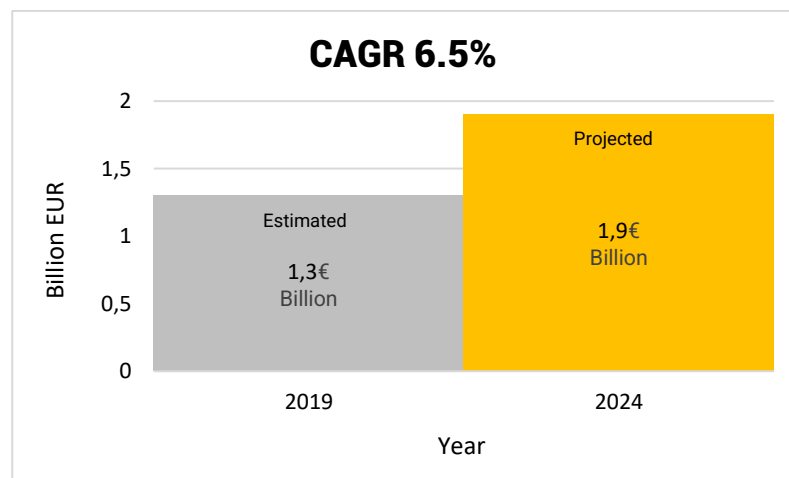


Figure 3 - Compound Annual Growth Rate – Ultrasonic Flow Meter Market

Macro-environmental Analysis

Chapter 2

Political

- Municipalities are responsible for public water supply and sanitation in Germany. (Opportunity)
- The German government subsidizes research and development (R&D) activities through financial aid to reinforce the German economy. (Opportunity)

Economical

- Rising in Disposable Incomes. (Opportunity)
- Rocketing Economic growth rate in Germany. (Opportunity)

Social

- End-users are increasingly turning to smart meters to monitor and analyze actual water consumption and collect data on usage habits. (Opportunity)

Legal

- Smart meters must comply with the standard European data retrieval and data protection standards and legislation. (Opportunity)

Ecological

- Germany is among the most industrialized countries in terms of environmental protection. As part of its long-term growth plan, Germany prioritizes environmental standards as a part of its sustainable development strategy. (Opportunity)

Technological

- The rising use of digitalization in the German water sector is driving demand for new innovative solutions that boost efficiency and enhance water systems' standards. (Opportunity)
- Competitors are adopting smart meters with comparable functionalities. (Threat)

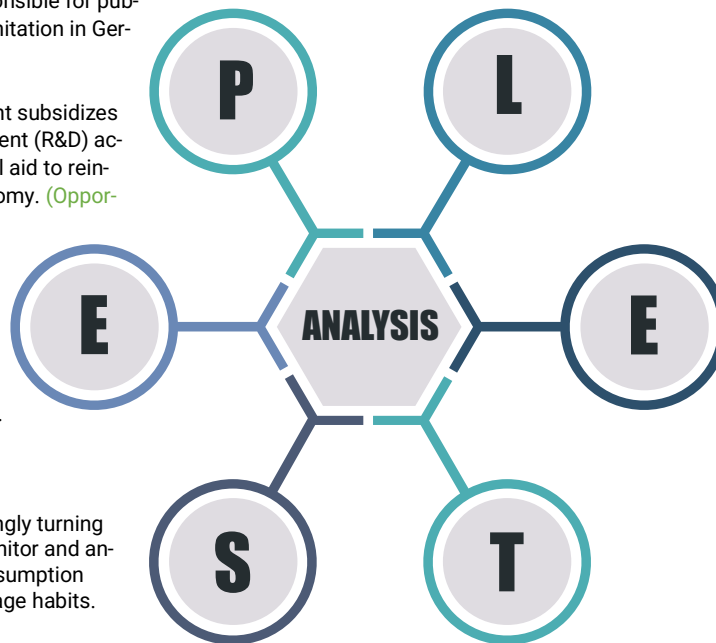


Figure 4 - PESTEL Analysis Framework

2.1 Political Factors

2.1.1 The Role of the State - Municipalities are always required to provide drinking water and dispose of wastewater under the Länder regulations, demonstrating that water supply is strictly regulated by government entities. As a result, several constitutional provisions of the Länder permit various organizations to undertake water-related projects within the area; nonetheless, projects are conducted on the municipalities' own initiative as part of their organizational sovereignty. There are five different types of business to government (B2G) operations that are authorized within the region. The most prominent type is "Eigengesellschaft", which allows private enterprises to participate in water-related projects in Germany alongside the municipality as shareholders.

2.1.2 Governmental Policies - Boosting research and development (R&D) activities is among the most important areas of growth for the German economy. Therefore, there is a key focus of financial assistance accessible in Germany. The public sector is committed to spend roughly 3% of national GDP on R&D each year. This equates to more than EUR 100 billion in annual R&D investment. The German government has also started an extraordinary push to encourage the creation of innovative technology. This effort is known as the "High-Tech Strategy," which brings together the resources of all government departments to devote roughly EUR 6 to 7 billion per year which are formulated in project grants to the development of cutting-edge technologies.

2.2 Economical Factors

2.2.1 Personal Disposable Income - Germany's booming economy yields a colossal opportunity for Somitra B.V. to expand and thrive, as the Personal Disposable Income (PDI) in Germany recorded an all-time high of 524.66 EUR billion in the fourth quarter of 2021. Personal disposable income measures the financial escalation of households and the amount of money that could potentially circulate the economy through consumer spending. According to 2021 estimates, a vast majority of the population recorded at 99% is linked to public drinking water supply networks and 97% of the population are accessible

to sanitation. The residential water consumption per capita is projected to be 122 liters per day which means that water supply and wastewater disposal and treatment cost German consumers per capita to spend on average 0.9% of their personal disposable household income. This opens the window of opportunity for Somitra B.V. to launch its product within the region and forecast a high sales quota as a result of rapid consumer spending which is derived from increased personal disposable income due Germany's booming economy.

2.2.2 Business Cycle - According to figures given by the Federal Ministry of Economic Affairs and Climate Action, Germany's GDP declined by 4.6% in 2020. GDP then rose at a pace of 2.7% in 2021, slightly higher than the 2.6% projected last October, according to the most current estimates. The German government expects that the service industry will grow by 3.6% in 2022. This representation of economic output and growth offers an opportunity for Somitra B.V. to debut its product in Germany during this period, taking note of the region's economic development.

2.3 Social Factors

2.3.1 Consumerism - The concept of digitalization is progressively gaining traction in Germany's water sector. With the rapid advancement of digitalization, businesses are frequently confronted with the question of how existing structures and practices will alter. In this regard, the focus is not just on hypothetical efficiency improvements, but also on how current data may be smartly connected together to provide information for Water companies in order to enhance services and offer added value for consumers and municipalities. The presence of sensors to system components such as pumps, water storage vessels, and the pipeline network, as well as the resulting capabilities for collecting and processing data in real time, will open up a completely new application possibilities for improving system understanding, control, and monitoring of water in various processes. An example worth highlighting in this context is water loss control. With the assistance of digitalization, communication with consumers may take on a whole new dimension. Furthermore, the usage of digital water meters can improve the efficiency and transparency of water consumption management for consumers.

2.4 Technological Factors

2.4.1 Technological Advancements - As wastewater treatment is becoming more complex and costly, it is essential to examine how to allocate available water resources in urban areas, especially during dry periods. In order to supply alternative water resources for various uses, urban water management will need to assess water usage and consumption per capita in the future. This requires technical linkage that necessitates the use of smart digital systems which can reliably read meter data for each residential unit. As a result, the German water sector is continuously driving demand for new innovative solutions that use digitalization to enhance efficiency and improve water system standards.

2.4.2 Product Comparability - In the German market, sensor manufacturers are increasingly offering data portals and evaluation systems as a complete bundle. However, the selection of sensors that are appropriate for the installation conditions, the installation, and the testing of the sensor technology, as well as the visualization of sensor data via dashboards such as leakage monitoring or consumption data, are all factors to consider. These features may either be a significant opportunity for players that can cover the entire spectrum in a service package or a threat for players who may fall behind the competition owing to the unmatched standards of the German water systems.

2.5 Ecological Factors

2.5.1 Sustainable Development - Germany's long-term growth plan prioritizes environmental standards as part of its sustainable development strategy since it is one of the most industrialized nations in terms of environmental protection. This facet offers Somitra B.V. a significant opportunity to introduce its product to the region. Somitra's digital water meter offers four major environmental benefits that perfectly align with Germany's sustainable development goals. Among the benefits is a signal alert to water supply providers if any unusual water consumption occurs. Furthermore, the product does not necessitate the use of radio bandwidth or any virtual network in order to operate. Ultimately, the meter's

electromagnetic waves are nearly halved, making it environment friendly. Viewed in this way, the above characteristics are in line with Germany's environmental protection regulations.

2.6 Legal Factors

2.6.1 Data Protection - Smart metering refers to a new generation of innovative and intelligent metering systems that can record the water consumption of a particular measurement point in ten minutes or even shorter intervals. These so-called smart meters may also communicate and transmit data to the product supplier over any communication network in real time or at least on a regular basis for various purposes such as monitoring consumption rate or signalling irregular consumption activities as mentioned previously. As a result, the product supplier must adhere to the regulatory requirements for the deployment of smart meters in Germany. There are primary regulations that must be carefully considered. Initially, the General Data Protection Regulation (GDPR) which is derived from the Data Protection Directive and has officially replaced the Data Protection Directive on May 25th, 2018, by adding new regulations which now took effect and is known as GDPR. Because Somitra B.V. is situated in the Netherlands, the Smart Water Meter complies and aligns impeccably with the German data protection principles and legislation, requiring the data controller to process metering data in line with the European data protection standards. Hence, Somitra B.V. has the opportunity to extend their business into the German market without confronting legal issues that might hinder the process of expansion.

2.6.2 General Data Protection Regulation (GDPR) - While there are various advantages of smart metering, it imposes a serious threat on data privacy and security. The shift from a system in which meters were manually examined on a comparatively infrequent basis primarily for billing purposes has significantly transformed to a system in which meters are remotely controlled on a continuous basis for a variety of objectives, which risks end-consumers to privacy issues. The ability to acquire precise information on individual water consumption use and trends in the most private settings such as households, might result in significant violations of consumer privacy, whether directly through smart metering processes or indirectly through data theft. There are 3 major concerns to be discussed that directly influence data protection in Germany. Initially, the compliance of privacy and data protection regulations relies on when and where smart metering incorporates personal data. Under these circumstances, it follows that certain actors will be designated as data controllers, with the responsibilities that come with that role. Ultimately, the limitations of data processing are then outlined.

- **Personal Data:** The question of whether or not, the data gathered by smart metering systems inaugurate "personal data" under EU data protection law is the starting point for the applicability of privacy and data protection laws. Personal data is defined as "any information relating to an identified person, directly or indirectly, in particular by reference to an identification number or to one or more factors specific to his or her physical, physiological, mental, economic, cultural, or social identity" - *Article 2 of the Data Protection Directive*. The main consideration is that the data can be connected to a person, not that it may reveal insights into the lives of private individuals. Which means that smart metering might involve the gathering and processing of identifier data, for instance, meter number or other data that identifies an individual as acknowledged by WP29 and the European Commission. Personal data in this context refers to data that is related to an individual, whereas data intended to analyse network performance or data that is not linked to persons, such as office buildings and residential units, is not considered as personal data.
- **Data Controller:** When personal data is involved, one or more parties will be considered as "Data Controllers" for that data. According to Article 2 of the Data Protection Directive, a Data Controller is defined as "any natural or legal entity, governmental authority, agency, or other organization that decides the purposes and the means of processing personal data alone or jointly with others." The data controller is responsible for ensuring that data protection legislation is appropriately followed, as well as providing data subjects (anyone whose personal data were collected) with the rights that they are entitled to under data protection legislation, such as access, alteration, deletion, and refutation. As a result, the question is who among the various entities qualifies as a data controller? WP29 has speculated that the supplier would be a data controller in any case, according to the

regulatory framework. However, other entities may serve as data controllers if they are responsible for installing and maintaining smart meter systems. In most cases, suppliers are typically in charge of installation and maintenance; therefore, they operate as data controllers.

- **Role:** After data controllers have been identified, they must put the rights of data subjects in relation to the personal data they are processing into practice. The responsibility to notify data subjects about the processing of their personal data according to the data protection directive, necessities data controllers to install and maintain meters. Furthermore, explain to data subjects what data is being collected from the meter and how it is utilized. Additionally, data controllers must respect data subjects' rights to access and, when necessary, amend or erase information about them. End-consumers, for example, might have instant access to their water consumption statistics. This might be accomplished through a display on the smart meter and/or an available functionality on the smart meter that the user could link to his or her device, such as a smartphone or laptop to monitor his/her consumption rate in real-time. If indirect online access is required, for instance, through the smart metering system operator's Wide Area Network (WAN), it should be assured that the data maintained by such parties is only accessible by the end-consumers only through secured online apps.
- **Data Processing Limitations:** Once personal data is involved, and the data controller has been determined, Data Protection legislation limits the capacity to treat personal data by requiring Data processing to be done within certain limits due to a number of legitimate reasons outlined in Article 7 of the Data Protection Directive. Consent, contractual constraints, fulfilment of public tasks, legal requirements, and the data controller's legitimate interests are among the limitations. In Germany, the precise role of Data Processing has yet to be clarified and specified. This makes determining the legitimacy of data processing challenging. Personal data, for example, cannot be reprocessed for a reason that is inconsistent with the original reason for which it was gathered. In other words, processing for the sake of contractual duties, for example, would simply cover billing only. Processing for public purposes may include the installation of smart meters to reduce overall water usage, but not the processing of personal data collected by these meters. Processing in accordance with legal responsibilities may include the installation of smart meters if required by law, but not the processing of personal data produced by the meters.

To summarize, Germany's authority to regulate smart metering must be utilized within the boundaries of EU data protection legislation. Because metering data, especially when acquired at short intervals, might expose sensitive information on specific individuals, smart metering necessitates a reconsideration of the concept of personal data. Smart metering is now widely accepted in Germany as including personal data. However, data processing must be justified in light of one of the data protection legislation's mentioned objectives. Data controllers, on the other hand, are responsible for ensuring that legislation is followed in order for end-users to practice their rights.

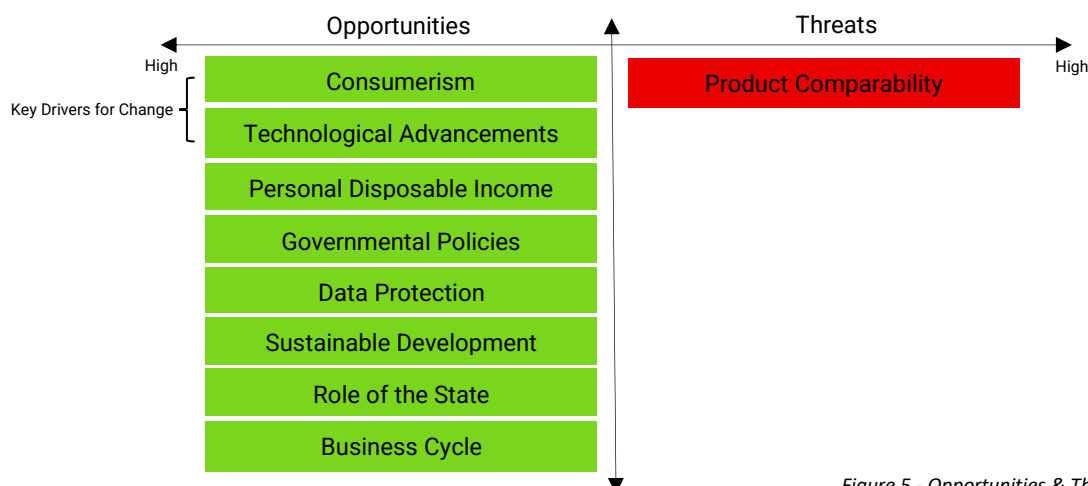


Figure 5 - Opportunities & Threats

2.7 Key Drivers for Change

2.7.1 Preferencing Inclination for High-quality Services - Consumerism. The German water sector is largely switching to digitization as it benefits from the use of smart metering systems in four major dimensions. To begin with, DWM-derived data are advantageous in encouraging residential areas and businesses to use less water and distribute demand during peak periods. Moreover, allowing consumers to observe their consumption rate encourages them to better understand their usage habits and make changes to minimize their consumption rate. Additionally, a continual flow of water, for example, might signal a leak that needs to be repaired. All of the above addresses the first dimension, which is natural resource conservation.

Cost effectiveness is a key dimension as many water providers find that the prospect of replacing a complete metering system is daunting and impractical. Thus, DWMs have the advantage of being easily installed onto existing meters. This allows German municipalities to make a smoother shift to the smart solution.

Thirdly, Better customer involvement and connections are made possible by smart metering. Customers are fully equipped to take control of their water usage when local government entities supply them with additional information about their consumption. Moreover, certainty of customers regarding water measurements and accurate invoicing will be achieved. With these advantages in mind, it's no wonder that utility companies and organizations are turning to DWMs as a simple way to save operating costs and water waste.

Ultimately, manual meter reading dissipates an enormous amount of time; therefore, having an automated module enhances efficiency while assuring precise measurements.

2.7.2 Expansion of Smart Meters Utilization - Technological Advancements. Smart water metering is getting prominent in the German water industry. Water shortages, leak detection, water conservation, customer billing, and pipe fault detection have accelerated the development and adoption of DWMs. Stakeholders are rapidly investing in digitization as the overall smart water meter market is projected to tremendously increase by 7.7% between 2020 and 2026. Investments in smart water metering are expected to rise from \$2.9 billion in 2020 to \$4.6 billion by 2026, according to a study published by Global Industry Analysts. Germany is projected to be among the top five countries leading the market besides Canada, China, Japan, as well as the United States. As water leakages cost the water industry \$39 billion in lost revenue each year, Smart Metering emerges as an interconnected technology that is shaping a driving force for change for utility companies, local governments, and enterprises.

Industry & Sector Analysis

Chapter 3

Threats of Substitutes

- New services based on big data, machine learning, and artificial intelligence technologies may pose a direct threat on current DWMs. (Moderate Force)
- Competitors are providing equivalent products at cheaper costs, but consumers' switching costs are outweighed by equipment reliability and brand recognition. (Moderate Force)

Bargaining Power of Suppliers

- There are only a few significant suppliers of regulated high-end equipment and services necessary for testing and installing DWMs, making switching costs higher for buyers. (Strong Force)
- Pumps and associated water related services are very standardized in Germany due to the nature of the water infrastructure. As a result, suppliers gain significant bargaining power in terms of pricing rare and essential equipment that tests and aligns DWMs with the German water infrastructure. (Strong Force)



Threats of Entry

- Digitalization in the water sector is rapidly growing and becoming extensive in industrialized countries such as Germany, which leaves limited room for new entrants. (Moderate Force)

Bargaining Power of Buyers

- Monitoring day to day water use operations is critical for both water providers and end-consumers. Therefore, customer's purchasing power is constrained. (Weak Force)
- The quantity of buyers has a significant impact on the power of buyers. Although an efficient water system is increasingly demanded by all businesses and individuals, the pool of potential buyers is exceptionally wide, reducing the bargaining power of buyers. (Weak Force)
- Buyers are left with limited options when it comes to choosing a supplier since obtaining regulatory permissions that ensures product suitability is difficult. (Weak Force)

Competitive Rivalry

- Product performance, reliability, and ingenuity of product, service, and solution, application expertise and process knowledge, brand reputation, water efficiency, product compliance with regulatory and environmental requirements, product lifecycle cost, scalability, timeliness of delivery, proximity of service centers to customers, effectiveness of distribution channels, and price are all big determinants in the competitive landscape in the German water sector. (Strong Force)

Figure 6 - Porter Five Forces Framework

3.1 The Threat of Entry

3.1.1 Incumbency Advantages - The high fixed costs of more complicated product design, embedded technology, and numerous layers of new IT infrastructure are significant barriers for new competitors in the smart water metering sector within Germany. Broadening product definitions can impose even higher barriers to entry. When agile incumbents acquire important first-mover advantages by gathering and consolidating product data and using it to enhance and redefine an after-sales service, barriers to entry grow. DWMs have the potential to significantly boost customer loyalty and switching costs, pushing entry barriers even higher. In that sense an imposing threat challenges Somitra B.V. as a new entrant in the German Market. However, Somitra B.V. can mitigate threat by leveraging economies of scale to reduce fixed costs per unit. In addition, investing in research and development and building capacities. As defining Digital water meter standards on continuous basis, decreases the window of opportunity for new operatives to make remarkable profits, discouraging new entrants into a dynamic sector.

3.2 The Threat of Substitutes

3.2.1 Price & Performance Ratio - Smart water metering system solutions can easily outperform traditional substitutes in terms of performance, scalability, and customer value, minimizing the threat of substitution and boosting industry growth and profitability. DWMs, on the other hand, produce new sorts of substitution risks in the German water sector, such as larger product capabilities that subsume other DWM products on the market. Industry profitability decreases when a new product satisfies comparable customer needs in different ways. Somitra, on the other hand, can withstand this imposed threat by being service oriented rather than just being product oriented in order to provide more added value to consumers. Furthermore, raising consumers' switching costs through economies of scale, in which more units are produced on a larger scale with lower input costs. As a result, Somitra B.V. may lower

pricing and on the long term and primarily focus on product development that continuously align their product with their customers' core needs to weaken the threat of arising substitutes.

3.3 The Bargaining Power of Buyers

3.2.1 High Switching Costs - Smart water metering systems significantly increase product differentiation potential, shifting competition away from price alone. Knowing how end users benefit from the product improves the company's capability to segment customers, customize DWMs, set pricing to capture more value, and provide value-added services. Smart water meters also enable corporations to build much stronger customer connections by gathering rich historical and product-usage data; as a result, the cost of switching to a new supplier rises; consequently, weaken or eliminate purchasers' bargaining power. Buyers in the German water industry are demanding for a large number of units, particularly in urbanized regions where water consumption is utterly high. The aim is to get the best possible deal by spending the least amount of money feasible. In the long run, this poses a strain on Somitra's profitability. The smaller and stronger Somitra's customer base is, the greater the customers' bargaining power and the capacity to demand growing discounts and offers. Somitra, on the other hand, can limit this risk by establishing a large customer base through Product Differentiation. Operating in the German market as a product differentiator is beneficial in two ways. It will reduce customers' bargaining power and provide the company the chance to streamline its sales and production processes.

3.4 The Bargaining Power of Suppliers

3.4.1 Concentration of Suppliers - Traditional supplier relationships are being shattered, and their bargaining power is being re-distributed across new suppliers. Physical components can be commoditized or even replaced by software over time as the smart and connection components of DWMs give a greater value than physical components, as is now the case. Software also decreases the requirement for physical tailoring; hence, the amount of physical component variations decrease as well. Traditional suppliers' contribution to the overall traditional metering systems cost will inevitably shrink, as well as their bargaining power. The new smart water meter products, on the other hand, will introduce new powerful suppliers that manufacturers have never required before, Suppliers now are providing sensors, software, connectivity, embedded operating systems, data storage, analytics, and other components of the DWMs technological stack. As a result of the concentration of suppliers, an imposed force is threatening Somitra B.V.'s operations in the German market; as a consequence, it is required to create an effective supply chain with diverse suppliers. Additionally, test the product's efficiency using other materials so that if material's prices skyrocket, the corporation may transition to another. Ultimately, develop dedicated suppliers who rely solely on the firm. Suppliers' bargaining power is severely reduced when their business is completely dependent on a single corporation.

3.5 Rivalry between Existing Competitors

3.5.1 High Fixed Costs - Smart water meters have the potential to shift competition through differentiation and providing value-added services. Smart water meter providers can widen their value proposition beyond the product per se by incorporating improved service offerings. Counteracting this shift in competition away from pricing, means that DWMs' cost structures are shifting toward greater fixed costs and reduced variable costs. This is due to greater software development upfront expenses, more complex product design, and high fixed costs associated with establishing the suitable technological stack, which includes reliable connectivity, robust data storage, analytics, and security. Firms that strive to spread their fixed costs across a larger number of units sold are sensitive to pricing pressure.

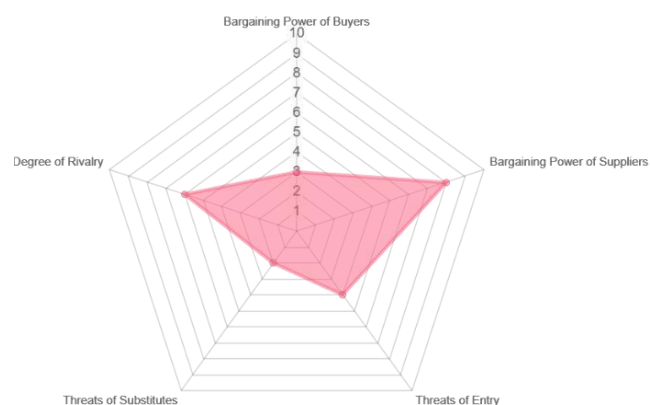


Figure 7 - Forces Driving Competition – Radar Plot

3.6 Strategic Groups Analysis

Strategic group analysis examines the competitive positions of players, as well as the underlying factors that determine their profitability and the competitive dynamics of the industry. A strategic group mapping study is depicted in *figure 8*. Within this two-dimensional chart, the most critical competitive features are displayed in order to distinguish strong rivals from inferior competitors based on performance. Each organization's Product-Line Breadth is shown on the vertical axis. The amount of product lines a corporation offers in terms of smart water metering systems, components, and services is referred to as product-line breadth. The horizontal axes show sales revenue for all metering industry players in Germany in 2021. More details about each organization featured is available in the competitive landscape shown in the following chapter. *Figure 8* shows that the breadth of these firms' product lines is not the most crucial element in shifting competition; nonetheless, based on the sales figures stated, brand awareness and business agility are the most important factors in the metering sector. Sensus, as shown in *figure 8*, does not have the broadest product range, but it does have the largest sales revenue among all players due to its large geographical coverage and product reliability, which is accomplished through a strong brand recognition as well as meeting customer demands. Sensus has a global presence in over 150 countries, providing its products and services a high level of reliability for its target audience to select over any other alternative accessible in the German market, especially that all firms provide equivalent products that perform similarly.



Figure 8 - Strategic Groups Mapping Analysis


Competitive Landscape

Chapter 4

Company Name	ZENNER International GMBH & Co. KG				ZENNER
Location	Römerstadt 6 66121, Saarbrücken, Saarland Germany				
Description	The headquarters of ZENNER International GmbH & Co. KG are in Saarbrücken, Saarland, Germany. The firm creates, manufactures, and sells metering and metrology technologies for global markets. Those technologies incorporate apartment, residential, and bulk-water meters; Moreover, heat meters, gas meters, and current system technologies such as radio-systems (wireless-bus, LPWAN for Internet of Things, GSM) and M-Bus systems, all part of the company's production line. With their own IoT (internet of things) business, Zenner initiated the transition into digitalization in 2016. Zenner has been supplying fully integrated IoT solutions for smart metering, smart utilities, and smart cities since 2018. These solutions are built from unique sensor devices, connectivity, fixed networks, IoT-cloud-services, and IoT-applications. ZENNER has production locations in Europe, Asia, and the United States, and is represented globally by 40 local companies. Since 2005, the firm has been a member of the family-managed corporate group Minol-ZENNER, which was formed in 1903.				
Business Focus	Smart Metering – Mag Meters & Ultrasonic	Gas Meters	Heat Meters	AMR/AMI Systems Technology – Stealth Reader System	
Products & Services	Water Meter Measuring Capsule Minolist 2"	Bulk Water Meter WSD/WSDE	Bulk Water Meter WSD/WSDE	Woltman Well Water Meter WB-N	
	Water Meters MTKD-M (-CC) & MTKD-N	Water Meter MNK-ST	Minomess Water Meter with Lo-rawan Interface	Water Meter 45 with 45 Inclined Dial	
	Positive Displacement Water Meter RTKP-MF-M-CC	Residential Water Meter MNK-N	Corrugated Stainless Steel Tubing & Connectors	Water Meters ETKD-L With Polymer Plastic Housing	
	Piston Type Water Meter RNK-RP-N	Water Meter MNK-RP-N With Protected Rollers	Connection Interface Type IST for Heat & Cooling Meter	Water Meter ETKDI/ETWDI	
	Ultrasonic Bulk Water Meter IUW	Compound Water Meter WPVR	Minomess Water Meter with Wireless M-Bus-Interface	Water Meter MTKD-L-N & MTKD-L-M	
	Water Meters MTKD-M-ST & MTKD-N-ST	Compound Water Meter WPVM	Water Meters ETKD & ETWD	Residential Water Meter MTKD-S	
	Hot Water Meter MTWD-M-ST & MTWD-N-ST	Bulk Water Meter WPD/WPHD	Positive Displacement Meter RTKD-M & RTKD-M-CC	Water Meter MTKD-M-FA & MTKD-N-FA	
	Bulk Water Meter WPD/WPHD	Dirt Filter for Bulk Water Meters	Positive Displacement Meter RTKD-L-M & RTKD-L-N	Residential Water Meter MNK-L-RP	
	Hot Water Meter MTWD-M-CC & MTWD-N	Ultrasonic Bulk Water Meter IUW	Water Meter ETKD R160	MNK-MF-N	
	Hot Water Meter MTWD-FA-M & MTWD-FA-N	Ultrasonic Flow Sensor IUF	Bulk Water Meter WPH-N-CC 90	Residential Water Meter MNK-N-FA	
	Residential Water Meter MNK-L/MNK-L-N	Piston Type Water Meter RNK-L-RP-N	Measuring Capsule Replacement Program	Water Meter Valve Meter Type MC	
	Water Meter MTK-S 45 with Inclined Dial	Water Meter Bathtub Meter Type MC	Universal Meter M22 for Installation Lengths From 110 to 190mm	Washstand Water Meter	
	Water Meter for Tap	Sensors for Woltman Bulk Water Meters	Adjustable Compensating Pieces for Bulk Water Meters	Irrigation Water Meter Woltman WI-N	
	Mobile Wireless M-Bus Radio System	ZENNER Flush Mounting Block 2"			
Employees	2,300 Employee				
Revenue	230 million EUR				
Competitive Advantage	Experts & Innovators in Water Metering Technologies - ZENNER has a history of water metering experience for 116 years and is represented in over 90 countries. ZENNER has regional expertise around the world, as well as local support partners, which allows them to understand the market and its requirements. As a result, the firm is able to provide and support solutions that are suitable for its clients all over the world.				
	Innovative Measuring Technologies - ZENNER's measuring technology meets all requirements for product service life, precision, and the ability to integrate meters into modern communication solutions, enabling municipal utilities, energy providers,				


	real estate companies, and industrial companies to complete all measurement tasks now and in the future. ZENNER measuring tools provides their clients with added value as they are offering solutions that are sustainable and future ready.
	Innovative Communication Technologies - ZENNER provides assistance with remote reading system planning, installation, and operation. The firm offers two new options for wireless remote reading for water meters, heat, and cooling energy meters: as well as gas meters through the wireless M-Bus system and the stationary LoRaWAN® IoT radio system, in addition to the hardware for wired M-Bus solutions.
Target Audience	Customers of Zenner include Municipalities, Power companies and public utilities; as well as industrial firms, wholesalers, and measurement service providers.

Table 2 - Zenner – Competitive Landscape

Company Name	Kamstrup 					
Location	Skanderborg, Denmark					
Description	Kamstrup is a prominent and leading manufacturer of smart energy and water metering system solutions across the world. Kamstrup's excellent expertise, leadership and partnerships have served as the cornerstone for their cutting-edge technological advancements in energy, heat, cooling, and water solutions. They collaborate with energy and water corporations, utilities, and submetering firms to develop new revenue streams and inspire smarter and more responsible solutions for the communities they serve. Placing their customers at the center of everything they are doing, understanding the needs, and anticipating future challenges allows them to continuously develop and innovate product ranges of hardware, software, and services, such as consumption meters, communication infrastructure, meter data management systems, smart grid applications, hosted solutions, and tools utilized for data analysis. Employees work for the organization in more than 20 countries across the world as Kamstrup is represented in more than 60 countries. Every day, Kamstrup smart meters are installed in households and businesses throughout the world, allowing the delivery of more intelligent, reliable, and cost-effective solutions to monitor and control energy and water supplies.					
Business Focus	Smart Water Metering	Smart Heating Metering	Smart Electricity Metering	Smart Cooling Metering	Sub-metering	
Products & Services	Water Meters	Modules	Accessories	Pressure Sensors	Meter Software	Meter Reading
	FlowIQ 2200 EU	Radio Module for Multical 41	READY Gateway	Kamstrup Pressure Sensor	Meter-Tool Water	RF Concentrator
	FlowIQ 3200 EU	Wireless M-Bus Module for Radio Network	Pit antenna	Kamstrup Valve	Meter Tool X	READY Converter Advanced
	FlowIQ 3100	ZigBee Module for Multical 601/602/61	Wall antenna			READY Manager & READY App
	FlowIQ 2101	GSM8H 3G	Wireless M-Bus Dongle			Radio Link Concentrator
	FlowIQ 2102	M-Bus Module	Kamstrup Pit Antenna II for Multical 21 & FlowIQ 3100			RF M-Bus Converter II
	FlowIQ 2101 – Concentric	Wireless M-Bus Modules for Radio Link Network	READY MTU			READY Collector
	Mag 8000	Wireless M-Bus for Multical 61/601/801	Geo Ensemble Water Display			Wireless M-Bus for Radio Network
	Multical 21	Wireless M-Bus for Multical 62, Multical 602 & SVM S6	Pulse Adapter			API Access
	Multical 62		Optical Read-out Head			READY Flagpole
	Multical 41		READY Repeat 5			READY Converter Basic
	Multical 61		Kamstrup 5-inch Pit Antenna			RF Router
			Kamstrup Temperature & Humidity Sensor			Meter Reading Import
			External Antenna			READY Mini Concentrator


		-Antenna		Radio Link Repeater
		FlowIQ Gateway		READY 4G Bridge
		Pulse Transmitter for Multical 61/62 & Ultraflow 14		USB Meter Reader
				READY Concentrator
				Radio Link Network
				Kamstrup Mobile Radio Network
				PcBase III
				RF M-Bus Converter
				GSM Master Modem
				READY Radio Mesh
Employees	1,500 Employee			
Revenue	307 million EUR			
Competitive Advantage	Technological Leadership - Kamstrup’s cornerstone is producing long-term value for their clients through technology superiority combined with deep customer knowledge and understanding. The firm provides adaptable end-to-end solutions that are tailored to each customer's specific needs. This includes giving them the tools and data they need to bill individual users more accurately in high-rise, multi-tenant buildings and commercial properties. Furthermore, Kamstrup smart metering has shown to save building owners significant amount of money on both financial and operational costs.			
	Sustainability - Kamstrup is dedicated to lead and continue to pave the way toward a more responsible and sustainable energy and water supply that can satisfy the world's expanding demand. In their automated manufacturing facilities in Denmark, Kamstrup's whole product range is manufactured with the highest certifications for environmental safety and quality.			
Target Audience	Municipalities, public utilities, property managers, and industrial businesses are among the clients of Kamstrup			




Table 3 - Kamstrup – Competitive Landscape

Company Name	Lorenz Meters Wasserzähler				
Location	Burgweg 3 89601, Schelklingen, Baden-Württemberg Germany				
Description	Lorenz is a flow measuring technology manufacturer and supplier, delivering cutting-edge apartment, residential, and bulk water meters. Lorenz, which was founded in 1963, now manufactures over one million measuring instruments each year, serving public utilities, service providers, the process sector, and private consumers as a trustworthy and reliable partner. Several awards for research and development, as well as corporate social responsibility, have been given to Lorenz. This includes awards such as the Volksbanken Raiffeisenbanken Banking Group's VR Innovation Prize, the Institute of Business Ethics' CSR award "Ethics in Business," and Government initiatives including "100 Companies for Resource Efficiency" and "100 Places for Industry 4.0."				
Products & Services	Flat Water Meters	Residential Water Meters	Bulk Water Meters	Accessories	
	Radio Measuring Modules	Digital Residential Water Meter	Ultrasonic Bulk Water Meter Octave	Connecting Joints	
	Single Jet Radio Water Meters	Ultrasonic Residential Water Meter Sonata	Ultrasonic Standpipe Meter Stainless Steel	Gaskets	
	Impulse Measuring Modules			Distance Pieces	
	Impulse Single Jet Water Meters			Reductions	
	Measuring Modules			Elongations	
	Single Jet Water Meters				
	Resettable Water Meters				
	Solar Water Meters				
	Customized Measuring Instruments				
Employees	230 Employee				

Revenue	21 million EUR
Competitive Advantage	Ecological Advantage - Water meters must be changed at regular intervals owing to calibration regulations and measurement accuracy, although in high-quality products, many components are still in a fine condition even after use and replacement. This is the foundation of the concept, which is unlike anything else in the business. Lorenz collects replaced flat water meters from metering services and water utilities, disassemble and reprocesses them, and returns the components to the manufacturing cycle as far as possible. This process decreases material consumption and environmental impact by 30%, and with the next generation of radio water meters, impact reduction may reach up to 80%.
	Economic Advantage - The crucial success factor is that reprocessing is also financially viable. Customers, after all do not only benefit from the use of high-quality measuring instruments, but also from the cost savings: the products manufactured by Lorenz are not the only the clear winners in terms of overall costs, but they also outperform plastic counterparts in pure unit price comparisons. Low-cost meters, on the other hand, could easily be discarded after a single installation, which would result in additional expenses for customers. As a result, resource efficiency and environmental preservation become a competitive advantage for German-made high-quality water meters by Lorenz GmbH & Co. KG.
	Cutting-edge Technologies - Lorenz is recognized as a pioneer in digitalization, sustainable production, research and development, and active corporate responsibility. The firm is considered as a driver of innovation. Lorenz collaborates closely with the globally active ARAD Group as part of their high-tech cooperation, combining Israeli high-tech with German reliability.
	Quality Certification - Lorenz manufactures authentic high-quality products with the highest measurement precision and stability, superb materials, and data security. All are made in environmentally friendly, digitalized production facilities that are very agile and deliver in the shortest timeframe possible. Lorenz has its own state-approved water meter testing facility, which is ISO 9001 accredited.
Target Audience	Lorenz GmbH targets public utilities, service providers, process industry and private consumers.


Table 4 - Lorenz Meters – Competitive Landscape

Company Name	Sensus, a Xylem Brand 								
Location	Headquarters	637 Davis Drive, Morrisville, North Carolina 27560, United States							
	German Location	R&D Centre of Excellence Manufacturing/Assembly - Meineckestrasse 10 Laatzen, Germany 30880							
	German Location	R&D Centre of Excellence Manufacturing/Assembly - Industriestrasse 16 Ludwigshafen, Germany 67063							
Description	Sensus is a Xylem acquisition with over 80 million smart metering devices in use across the world. Sensus provides investor-owned utilities, cooperatives, and municipalities with remotely managed products and solutions that deliver accurate data at the right time. Smart devices and advanced applications link with a number of communication technologies as part of Xylem's digital portfolio to enable customers make fast choices that improve electric, gas, and water infrastructure. Sensus has large production facilities in the US, UK, Germany, Slovakia, and China. Sensus recently announced that the municipality of Bad Koenig, near Darmstadt, Germany, has selected the Sensus iPERL advanced water meter system after a trial deployment that showed considerable advantages to the community. Bad Koenig, a resort town of 9,300 people in Hesse State with a 47-square-kilometer area, installed 1,600 iPERL smart water meters and has now opted to buy another 1,400 units after the Sensus system drastically decreased meter failures and inspection delays. One of the main reasons for picking the iPERL system was its solid-state electromagnetic measuring technology. Furthermore, iPERL was chosen because of its very efficient and reliable radio technology, which allowed them to read 80 meters in less than 10 minutes.								
Business Focus	Smart Meters (Water, Gas, Electricity)			Communication Systems (Water, Gas, Electricity)			Software & Services (Water, Gas, Electricity)		
Products & Services	Smart Water Meters		Reading Devices	Accessories	Base Station	End Point	Hand-held Devices	Software	Third Party
	Residential	Commercial	Touch-Read® 6590 AutoGun Reading Device	Act-Pak® Remote Monitoring Instruments	FlexNet EasyLink™ Reader	SmartPoint® 510M Non-Pit Set Module	Field-Logic™ Hand-held Device (HHD)	AutoRead® Software	Juniper® Archer™ 3 Hand-held Device
	ac-cuSTREAM™ Water Meters	Hydroverse Insertion Meter							
	ally® Water Meters	Hydroverse™ Water Meters	Touch-Reader®+ 3096	CommandLink®	M400B FlexNet®	SmartPoint® 520M Pit Set Module	Juniper® Archer™ 3	AutoVU® Software	

			Reading Device	II Wireless Interface	Base Station		Hand-held Device			
	iPERL® (North America) Water Meters	Mainline Propeller Water Meters		Permalog+ Acoustic Monitoring Sensor	M400D FlexNet® Base Station	Vantage-Point® Lighting Control Module		Customer Portal Software		
	OMNI™ + R² Water Meter	OMNI™ + Compound (C²) Water Meters		Sensus® Smart Gateway Sensor Interface	R100NA FlexNet® Collector			Device Manager Application		
	SR® II Water Meters	OMNI™ + Fire Hydrant (H²) Water Meter			Vehicle Gateway Base Station (VGB)		FieldLogic™ Software Suite			
		OMNI™ + Fire-line® (F²) Water Meter					FlexNet EasyLink™ WorkBook Application			
		OMNI™ + Turbo (T²) Water Meters					FlexNet EasyLink™ WorkSpace Application			
		OMNI™ + Verification (V²) Portable Test Water Meter					Pressure Profile			
							Regional Network Interface (RNI)™ Software			
							Sensus Advanced Analytics			
							Sensus Enhanced Analytics			
						Sensus Essential Analytics				
						Service Management				
						Vantage-Point® Lighting Software				
	Employees	3,300 Employee					17,000 Employee			
Revenue	769 million EUR					4.7 billion EUR				
Competitive Advantage	Extensive Customer Relationships - Sensus offers a large metering product portfolio and is well positioned in the advanced metering infrastructure (AMI) market. Regulations and customers' increased need for real-time data and lower operating costs are driving the AMI segment to grow at roughly double the rate of the entire metering area. Sensus' extensive customer relationships and connections will enable the company to expand its product and technology reach into new markets across the world, emerging markets.									
	Product Differentiation - The merging of Xylem's world-class brands and products with Sensus' cutting-edge, smart technologies will produce a unique solution that will better satisfy their customers' changing demands, such as increased water efficiency, water conservation, and lower life-cycle costs. This product differentiation strategy places Sensus ahead of competition. Combining both firms' superior technology and R&D skills and capabilities will speed the delivery of new solutions to their clients, especially in the field of advanced analytics in the water, wastewater, and outdoor water sectors. FlexNet, Sensus' network infrastructure, is capable of supporting several of Xylem's linked product offerings while also allowing for development into adjacent Internet of Things									

	businesses. The firm sees natural potential to expand its advanced data analytics platform, which offers clients with actionable insights.
Target Audience	Sensus targets with a wide range of public service providers, including utilities, city governments, industrial facilities, and institutions. Sensus product solutions are primarily involved in water, gas, and electrical infrastructure to improve the quality of life in the communities they serve. Sensus helps its customers reach further by leveraging technology and data-driven insights to increase productivity and responsiveness. With innovation in sensing and communications technology, data analytics, and services, the company collaborates with clients to anticipate and adapt to changing business demands.

Table 5 - Sensus, a Xylem Brand – Competitive Landscape

Company Name	Maddalena GMBH 						
Location	Headquarters	G.B. Maddalena 2-4, Povoletto, Friuli Venezia Giulia 33040, Italy					
	German Location	Steinberg 22 – D-42855 Remscheid, Germany					
Description	Maddalena S.P.A	Maddalena is a global player in the measurement and smart metering of water and thermal energy. The firm has been assisting utilities, industry, and end-users in properly managing water resources and data since 1919. Water meters for potable, heating, and irrigation water, as well as thermal energy meters, are all part of the Maddalena product line. Stationary, walk-by, and drive-by reading devices are among the company's AMR and smart metering products. Maddalena also takes pride in being the first firm in Italy to have a certified laboratory that serves as a calibration centre for water meters (UNI CEI EN ISO/IEC 17025:2005).					
	Maddalena GMBH	Maddalena GmbH is a completely owned subsidiary of Maddalena S.p.A., a firm that has been innovating, manufacturing, and distributing water meters for more than 100 years. Maddalena S.p.A. acquired a German firm based in Remscheid that specializes in the production of water meters in 2018. This was the first step toward establishing an independent presence in Germany and gaining direct access to the German market. Maddalena has added volumetric rotating piston meters, single jet meters, and large-diameter meters to its standard multi-jet meter line in both mechanical and ultrasonic variants during the previous two years. Remote radio reading systems based on common standard technologies are also available and may be incorporated to give solutions for sizes ranging from 15 to 200 mm. With a diverse product range, the firm provides full solutions to fulfill the needs of the German water metering industry. In Germany, all water meters sold meet the required drinking water standards. Maddalena GmbH possesses all of the mandatory ISO certifications for the German market.					
Business Focus	Smart Water Meters				Thermal Energy Meters		
Products & Services	Smart Water Meter		Communication Modules	Thermal Energy	Systems	Irrigation	Instruments
	SJ PLUS/ EVO	ELECTO SONIC	RADIO EVO 868	MICROCLIMA EVO	Outdoor – Mobile Meter Reading Via Wireless M-Bus	WT	TDML/TDSL Batch Control Water Meters
	ELECTO SJ	WMAP EVO	ARROW WAN 169	KUS	Indoor – Fixed Meter Reading Via Wired M-Bus/Wireless M-Bus	HYDRANT GATE VALVE S58	Electromagnetic Flow Sensors
	VTZ	ELECTO T	RADIO LORAWAN 868	MICROCLIMA COAX	Wide Area Network – Fixed Meter Reading	IRRIMATIC	WMAC
	CD ONE TRP	ELECTO BULK	ARROW WAN 868 (LO-RAWAN)	CALCULATOR MICROCLIMA S3C		Flow Limiter	Batch Controllers & Counters
	DS TRP		ARROW EVO 868	MICROCLIMA U		DATAWATER WMVI	
	DS SD		ARROW WAN NB-IOT	90°C/130°C Water Meters			
	MVM		ARROW EVO 868 (SPLIT)	Temperature Sensors			
	WT		ARROW WAN NB-IOT SPLIT	Heat Cost Allocator			
	MVM PLUS C		ARROW WAN 169 (SPLIT)	FUE			
			M-BUS EVO	Optical Interfaces			

		ARROW WAN 868 (LO-RAWAN – SPLIT)	
		FLOWPULSE M-BUS	
		PULSE EVO	
		REED SWITCH	
		QUADRAPLUS – TRP	
		REED SWITCH – TRP	
		FLOWPULSE	
		REED SWITCH WOLT-MANN	
		TWIN-PULSE - M-BUS	
-	Maddalena GMBH		Maddalena S.P.A
Employees	24 Employee		133 Employee
Revenue	786,657 EUR		49.77 million EUR
Competitive Advantage	Corporate Social Responsibility - Maddalena Spa's decision to join Animaimpresa, a social promotion organization dedicated to promoting CSR (Corporate Social Responsibility) and sustainable development, is a significant step towards the company's commitment to sustainability. Being a part of this qualified and active community demonstrates Maddalena's adherence to social responsibility that encompasses all domains, including economic, social, environmental, and governance aspects, which on the wider scheme results in stakeholders' engagement.		
	Quality Certifications - Maddalena GmbH meets the same high-quality standards as the parent company, based on the ISO 9001 certification and the fulfillment of all the regulatory frameworks in Germany; in addition to the elements of the Maddalena water meter that comes into contact with drinking water.		
	Expertise – Maddalena Spa is reinforced by 100 years of history and experience, which enables the firm to produce precise & accurate metering and measuring equipment that guides it through a path of strategic sustainability as a source of competitive advantage.		
Target Audience	Maddalena GMBH target Water Utilities, Municipalities, Businesses as well as End-users.		

Table 6 - Maddalena – Competitive Landscape

Company Name	DIEHL GMBH					DIEHL
Location	Headquarters					
	German Location	Industriestraße 13, 91522 Ansbach, Germany				DIEHL Metering
	German Location	Am Weimarer Berg 3, 99510 Apolda, Germany				DIEHL Metering
	German Location	Donaustraße 120, 90451 Nuremberg, Germany				DIEHL Metering
Description	Diehl Metering is a global player in smart metering system designing, manufacturing, and distribution. The firm’s solutions for metering equipment, systems, and software applications combined with experience of more than 150 years, helps suppliers globally in the domains of water, heating, and cooling. Their very precise meters are intended for a wide range of applications and communication options. Data-driven insights, IoT connection, fully flexible softwares, intelligent metering are all part of Diehl's comprehensive range of services and solutions. The company developed a number of innovative metering methods and continues to pursue digitalization and artificial intelligence technologies. Diehl Metering is part of the Diehl Group. Its cutting-edge technology has been used in system technology projects all across the world. Their whole business is based on delivering long-term value and cultivating long-term relationships with their clients. The company is based in Germany and has three manufacturing facilities there. It is a family-owned corporation with a global presence. The organization is noted for upholding its founding principles of quality, reliability, and their lose connection to clients while proactively crafting a better future for their customers and the communities they serve.					
Business Focus	DIEHL METALL	DIEHL CONTROLS	DIEHL DEFENSE	DIEHL AVIATION	DIEHL METERING	
	Automotive	Home Appliances	Guided Missiles	Cabin Lining	Smart Water Metering	

	Heating & Sanitation	Professional Appli- ances	Air Defense Systems	Luggage Compart- ments	System & Software
	Electrical Engineering	HVAC/R	Ammunition	Cabin Lighting	Thermal Energy Meter- ing
	Mechanical Engineer- ing	Industrial IoT	Reconnaissance & Protec- tion	Fire Protection	Services
		Mobility	Components & Packaging	Water Manage- ment Systems	
				Cabin Manage- ment Systems	
				Air Distribution & Management Sys- tems	
				Avionics	
Products & Services	Smart Water Metering	System & Software	System & Software Components		Thermal Energy Metering
	HYDRUS 1.3 – Ultrasonic Meter	IZAR@NET 2 – Soft- ware	REED SWITCH 570 – Electronic Ac- cessory – Transmitter		SHARKY 775 – Compact En- ergy Meter – Ultrasonic
	HYDRUS 2.0 BULK – Ultra- sonic Meter	IZAR@HOME – Soft- ware	PULSE TRANSMITTER 571/572 – Electronic Accessory – Transmitter		SHARKY SOLAR 775 – Com- pact Energy Meter – Ultra- sonic
	HYDRUS 2.0 – Ultrasonic Meter	IZAR PLUS PORTAL – Software	IZAR BE PULSE – Electronic Acces- sory – Transmitter		SHARKY 774 COMPACT – Compact Energy Meter – Ul- trasonic
	CORONA ER – Electronic Meter – Multi-Jet	IZAR@MOBILE 2 – Software	IZAR RC G4 – Radio Module		SCYLAR INT 8 – Calculator
	CORONA E – Electronic Meter – Multi-Jet		IZAR RADIO COMPACT ACM – Radio Module		SHARKY FS 473 – Flow Sen- sor – Ultrasonic
	AQUILA V4 – Single-Jet Meter		IZAR RADIO EXTEND – Radio Module		RAY FS WS 453/455 – Flow Sensor - Mechanical
	AQUARIUS S/P – Single- Jet Meter		IZAR@MOBILE 2 TABLET – Radio Handheld		RAY FS WP 456/457 – Flow Sensor - Mechanical
	AQUILA V# DIN – Single- Jet Meter		IZAR RECEIVER BT – Radio Receiver		
	ARIES ON15/20 – Single- Jet Meter		IZAR ROC BATTERY – Radio Receiver		
	CORONA 101/102 – Multi- Jet Meter – Wet Runner		IZAR ROC VEHICLE – Radio Receiver		
	CORONA MCI 108 – Multi- Jet Meter – Wet Runner		IZAR ROC PREMIUM 2 – Radio Re- ceiver		
	CORONA MCI COMPOSITE 108 – Multi-Jet Meter – Wet Runner		IZAR RECEIVER M-BUS – Radio Re- ceiver		
	CORONA DP 405 – Multi- Jet Meter -Dry Runner		IZAR OH BT 2 – Radia OPTO Head		
	CORONA ST 130 – Multi- Jet Meter – Standpipe		IZAR CENTER – M-Bus Master		
	ALTAIR MCI 119 – Rotary Piston Meter		IZAR PORT PULSE – M-Bus Converter		
	ALTAIR MCI COMPOSITE 119 – Rotary Piston Meter		IZAR PORT PULSE MINI – M-Bus Con- verter		
	ALTAIR V3 – Rotary Piston Meter		IZAR M-BUS COMPACT I – M-Bus Module		
	ALTAIR V4 DN15/20 – Ro- tary Piston Meter		SIGNAL CONVERTER 520.11 – Elec- tronic Accessory – Display & Control Devices		
	ALTAIR V4 CONCENTRIC – Rotary Piston Meter		SWITCHING AMPLIFIER 521 - Elec- tronic Accessory – Display & Control Devices		
	ALTAIR V4 DN25/32/40 – Rotary Piston Meter		IZAR PULSE I - Electronic Accessory – Display & Control Devices		




	WESAN WP G – Bulk Water Meter - Woltman	
	WESAN WS G – Bulk Water Meter – Woltman	
	WESAN WPV G – Bulk Water Meter – Woltman	
	WESAN WPV A G – Bulk Water Meter - Woltman	
Employees	1,700 Employee 	16,866 Employee DIEHL
Revenue	333 million EUR 	2,979 billion EUR DIEHL
Competitive Advantage	Strong Suppliers Relationship - Diehl is able to maintain a strong supplier relationship management with the goal of ensuring customer satisfaction because of its continual attention on its end-users. Diehl's suppliers are critical to their success and performance in terms of supporting developments; as a result, Diehl's metering has 2,300 suppliers.	
Target Audience	Diehl Metering enables utilities, municipalities, and businesses to take control of their infrastructures, allowing them to manage water and energy more efficiently and sustainably. Diehl Metering primarily targets water and heat suppliers, as well as businesses, engineering, planning, and construction firms. Diehl Metering also strives to establish relationships with installation businesses that work in the water or heat supply sectors in order to collaborate on joint development projects.	

Table 7 - Diehl – Competitive Landscape

Company Name	Aquametro Messtechnik GMBH				
Location	Headquarters	Ringstrasse 75 Therwil, 4106, Switzerland			
	German Location	Kurt-Schumacher-Allee 2 28329, Bremen, Germany			
Description	INTEGRA Metering owns Aquametro Messtechnik GmbH, which is a subsidiary that specializes in the development, manufacturing, and distribution of water and energy meters (heating/cooling), as well as data management systems for monitoring consumption in the water and energy supply industries. The company's measuring components are exactly aligned with one another, ensuring a reliable and cost-effective operations for their customers.				
Business Focus	Smart Water Metering		Smart Thermal Energy Metering		
Products & Services	TOPAS® SONIC - Smart ultrasonic free-flow water meter for domestic and cold-water applications	AMBUS® CMe2100 LTE - M-Bus Metering Gateway for mobile networks	TOPAZ ESKM - Ultrasonic meter for cold water with integrated M-Bus	RUBIN RD 02/022 pulse generator - Reed pulse generator for RUBIN WP-FS / FSL	
	RUBY® SONIC - Ultrasonic bulk water meter for cold water networks	TOPAS ESKR 2 - Ultrasonic meter for cold water with integrated wireless M-Bus radio	SAPHIR® Modularis - Apartment water meter for hot water measurements with pulse, M-Bus, and radio	RUBY OD AM/04 pulser - Opto-electronic pulse generator NAMUR according to DIN 19234	
	AMBUS® WEBLOG 250 - M-Bus data logger for 250 devices with touch screen and web server	TOPAS ESKM 2 - Ultrasonic meter for cold water with integrated M-Bus	Aquabasic® PMK basic - Cold water meter from DN 15 to DN 50 For horizontal installation, Temperature ranges from 0°C to 40°C	Aquaradio® smart pulse - radio reading	
	AMBUS® RelAir R2M Pro - Wireless M-Bus to wired M-Bus converter	AMBILL® smart link II - Wireless M-Bus converter	aquabasic® PMKF/-S - Cold water meter from DN 20 to DN 40 For vertical installation, Temperature ranges from 0°C to 40°C	Aquaradio® smart M-Bus - radio reading	
	AMBUS® CMiBOX - Wireless M-Bus receiver	Aquastream® M-Bus/Pulses - System module Dual M-Bus interface and pulse communication module for mechanical water meters	RUBY KMS / KMS+ - Mechanical bulk water meter for cold water	Aquaradio® smart radio receiver - Bluetooth radio receiver	

	AMBUS® CMeX50 - Wireless M-Bus receiver	RUBY WP FS - Bulk water meter for thermal energy measurement	RUBY KTW / KTW+ - Mechanical compound water meter for cold water	Mobile measurement service - Mobile ultrasonic flow or energy measurement as a clamp-on system
	AMBUS® CMeX10/11/10S/11S/12S/13S - M-Bus master for M-Bus installation extensions	RUBY WMS - Bulk water meter for thermal energy measurement	Aquastream® radio - Communication module radio	AMBUS® Link - M-Bus data centre
	AMBUS® CMe3100 - Smart M-Bus Metering Gateway for the fixed network	AMFLO® MAG Pro -Electromagnetic flow meter	Aquastream® M-Bus - M-Bus communication module	AMBILL® easy reader - USB radio receiver for reading radio consumption meters
	AMBUS® CMe3000 - M-Bus gateway for the fixed network	TOPAS ESCR - Ultrasonic meter for cold water with integrated radio	RUBY HRI pulse generator - Communication module for RUBIN water meter – pulse generator and M-Bus	AMBILL® smart suite 2 - Mobile reading and parameterization software
Employees	23 Employee		165 Employee	
Revenue	3.05 million EUR		24.48 million EUR	
Competitive Advantage	Expertise - INTEGRA Metering has been designing and manufacturing high-quality water and thermal energy meters for over 90 years. INTEGRA Metering is a preferred partner for water and thermal energy providers, public utilities, property management firms, and building operators because of its comprehensive solution range. The company is now concentrating on IoT communication technologies for smart meters and smart cities. The goal is to equip its consumers and business partners with the information they need to manage resources, forecast rising demand, save costs, and contribute to a more sustainable energy and water future. INTEGRA Metering currently has 68 partners across the world.			
	Quality Certification - Because suppliers are such an essential component of the company's service and quality provision, INTEGRA Metering is ISO 9001 certified, giving them a competitive edge in terms of high-quality products.			
Target Audience	Water suppliers, energy providers, public utilities, as well as property managers and building operators, are the company's target audience.			

Table 8 - Aquametro – Competitive Landscape

Company Profile

Chapter 5




Company Name	Somitra B.V.			
Location	Holding Company	Somitra B.V.	Beetslaan 93, 4707JP Roosendaal, The Netherlands	 
	Subsidiary	Sleer B.V.		
Description	Sleer B.V is a Somitra Group subsidiary that will soon begin operations in the Netherlands. Sohrab Bozorg Pishani, the founder of Somitra B.V., is also the CEO of Sleer B.V. Somitra Group is now able to achieve tremendous growth and deeper direct customer relationships with water suppliers in its native market of the Netherlands, as well as the rest of Europe and globally, as a global European innovator of Smart and Digital technologies. The company's service development offers the advantage of being able to highly tailor and satisfy the needs of its customers. Customers will benefit from the synergies of the close relationship with Sleer B.V. in the long term. The company can offer Customers complete and unique solutions for optimizing the meter reading process by coordinating and further developing the diverse product categories of smart meter reading technology. Somitra Group's intensive development, innovation, and collaboration with a team of innovators recently paid off with the launch of cost-effective, economical, and environmentally friendly smart water, gas, and electricity meter reading solutions.			
Business Focus	Smart & Digital Technologies			
Products & Services	Smart Water Meters		Other Categories	
	Optical Sensors		Smart Multi-function Electricity Meters	
	Electromagnetic Sensors		Smart Electronic Box	
	Digital Scanners		Smart Lighting	
	Software		Smart Industrial Box	
			Smart Hotel	
			Smart Fire Systems (Smoke & Leakage Sensors)	
			Smart Security Systems (Motion Sensors)	
Target Audience	Somitra's target audience includes water suppliers, energy providers, public utilities, as well as property managers and building operators.			

Table 9 - Somitra B.V. – Company Profile

5.1 Sleer - Digital Scanners

With increasing pressure on utility companies to save limited water resources, The company's smart metering system allows them to streamline their water distribution processes by making data-driven decisions. Utility businesses can use smart water metering to collect usage data automatically, reduce manual meter reading, increase efficiency, and reduce costs. It also allows for a more efficient detection of leaks and abnormal consumption than manual alternatives. Electronic sensors and bidirectional communication networks are used in Sleer's smart systems to remotely read, store, and transfer data for analysis and feedback. The consumption data is transferred to the processing server via the transmitter, or the data logger linked to the water meter for analysis, billing, and other procedures. The automated meter reading and transmission method is flexible, and it can be done on daily, hourly, or real-time basis. Sleer's smart system provides consumers with features such as transparent consumption and billing. Water companies will save time and reduce costs by eliminating manual meter reading, boosting leak detection, and cutting maintenance expenses.



Figure 9 - Digital Scanner – Sleer

Sleer's digital scanners are simple to operate and may be quickly fitted on a variety of meters. The meter is now ready to read the information displayed on the meter and transmit data automatically without the need to manually read the meter after inserting the device on top of it. Sleer's Digital Scanner can be integrated and installed on any water meter, as water utilities do not need to make any changes to their existing meters for the digital scanner to work effectively. It is also possible to connect directly to the software's server, where data is transferred without the use of Wi-Fi or any other network. The device reads the information from the water meter automatically, without intervention from the water utilities. As previously noted, water utilities can alter the scanner to deliver water meter reading information on a daily, hourly, or real-time basis. With a diameter of 8cm and a height of 3cm, the device is rather light and compact as shown in *figure 9*.



Figure 10 - Digital Scanner – Sleer

5.2 Sleer - Optical Sensors

Optical sensors are a less expensive, less technologically sophisticated alternative to digital scanners. Optical sensors, on the other hand, provide similar benefits to the Digital Scanner. Sleer B.V.'s Optical Sensors detect, measure, and communicate data from the analogue counters on the water meter to the water utility. Different measurements of water flow are provided by the counters on the water meters. So one counter displays readings in cubic meters, while the second displays readings in Liters, while the third displays values in CC. Depending on which metric the utility requests, the optical sensor offers reliable and precise data. The data is subsequently transferred from the optical sensor to the software for further analysis. The optical sensor can be manually adjusted to read the specific counter requested by the utility by rotating the sensor around the meter as shown in *figure 11*.



Figure 11 - Optical Sensor – Sleer

5.3 Sleer - Electromagnetic Sensors

In terms of options, Sleer's Electromagnetic Sensors are a more limited counterpart of the Optical Sensors. Only the magnetic counters on the water meter are read by the electromagnetic sensor, which then transmits the information to the utility via software. The Electromagnetic Sensor uses 25% less electricity and energy than optical sensors. As a result, for utilities that do not require a multi-function sensor and only need to read a single metric provided by an electromagnetic sensor, the electromagnetic sensor then becomes the most cost-effective option in terms of price and resources consumed. In that sense, optical sensors are far more flexible, as the sensor's rotation feature allows it to read all counters, whereas electromagnetic sensors are less flexible because they not only read magnetic counters, but they also might require changing the placement of the counter inside the meter to appropriately use the sensor, which is prohibited unless the water utility changes it. As a result, regulatory requirements limit the electromagnetic sensor, and installation may be problematic.



Figure 12 - Electromagnetic Sensor Chip– Sleer

5.4 Sleer - Software

By building a software dashboard that employs AMI technology systems, Sleer is primarily focused on providing more particular insights and information to water utilities. The software enables a two-way communication channel, allowing the utility to quickly halt, limit, or enhance water delivery depending on the scenario. Furthermore, the software dashboard provides extremely detailed information on users' usage per household by profiling all meters used under a certain user's identity as shown in *figure 13*. The program can also be used by utility providers to open and close valves. For instance, if a client fails

to pay their bills or if a leak occurs in a specific location, the utility can use the dashboard to temporarily suspend the water flow in that region.

Into the bargain, searching for users is far more convenient for utilities. Users can be accessed by using the dashboard's search engine and inputting their last names, residence, area, postal code, or subscription number. Sleer makes it easier for water utilities to find customers. Furthermore, if an end-user installs energy or electricity meters, alongside water meters, or owns multiple households, the software creates a dossier and links all meters used under that person's identity. Sleer aims to provide as much information as possible regarding customer consumption, as well as the ease with which that information can be accessed.

Most importantly, using complex programming tools, the software automatically estimates pricing for each user based on their consumption rate, converting the water flowing through the pipelines to a number that can be billed to the end customer. Additionally, the software generates comparable consumption statistics for the same user, comparing current consumption to consumption over the previous 24-hours and calculating an average consumption rate. Utilities will be able to monitor customers' activity more precisely, which will aid in the detection of other issues such as leakage, as when leakage or unusual consumption is detected, the digital scanner can be configured as a detector and transmit alerts onto the software. Ultimately, the software and the Digital Scanner do not require Wi-Fi or any other form of internet connection to transfer or analyze data, which contributes significantly to sustainability in terms of carbon footprint reduction. In a nutshell, Somitra's technology allows utilities track water use and user behavior by providing a plethora of simple and easy-to-use solutions.

The screenshot displays the Sleer Software Dashboard, which is organized into several functional panels:

- Subscriber Information:** Includes fields for Subscriber Number (436735), First Name, Last Name, Nationalid, Purchase Date (4/15/2021), Area, and Address. A blue person icon is shown next to the form.
- Current Information:** Fields for Subscriber Id, Device Id, and WaterMeter Id. It also has checkboxes for Air Connection and Serial Connection.
- Sensor or Device Configurations:** Fields for Sensor Id or New Device Id, WaterMeter Counter, WaterMeter Prescaler, and Number Of Digits. A 'Program' button is present.
- Financial Process:** Fields for Remain Charge, Date (4/15/2021), and Charge Amount. A 'Charge' button is present.
- Device, Water Meter and Sensor:** Fields for Body Number, Counter Number, Number Of Counter Digits, Pipe Diameter, Type Of Branch, Area, Address, Device Id (with a 'Select a Device' dropdown), Sensor Id (with a 'Select a Sensor' dropdown), ReadyToSendTime, Prescaler, and Credit. A 'Save Subscriber' button is at the bottom.
- Auto Program:** Checkboxes for WaterMeter, Communication, Receive, Date, and Time, each with a 'Set' button. An 'Auto Program' button is at the bottom.
- Receive Configurations:** Fields for ReadyToSendTime and a 'Program' button.
- Date and Time Settings:** Fields for Date and Time, each with a 'Program' button and a 'Set' checkbox.
- Communication Configuration:** Fields for Address, Key, Net Id, Air Data Rate, Power Send, and Channel. 'Program' and 'Set' buttons are at the bottom.

Figure 13 - Software Dashboard–Sleer

5.5 Competitive Advantage

5.5.1 Technological Advantages - (Device) The Modbus output on the Digital Scanner is a technology for sending data across serial lines between electronic devices. Its operational voltage is 3.7 volts, and the battery may be charged by USB. It also has the capability of reading water temperature and pressure. The Digital Scanner communicates, and syncs monitored data to the software, allowing the utility to maintain track of end-user water consumption rates. When the gadget is placed, it triggers an alarm to distinguish between household and commercial use. Furthermore, the device does not require radio bandwidth and has an IP 65 rating to extend its longevity. To operate effectively, it does not require a continual connection to any type of network, cables, or landlines.

5.5.2 Technological Advantages - (Software) The final data output is automatically produced as a CSV file and numeric codes when the data is delivered to the Software for farther analysis. If appropriate, data can be integrated with other data. Between the device and the server, the package offers a highly convenient and straightforward connection protocol. Furthermore, Sleer's software does not necessitate any changes to the water utility's core program, making data merging and transfer smoother and agile. Moreover, when using encrypted data, there is a very low data transmission rate. Additionally, because the device was built at a factory, the IP address is static. Finally, there are no time constraints on reading and transmitting signals or information.

5.5.3 Ecological Advantages - Since it considerably minimizes electromagnetic radiation, the digital scanner is considered an environmentally friendly instrument. It also has a lengthy battery life due to the device's minimal energy usage. The digital scanner does not require any LAN networks, such as Wi-Fi or GPRS, which helps to reduce carbon emissions significantly. Additionally, the system utilizes this feature to track consumption rates in real-time and promptly alerts utilities in the event of a leak or unusual water consumption. Lastly, the elimination of a radio bandwidth minimizes the amount of RF radiation and frequencies emitted, making the gadget incredibly eco-friendly.

5.5.4 Economic Advantages - The data delivery to the water utility is completely free owing to the utilization of AMI technology. Furthermore, the device's installation on a water meter requires minimum infrastructure equipment, making it cost-effective. Finally, the device's immediate signals to the utility in the event of a water leak or unusual water consumption improves water utilities' agility to act, reducing loss costs and conserving a valuable resource.

Adopted Technologies

Chapter 6

6.1 Arrival of Smart Metering

Smart water metering technology has progressed significantly in recent years. The opportunities given by the advanced technology are driving water utilities to consider intelligent metering as a possible approach to ensure efficient water supply, reduce waste, and control costs while also changing the customer-utility relationship in terms of billing. An array of intelligent metering systems has arisen in this context to meet a wide variety of applications such as households, institutions, businesses, as well as municipalities. The following section defines some basic terms in order to frame the technologies adopted by Smart water meter companies in Germany.

6.2 Understanding Smart Metering

The keywords "intelligent" and "smart" metering are sometimes used indiscriminately to refer to a technological combination that is superior to traditional metering. This intrinsic ambiguity, on the other hand, reflects the wide range of technology configurations that intelligent metering includes, as well as its significance to the water industry. Any new technology utilizing the latest in communication capabilities and expanded functionality for monitoring water consumption might be referred to as intelligent or smart metering. Taking a closer look at its components reveals that it consists of two unique elements: meters that employ modern technology to record water usage data and communication systems that can capture, and transfer water use data in real time. This is performed through a connection to a data logger, which enables the water utility and/or a third party to monitor water use in real time. The data is also delivered to the end-consumer via a variety of feedback channels; hence improving customer engagement and water resource management. Smart metering is, in fact, a collection of components and techniques designed to continuously monitor and evaluate water usage.

The measurement, data transport, processing, and analysis, as well as reporting of water consumption data, are all integral parts of the smart metering system. Data storage is positioned between these operations. Mode; "the method of measurement delivery", resolution; "the accuracy or quality of data", and frequency; "the regularity of data", are the best ways to characterize how these processes develop. The link between mode and frequency is normally one of dependency, and data resolution is frequently a function of mode. These factors work together to give a framework for a better understanding of how and when water is utilized. This model clarifies the role of the information supply chain as well as the various technologies adopted by the German market players. See *table 10* for a farther elucidation.

6.3 Smart Metering Technologies

To capture and record water usage, a variety of metering devices are used, each using a distinct concept. Displacement meters, velocity meters, compound meters, and electromagnetic meters are the four types of common metering technologies adopted by German competitors. To record water flow, displacement meters calculate the amount of water in a given area and mechanically displace components within the meter in proportion to the amount of water to appropriately read the consumption rate. At low to moderate flow rates, they offer the benefit of being affordable and accurate. Multi-jet, magnetic flow, and ultrasonic velocity meters all measure the flow velocity via a meter with a predetermined internal capacity. The speed of flow is then converted into volume of flow to determine the usage capacity available. In the event of high and low flow rates that need to be recorded accurately, compound meters combine the strengths of displacement and velocity technologies into a single meter. Electromagnetic flow meters take use of water's electromagnetic characteristics, which create voltage when it flows through magnetic field force lines. The voltage signal created is proportional to the speed of the flow. Electromagnetic flow meters are ideal for flows containing pollutants or debris that might otherwise harm a mechanical flow meter. In water treatment, magnetic flow meters are used to monitor treated and untreated sewage, process water, and chemicals.

Framework	Measuring Process	Data Transport	Data Processing	Reporting
Mode	To collect water consumption data, water meters and data loggers are used in conjunction. Displacement meters, which create a pulse signal once a certain volume goes through the meter, are primarily used in residential areas in Germany.	The method through which data from smart meters is communicated to water utilities and end-users. Data from the data logger is transmitted through a broadband cable or wirelessly via radio, GSM, or CDMA. Data can also be delivered remotely or via a close-range gathering method like a "drive-by" download.	End-use analysis software package is a way for water utilities and/or third parties to store data servers and manage water consumption data.	Postal bills, emails, online interfaces, and smart phone applications are examples of methods through which data is delivered to end-consumers for interpretation.
Frequency	The defined time intervals between the number of pulses at which the meter records water use. The data logger collects data from the meter, for example, every 10 minutes.	How frequent does the utility and/or the third party gather or communicate data. For instance, daily, half-hourly, or real-time updates. The length of time it takes varies greatly depending on the type of meter. "Pulse" verses "Interval," for example.	The speed at which water usage data is utilized to keep utility operations up to date. Leakage or pressure control, for example.	The rate at which water consumption data is sent to end-consumers, which can be quarterly, monthly, daily, or real time.
Resolution	The water meter's precision of detecting the water flow, for instance, L/pulse. This precision is determined through the purpose, capabilities, and settings of the water meter. The data logger specifies the resolution of the recorded data, for instance, L/15 minutes.	Even if the quality of the data is partial or complete, the resolution remains constant. The transmission process might be disrupted as a result. Therefore, smart meters should be installed in the appropriate locations based on their categories.	To study trends, data can be grouped and controlled, as in leak assessment or end-use analysis.	The degree of detail offered to the end-user, such as utilization per unit of time and/or end-of-use breakdown. Legibility and understanding are improved by using comparative framing and benchmarking. In that sense, information and framing will serve as critical determinants of consumers' behavioral change.

Table 10 - Operations of Smart Water Metering System

6.4 Smart Metering Systems

6.4.1 AMR - AMR (Automated Meter Reading) and AMI (Advanced Metering Infrastructure) are two types of smart metering systems. The main distinction is the degree of measurement and control complexity, or functionality. AMR, also known as remote meter reading, is the automatic transfer of recorded water consumption data to servers for storage and further analysis by the utility and/or a third party, this transfer often occurs through GPRS, CDMA, GSM, or private radio transmission. Although pulse/interval meters may also be employed in an AMR context. AMR improves data speed and accuracy; however, it is only said to provide a slight increase in data density, such as one read per month.

6.4.2 AMI - AMI follows a similar path but adds a two-way communication between the meter and the utility or other third party via the data logger. Moreover, AMI provides significantly higher data density. Although end-use analysis needs retroactive inspection utilizing trace software such as TraceWizard™ to yield useful insights, AMI effectively creates a data stream termed as "big data" by the industry, allowing for real-time monitoring and analysis. Furthermore, AMI gives a higher level of detail in terms of consumption statistics, such as number of pulses collected in short intervals by the data logger. Additionally, the two-way communication feature enables the meter operator to acquire meter reads on demand, determine whether water has recently flowed through the meter and onto the facilities or not, and issue commands to the meter to execute specific activities such as disconnecting or restricting water flow is referred to as two-way communication.

6.4.2 IUWN - An IUWN (intelligent urban water network) is a network management program that utilizes new technologies to regularly monitor performance, remotely sense asset condition, assess water availability, and monitor real-time water use in attempt to optimize water, wastewater, and stormwater service delivery for all stakeholders. The IUWN model indicates a higher level of intelligence in monitoring not just water use but also water quality, pressure, and asset condition, allowing for more effective and sustainable urban water management and delivery. It's similar to the energy sector's "smart grid," which

refers to the idea of an integrated "smart city". IUWN is considered as a complicated, yet manageable and adaptive system of fine-grained monitoring, automation, and control of distributed infrastructure.

6.5 Rollouts

The forthcoming section focuses chiefly on the adoption of Information Management (IM) in Germany, aiming to study the objectives of IM installations and, as a result, gain a more comprehensive knowledge of the key-drivers that influence technology adoption. This allows to situate the importance and application of IM in the context of utility operations, as well as analyze the potential opportunities and drawbacks of IM.

The majority of IM applications in Germany have been limited to small-scale projects, with only a few larger-scale rollouts. For example, Bad Koenig, a spa town of 9,300 people scattered across 47 km² in Hesse State, installed 1,600 iPERL smart water meters and has now decided to purchase another 1,400 after the Sensus system significantly reduced meter failures and inspection times in comparison of their previous levels. Moreover, Entega AG, situated in Darmstadt (Germany), has planned to install 46,000 smart water meters with the aim of decreasing meter reading and replacement costs, simplifying metering operations in general, and improving leakage monitoring. Furthermore, E.ON and Vodafone are partnering up to update water meters using wireless technology and turn them into smart meters. According to E.ON and Vodafone, the technology has been implemented in the Ruhr region, with around 200 networked water meters in operation at roughly 30 locations. According to reports, a water pipe in Germany bursts every 30 seconds. 1.1 million occurrences of tap water damage were reported in 2019, costing over 3 billion EUR. Leaks or other anomalies in water use should be spotted much earlier with the new digital technology, which will communicate data via the existing mobile network, saving water resources. By the end of the year, both companies plan to install additional 1,000 smart water meters. On the long term, the technology will be widely employed in private households. End-consumers will be able to keep track their water consumption data via an app and will be notified immediately if any damage occurs. The majority of the projects examined in this study are residential, although industrial, municipal, and commercial deployments are also on the upswing. Following small-scale testing, numerous countries throughout the world are moving forward with large-scale rollouts of smart water meters.

7.6 Drivers

Water utilities stand to benefit from enhanced and improved water meter data for various purposes. Initially, higher resolution metering data would give the utility insights into how consumers use water, allowing it to monitor particular end uses, such as outdoor usage, in order to change consumer water conservation and consumption attitudes and behaviors. This information may also be communicated to customers to improve water literacy and awareness; moreover, encourage behavioral change. Nonetheless, increased data collection frequency combined with higher volumetric flow capture resolution would enable utilities to better identify and decrease water losses inside the system network as well as reduce meter defects that trigger continual leaks.

SWOT Confrontation

Chapter 7

Strengths	Weaknesses
<ul style="list-style-type: none"> • Sustainability - Somitra views corporate sustainability as a means of initiating societal and economic benefit. The synchronization of the digital scanner and software simplifies the process of tracing irregular consumption patterns and diagnosing leaks via automatic warning features, allowing utilities to immediately close and open water valves to save water. Furthermore, the elimination of a radio bandwidth and LAN networks such as Wi-Fi or GRPS from the scanner reduces the quantity of RF radiation and frequencies emitted, making the device exceptionally environmentally friendly. • Certifications - Somitra's products and services have earned several certifications as well as eight international awards from various countries such as Germany. In 2019, they were awarded a gold medal and a certificate of honour by iENA in Nuremberg, Germany for new product innovation. • Diversified Product Portfolio - Sleer offers wide production lines where it serves multiple industries, providing products and services to a variety of business segments. Sleer's product lines employ comparable technologies in terms of operating systems and features introduced in the German competitors' product portfolio. 	<ul style="list-style-type: none"> • Suppliers Network - In Germany, competitors have strong relationships with a range of suppliers. Diehl, the German market leader in smart metering systems, for example, has 2,300 suppliers. Suppliers in the smart metering business are a vital component of a company's success and performance in terms of supporting innovations and developments while ensuring maximum customer satisfaction as it allows them to tailor their products and services to the demands of their customers. Competitors gain a competitive edge in terms of optimum quality by having several suppliers, which improves their market position in Germany. Somitra, on the other hand, lacks comparable relationships with suppliers, which is seen as a flaw that could hinder the company's operations in Germany. • Promotion - Somitra's weak promotional approach is inefficient, resulting in a lack of familiarity with its products and services among water suppliers, energy providers, public utilities, property managers, and building operators in Germany. This flaw poses a vulnerability for Somitra since the reliability of their products and services is questionable, preventing them from gaining a competitive advantage. Furthermore, because Somitra's products are comparable in functionality to those of its German competitors, consumers have low switching costs, allowing them to simply shift to competitors' products. • Service Reliability - The platform used for managing metering devices used by Somitra needs further investment to assure reliability as the number of users increase. Aside from the reliability of their platform, Somitra has only one manufacturing location which enforces limited production therefore, doubtful service reliability.
Opportunities	Threats
<ul style="list-style-type: none"> • Growing Population & Urbanization - Water demand for industrial, agricultural, municipal, and household purposes is surging as Germany's population and urbanization grow. As a result, greater water monitoring and solution efficiencies will be necessary. This will provide a window of opportunity for Somitra B.V. in Germany, where 13.5% of the available water supply is used, with public water supply accounting for 2.8%, meaning that 99.2% of the German population is connected to public water supply. Somitra advantages from this opportunity since their Digital Scanners can be used in both residential and commercial settings and will continue to perform effectively without the need for any extra components that would boost expenses. • Synergy - Unlike its German competitors, Sleer B.V. is able to supply consumers with custom-tailored solutions that meet their particular needs. Somitra's agility in terms of customizing highly personalized services at a faster pace to satisfy client expectations would be enhanced by adopting this method. Clients will benefit from the strong cooperation with Sleer B.V. in terms of coordination and development of various smart meter reading product lines, which will provide customers with full and unique solutions for optimizing the meter reading process. In that sense, Somitra B.V. can survive German market rivals' agility in adapting and developing products that meet customer demands, which is considered as a significant threat to the company. 	<ul style="list-style-type: none"> • Brand Awareness - In Germany, competitors are primarily huge corporations that have been operating in the German market for decades and offers a diverse range of products and services to their clients. Because of the reliability of their products, the seven key players in the German market mentioned above have such a high brand awareness, giving them an advantage in being chosen by German municipalities and water utilities over Somitra B.V. which is viewed as a new entrant to the market that has not yet established a solid foothold. • Increasing Revenues & Margins - According to the competitive landscape, market players from the smallest to the largest earned sales revenue in 2021 ranging from 23.29 million USD to 306 million USD. These revenues enable such businesses to be technologically agile, allowing them to develop their products, produce more units and expand their product and service range in the German market. Therefore, Somitra B.V. will find it difficult to achieve a higher market position. • Business Agility - All competitors have various manufacturing locations in Germany and employs a significant number of staff, allowing them to meet their clients' demands in terms of producing as many units as necessary. Somitra, on the other hand, employs fewer people and has only one manufacturing location, which may pose a threat to the company's ability to meet client requests, particularly if Somitra intends to form a B2G business model in the German market.

Table 11 – SWOT Analysis

7.7 SWOT Confrontation Matrix

Initially, the confrontation matrix is constructed through a combination of strengths, weaknesses, opportunities, and threats. There are four combinations that yield various outcomes. A final conclusion was then drawn based on the outcomes derived from those four combinations of the confrontation matrix. Here are the combinations:

- **SO:** This is a combination of strengths and opportunities that allows Somitra to perform what it does best while also taking advantage of opportunities to secure and enhance its core competencies.
- **WT:** This is a combination of threats and weaknesses. Somitra should carefully consider this area, since there is a significant external threat that will have a significant impact on its future operations in Germany based on their existing capabilities.
- **WO:** This is the combination of weaknesses and opportunities. This is a problem spot since it demonstrates that Somitra is attempting to capitalize on an opportunity for which they lack the capabilities needed for it.
- **ST:** This is the combination of strengths and threats. These are possibilities that demonstrate Somitra's ability to convert threats into opportunities.

		Opportunities		Threats			Total
		Growing Population & Urbanization	Synergy	Brand Awareness	Increasing Revenues & Margins	Business Agility	
Strengths	Sustainability	2	0	1	0	0	3
	Certifications	1	1	1	0	0	3
	Diversified Portfolio	-2	0	-2	0	-1	-5
Weaknesses	Suppliers Network	-2	0	-2	-2	-2	-8
	Promotion	-2	0	-2	0	0	-4
	Service Reliability	-2	1	-2	0	0	-3
Total		-5	2	-6	-2	-3	

-2 (Very Negative)	Combination of the two strongly worsen each other.
-1 (Negative)	Combination of the two mildly worsen each other.
0 (Neutral)	Combination of the two has no effect on each other.
1 (Positive)	Combination of the two mildly reinforce each other.
2 (Very Positive)	Combination of the two strongly reinforce each other.

Figure 14 - SWOT Confrontation Matrix

7.8 SWOT Confrontation Matrix Results

SO₁ - According to Somitra's present profile, one can notice that Sleer has a diverse range of production lines that serve a wide range of different sectors and provide products and services to a wide range of business categories. Apart from the Smart Water Meters category, Sleer currently serves seven other industries. This diversification reduces Somitra's ability to compete in the smart water metering market in Germany with products of comparable quality to those of competitors. In terms of operating systems and functionalities, Sleer's product lines are currently less advanced than those offered by German competitors.

In the confrontation matrix, it can be seen that the combination of a diversified portfolio as a strength and growing population and urbanization as an opportunity has a very negative effect on Somitra's current position, as Somitra does not generate as much sales revenue as current competitors operating in the German market; as a result, competitors have higher chances of producing higher quality smart meters that can meet and withstand the growing population's demands in terms of quality and number units required by German water utilities. However, if Somitra focuses on several business categories with a low budget compared to rivals, it will be unable to match the rising population's needs in terms of quality, and the number of units required to cover a vast geographical region through German water utilities.

ST₁- Somitra's current position is negatively affected by the combination of a diversified portfolio as a strength and brand awareness as a threat. Competitors in Germany are primarily large corporations who have been operating in the German market for decades and provide a wide range of smart water metering products and services to their customers. The seven key players in the German market mentioned in chapter 4 have such a high brand awareness as a result of the reliability of their products, giving them an advantage of being selected by German water utilities over Somitra, which is currently seeking investments to have their service solutions operate effectively without experiencing sudden errors when processing a large number of users. As a result of this problem, Somitra is viewed as a partner with less reliable products for German water utilities. This problem is directly linked to the first combination, which deals with a lack of focus on smart metering production in terms of quality and functionality due to the need to distribute their focus over their diversified portfolio as mentioned in SO₁. This problem directly influences their reliability level with German Water utilities which negatively affects the water utilities' perception of Somitra's reliability level. Therefore, water utilities' choice of Somitra's products will be less likely to happen; hence, ruining the image and decreasing awareness of the products' brand when comparing to competitors operating in the German market.

ST₂ - As a result of combining Somitra's diversified portfolio as a strength with business agility as a threat, Somitra will be less agile to respond to customer demands. The smart water metering market's business agility is founded on two factors, satisfying ongoing customer demands in terms of units supplied and adopting new technologies in terms of product development. These two factors necessitate ongoing R&D engagement. However, since Somitra employs fewer people and has only one manufacturing location, the company's capacity to satisfy client demands is jeopardized. On the other hand, all competitors have various manufacturing locations in Germany and employs a significant number of staff, allowing them to meet their clients' demands in terms of producing as many units as necessary as well as continuously developing and improving their product range through adopting new technologies.

As seen in figure 14, the combination has a negative effect. Somitra currently focuses on seven separate product lines, each serving a distinct business area, indicating a lack of focus on smart water metering, as discussed in SO₁. Somitra's limited budget is dispersed over multiple business areas, preventing them from achieving high levels of agility in the smart water metering market when compared to competitors operating in Germany. Lower agility primarily arises from two main factors. Initially, Somitra's inability to handle large client requests. Moreover, the technologies utilized by Somitra in the smart

water metering are inferior to those of rivals. This indicates that Somitra's agility is significantly lower than that of rivals.

WO₁ - Competitors in Germany have strong relationships with a variety of suppliers. Diehl, for example, has 2,300 suppliers and is a major German player in smart metering systems as mentioned in table 7. Suppliers in the smart metering industry are critical to a company's profitability and performance in terms of supporting innovations and advancements while maintaining optimum customer satisfaction since it allows them to adjust their products and services upon customers' requests. By having several suppliers, competitors obtain a competitive advantage in terms of optimum quality, thus improving their market position in Germany. Somitra, on the other hand, lacks comparable supplier relationships, which is seen as a flaw that could hinder the company's operations in Germany.

The combination of suppliers' network as a weakness and growing population and urbanization as an opportunity imposes a very negative effect on Somitra. This negative effect is primarily due to Somitra's poor suppliers' network, which is evident in the quality and technology displayed in the final product output when compared to rivals operating in the German market. As a result, companies with a strong supplier network can match the expectations of a rising population with considerably more advanced products that include higher quality as well as a far more advanced functionality. Unlike Somitra, which has a weaker supplier network, leading to lower product output in terms of quality and functionality across the German market.

WO₂ - Given the foregoing reasons, Somitra faces a very negative effect as a result of the combination of promotion as a weakness and growing population and urbanization as an opportunity. Water demand for industrial, agricultural, municipal, and household purposes is surging as Germany's population and urbanization grow. As a result, greater water monitoring and solution efficiencies will be necessary. However, as Somitra's product reliability remains questionable, water utilities switch to alternative products offered by competitors, leaving end-consumers unaware and unfamiliar with Somitra's products and services. Therefore, Somitra cannot induce an effective promotional approach due to German competitors that offers a far more reliable product and service solutions in the smart water metering market which are continuously selected by water utilities; hence, preventing Somitra from gaining a competitive edge.

WO₃ - During the interview with Mr. Vahid Niroumand, it was noted that Somitra only has one production facility; moreover, the software in place managing the smart water meter devices is currently developed as a prototype and requires investment in order to handle a greater number of users on the platform. On a wider scheme, both reasons reduce Somitra's overall service reliability with water utilities. Unlike rivals, who have several manufacturing locations and are continually embracing new technologies to improve the overall product solutions available. In this approach, water utilities are focused on smart water metering suppliers that have a high service reliability, ensuring the capability of delivering as many units as requested while maintaining optimal quality.

Somitra faces a very negative effect from the combination of service reliability as a weakness and growing population and urbanization as an opportunity. As previously stated, Germany's population and urbanization is increasingly growing; hence, water demand for industrial, agricultural, municipal, and household purposes is rising. Therefore, greater water monitoring and solution efficiencies will be required. To boost the odds of being selected by water utilities, efficient solutions demand a higher level of service reliability. To recapitulate, the more the population increases, the higher the number of competitors; hence, greater level of service reliability is necessary.

WT₁ - Suppliers variety and strong relationships are identified as essential elements in producing high-quality products in the smart water metering sector. Corporations in Germany cannot continuously provide a high-quality products and services to their clients without a strong relationship with suppliers. Sler presently has five suppliers for the smart water meters business category. Competitors, on the other hand, have a wide range of suppliers. Diehl, for example, has 2,300 suppliers, as described in table 7. Suppliers in the smart metering industry are critical to a company's profitability and performance in

terms of supporting innovations and developments while maintaining optimum customer satisfaction since it allows them to adjust their products and services upon their customers' requests. By having several suppliers, competitors gain a competitive advantage in terms of optimal quality, which improves their brand awareness in Germany. Somitra, on the other hand, lacks such supplier relationships.

As a result, Somitra encounters a very negative effect from the combination of suppliers' network as a weakness and brand awareness as a threat. The negative effect is defined by the fact that suppliers are in charge of the company's product output quality. This is evaluated through the materials delivered for the manufacturing process. In this way, having multiple suppliers increases suppliers' competitiveness in terms of the materials' quality provided, which results in enhancing the overall quality of the end product. In this way, brand awareness is mirrored by quality; if quality is high, the possibilities of being chosen by water utilities increase, and the company's brand awareness rises as a result. Water utilities would switch to rivals' products if the quality offered is poor, resulting in lower brand awareness.

Somitra currently lacks comparable relationships with suppliers when compared to rivals operating in Germany. The quality offered by Somitra is lower than this of competitors' due to few suppliers who have the power to determine the quality of inbound materials needed, which is mirrored through a lower brand awareness. Since Somitra's end-products' quality is seen lower compared to their competitors, this situation confronts Somitra with difficulties to form partnerships with German water utilities in the presence of higher-quality products offered by competitors.

WT₂ - According to the confrontation matrix illustrated figure 14, the combination of suppliers' network as a weakness and increasing revenues and margins of rivals has a highly negative effect on Somitra. A robust supplier network, as described in WT₁, has a substantial influence on products' quality. Competitors in Germany are using this strategy to continuously strengthen their supplier network in order to deliver the finest quality. Rivals' growing sales and revenues enable them to build a broader and stronger suppliers' network, allowing them to supply higher-quality products than Somitra.

WT₃ - Somitra is severely impacted by the combination of suppliers' network as a weakness and business agility as a threat which imposes a very negative effect as demonstrated in figure 14. As competitors operating in the German market established a broad and strong suppliers' network, materials are then flowing into various manufacturing locations, allowing them to increase agility in terms of units produced to meet customer demands while also enhancing the overall quality of products through the adoption of new technologies. Somitra, on the other hand, is less agile due to a weak suppliers' network, which decreases products' quality and meeting customer demands when compared to rivals with such a large and robust supplier network, which, in turn, reduces Somitra's possibilities of forming alliances with German water utilities.

WT₄ - Competitors in Germany are primarily large corporations that have been operating in the German market for decades and offer a diverse variety of products and services to their customers. The seven key players in the German market mentioned in chapter 4 have such a high brand awareness as a result of the reliability of their products and their large customer base, giving them an advantage in being selected by German water utilities over Somitra, which is viewed as a new entrant to the market that has yet to establish a solid foothold. Somitra's current position will result in an ineffective promotional activity as German water utilities lack familiarity with the products and services offered by Somitra. Primarily because the reliability of Somitra's products and services is questionable, this weakness puts them at a disadvantage, preventing them from achieving a competitive edge in the German market. Therefore, the combination of promotion as a weakness and brand awareness as a threat, imposes a very negative effect on Somitra. If Somitra intends to enter the German market at this current stage, their weak promotional presence when compared to competitors will decrease and negatively affect their brand awareness.

WT₅ - The combination of service reliability as a weakness and brand awareness as a threat imposes a very negative effect on Somitra. Referencing all of the factors determined from the confrontation matrix that have a direct impact on Somitra's service reliability, it is clear that German water utilities put a

priority on alternative solutions supplied by rivals because of their superior service reliability. Higher service reliability leads to increased brand recognition, which eventually leads to increased brand awareness.

Recommendations

Chapter 8

Somitra's current capabilities have proven that they do not correspond with the current market situation, resulting in 11 negative combinations that will have a significant impact on Somitra if they attempt to enter the German market during this juncture - See Figure 14 - Confrontation Matrix Results. As an outcome, Somitra is left with three possible solutions in order to bridge the identified gaps between potential customers and their product solutions within the German market. The following were found to be the most superlative solutions for transitioning 8 red highlights in the confrontation matrix into green highlights that demonstrate a positive impact on Somitra when dimensions are integrated, which indicates a safe market entry - See Figure 15 - Expected Confrontation. In the following sections, all 3 recommendations are covered in depth and fortified with SAFe criteria.

8.1 Strengthening Suppliers' Network

WO₁ - In Germany, competitors have strong ties with a wide range of suppliers. In the German smart water metering market, suppliers are crucial to a company's profitability and effectiveness in terms of supporting technological breakthroughs while maintaining high levels of customer satisfaction - See Confrontation Matrix Results - WO₁. If the company strengthens its suppliers' network, Somitra can upgrade its material quality and catalyse its inbound logistics processes, which will be mirrored in the number of units produced, quality, and technology provided in the final product output. As a result, Somitra will be able to satisfy the requirements of a growing population by offering significantly more advanced products with higher quality and functionality. This increased quality and functionality will meet Germany's growing population demands in terms of features and attributes that can operate in an efficient and effective manner.

WT₁ - As suppliers' network expands, suppliers' competitiveness will increase in terms of the materials' quality provided. In this approach, quality reflects brand awareness; if quality is high, the possibilities of forming strategic partnerships with water utilities increase, and Somitra's brand awareness rises as a result.

WT₂ - Rivals' increasing sales and revenues allow them to expand and strengthen their supplier network, enabling them to provide higher-quality products than Somitra. Please refer to Confrontation Matrix Results - WT₂ for an in-depth elaboration. Developing Somitra's suppliers' network will enable the company to offer products that are comparable to those of rivals in terms of quality, features, and attributes. This will greatly mitigate the negative impact generated from the combination of suppliers' network as a weakness and rivals' increasing revenues and margins as a threat.

WT₃ - Expanding suppliers' network will increase Somitra's agility in terms of units produced to fulfill changing customer demands while also enhancing the overall product quality through adopting of new technologies. This will eventually diminish the negative impact of the combination of a supplier's network as a weakness and business agility as a threat - See Confrontation Matrix Results - WT₃. And boost the Somitra's opportunities in forming strategic partnerships with more utilities.

Suitability	In Germany's smart water metering market, the suppliers' network is key. Referring back to Chapter 2 - Pestel Analysis, it can be seen that digitalization is becoming more prevalent in the German water sector, which is driving demand for new innovative services that can enhance efficiency and water system standards; as a result, rivals are continually pursuing new technologies to improve features, qualities, and attributes of their products. The aim of this ongoing technological advancement is to provide solutions that can accurately assess water usage and consumption rate per user. This involves the use of smart digital systems that can properly read meter data for each residential unit, which mandates the use of enhanced technological connectivity. As a result, the German water industry is constantly pushing demand for new innovative solutions that can leverage digitalization to increase efficiency and enhance water system standards. Competitive rivalry is
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	<p>considered to be a "strong force" when the demand for new innovative solutions grows. Product performance, reliability, and ingenuity of product, service, and solution, application expertise and process knowledge, brand reputation, water efficiency, product compliance with regulatory and environmental requirements, product lifecycle cost, scalability, timeliness of delivery, proximity of service centers to customers, effectiveness of distribution channels, and price are all major determinants that is largely based on a company's suppliers' choice and network. These aspects also define competition in the German smart water metering sector. It is shown that the German market's 7 major rivals gain a competitive advantage by having a robust supplier network. For example, Diehl has over 2,300 suppliers, whereas Somitra relies on only 4 suppliers across eight distinct business areas. As a result, if Somitra intends to enter the German market successfully, it will necessitate a strong suppliers' network. Strengthening Somitra's supplier network will assist the company tackle four major challenges depicted in the confrontation matrix - See <i>Figure 14 - Confrontation Matrix Results</i>, allowing it to survive and withstand competition in the German market.</p>
Acceptability	<p>According to Mr. Pourya, the In-company supervisor, Strengthening suppliers' networks is found to be a useful recommendation with measurable returns, minimal risk, and stakeholders are open to implementing it; however, the main concern is the bargaining power of suppliers and the key and large known incumbents in the market. The smart water metering market is a new market and suppliers are concentrated as mentioned in Market Research held. As a consequence, physical components can be commoditized or even replaced by software over time as the smart and connection components of the smart water meters give a greater value than physical components, as is now the case. Software also decreases the requirement for physical tailoring; hence, the amount of physical component variations decrease as well. Traditional suppliers' contribution to the overall traditional metering systems cost will inevitably shrink, as well as their bargaining power. The new smart water meter products, on the other hand, are introducing new powerful suppliers that manufacturers have never required before, Suppliers now are providing sensors, software connectivity, embedded operating systems, data storage, analytics, and other components of the smart water meters' technological stack. As a result of the concentration of suppliers, Somitra's bargaining power will be reduced which is going to be reflected on Somitra's profitability and internal funds. Therefore, Somitra might not be able to implement this recommendation at this current stage.</p>
Feasibility	<p>The solution can work in practice through external financing and additional funds coming through investors. The solution requires an enhancement of the procurement process through assessing current suppliers and seeking new suitable suppliers. This can be accomplished through employing Supplier Quality Engineers that will serve as auditors to assess and evaluate suppliers' standards before and after partnerships are established. Moreover, Somitra can employ Product Quality Engineers to inspect suppliers' materials quality which can ensure high quality materials being inbound. Those are the two prime resources required to integrate the solution efficiently. Somitra recently hired Mr. Toon van Hoesel as a Business Development Manager. The company can largely benefit from Mr. Hoesel's relations to seek investors for external financing which was the case during the previous months. Mr. Hoesel has recommended and arranged meetings with multiple investors that are willing to finance Somitra's smart water metering projects due to its potential. This demonstrates that wide relationships are the major capability required to finance the smart water metering projects.</p>

Table 12 – SAFe Criteria – Strengthening Suppliers' Network

8.2 Enhancing Service Reliability

WO₃ - During the interview with Mr. Vahid Niroumand, it was highlighted that Somitra only has one manufacturing facility; also, the software in place to manage the smart water meter devices is still in the prototype stage and cannot handle a larger number of users – See *Confrontation Matrix Results* – WO₃. If

Somitra improves its service reliability, the company will be able to develop its software to manage a substantial number of users. As Germany's population and urbanization increase, so does the demand for water for numerous purposes. As a result, more water monitoring and solution efficiencies will be necessary. In this way, Somitra will enhance its possibility of being selected by water utilities, as efficient solutions necessitate a greater level of service reliability, which will be maximized if service reliability is enhanced.

WT₅ - Because of their superior service reliability, German water utilities prioritize alternative options provided by competitors, which gives them a stronger brand awareness – See *Confrontation Matrix Results* – WT₅. Higher service reliability inevitably leads to increased brand recognition, which in turn leads to enhanced brand awareness. As Somitra's service reliability improves, its brand awareness will increase. The rationale for this is that as water utilities form strategic partnerships with Somitra due to its high service reliability, Somitra will benefit from an increased brand recognition which will result in other water utilities selecting Somitra as a smart water metering supplier, resulting in a significant enhancement of Somitra's brand awareness.

Suitability	As previously stated in section 8.1, digitalization is becoming more prominent in the German water sector, which is pushing demand for new innovative services that can improve efficiency and water system standards; as a result, competitors are continuously pursuing new technologies to improve smart water metering software's features, capabilities, and options. As a result, Somitra must expand and improve its software capabilities in order to administer a large number of users. As previously noted, German water utilities are public entities, with public water supply systems serving 99% of German consumers. Forming strategic partnerships with public water utilities in this case demonstrates that providers will be in charge of delivering a software that can monitor, collect, process, and store data across vast geographical regions. This signifies that German water utilities develop strategic alliances with suppliers who have a high level of service reliability, which is reflected in the products and services provided. As a result, Somitra should opt for a software that can efficiently and effectively manage and handle users' data without lagging or eventually failing when a substantial volume of data are being communicated and processed which is the case for Somitra during this stage.
Acceptability	According to Mr. Pourya, the In-company supervisor, enhancing service reliability is seen as a crucial and valid point with medium to high potential returns; risk is medium because we should not delay market entry too much and perhaps a pilot work (our next step in Brabant Province) could cover it; stakeholders understand and fully agree with it, and for the reasons stated above, this recommendation has to be implemented so we can deploy our products within the domestic market and export our smart metering solutions to foreign markets.
Feasability	As noted in section 5.4, the software as a prototype currently provides a plethora of simple and easy-to-use solutions which enables water utilities to make use of a bidirectional communication using AMI technology. This means that data are transmitted through the device to the software for monitoring and processing real-time data while the utilities are allowed to issue various commands to the device to quickly halt, limit, or enhance water delivery depending on the scenario. In addition, the software dashboard provides extremely detailed information on users' usage per household by profiling all meters used under a certain user's identity. However, the software cannot handle more than 100 users which is not reliable as when the number of users exceed the indicated number, an error will occur which will cause the software to ultimately fail. Therefore, Somitra requires a significant development of their software. This solution is feasible if external financing is applied. Additional resources in terms of programmers and IT specialists are currently not a necessity; however, external financing and additional funding are required.

Table 13 – SAFe Criteria – Enhancing Service Reliability

8.3 Selection of a Priority Sector

SO₁ - Sler has a diversified range of manufacturing lines that serve a broad array of different sectors and provide products and services to a large range of business categories, according to Somitra's current profile. Sler presently serves seven different sectors in addition to Smart Water Meters. Due to a lack of focus, Somitra's capacity to compete in the smart water metering market in Germany with highquality products is hampered, resulting in lower a production output than that of rivals. It can be observed that Somitra's current position is severely impacted by the combination of a diversified portfolio as a strength and a growing population and urbanization as an opportunity. Therefore, it is advised that Somitra focuses its R&D efforts toward a single sector to improve its presence in the smart water metering market with products that are comparable to those of competitors in terms of operating systems and functionalities. This will eventually lead Somitra to match the rising population's needs in terms of quality, and the number of units required to cover a vast geographical region through German water utilities. Sler's product lines are currently less advanced than those offered by German competitors - See *Confrontation Matrix Results – SO₁*.

ST₂ - When compared to competitors, Somitra's limited budget is scattered over several business areas, prohibiting them from obtaining high levels of agility in the smart water metering market - See *Confrontation Matrix Results – ST₂*. Thus, it is advised that Somitra tailor its limited budget in one direction to have the capability to satisfy changing customer demands in terms of units supplied and to adopt new technologies that concerns product development. In this approach, Somitra will enhance its agility to withstand competitor's continuous product developments.

Suitability	Shutting down a business category is not a viable solution for the organization. To avoid risk, Somitra presently scatters its investments across a wide array of industries and other areas. However, the findings of the study revealed that diversification is costly for Somitra at this juncture, particularly because all of the business categories in which Somitra is now involved demand substantial resources, such as various types of R&D staff, materials, and testing equipment. As a result, covering eight distinct business categories with a limited budget might have severe drawbacks. When compared to rivals in the German market, these deficiencies are seen in the end-products' quality, features, materials, and properties. As a result, the recommendation that arose was to focus on a key industry with high potential and adapt their limited budget to this sector in order to enhance the company's presence in the German market. Somitra will be able to meet the growing population's demands in terms of both quality and the quantity of units necessary to cover a large geographical area via German water utilities as a result. In addition, Somitra will have the capabilities to be agile in order to meet changing customer demands in terms of units delivered and to adopt new technologies in terms of product development. This advice, however, cannot be termed "suitable" because it is based on the results of a single market study, namely the German market. This denotes that other markets are beyond the scope of the study; as a result, such a decision cannot be generalized; therefore, not suitable, particularly because the German market is difficult to enter due to the severe competitive rivalry mentioned previously.
Acceptability	According to Mr. Pourya, the In-company supervisor, Given the limited resources of Somitra, this recommendation makes full sense in practice, we should be fully concentrating on the Water utility sector. Yet, we agree that we should be aware of this pitfall all the time when making decisions so stakeholders are on the same page and can mitigate the risk of failure. In this approach, diversification is used by the company to lower the risk and grow into new markets and sectors with high potential returns in order to increase profitability.
Feasability	Based on the aforementioned suitability and acceptability situation, Somitra is expected to continue operating in different business sectors since they already generate revenue to the company. Somitra is striving for a gradual growth in each sector individually and not planning to abandon any of the current ongoing businesses. This strategy established by

	the company weakens the feasibility of this solution. Moreover, narrowing down Somitra's business focus is mentioned as an advice based on the study executed over the German market only.
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Table 14 – SAFe Criteria – Selection of a Priority Sector

8.4 Temporary Shift to Private Water Supply Entities (Side Recommendation)

This recommendation requires extended research; thus SAFe criteria is not applied. This recommendation is illustrated as a long-term solution that can potentially eliminate two challenges when Somitra redirects its target market to Germany. In Germany, more than 99% of end-users are connected to a public water supply system, implying that water utilities are public utilities that are supplying vast geographical areas. This illustrates that German water utilities form partnerships with competent providers, allowing them to satisfy changing customer demands. Somitra currently lacks comparable capabilities of competitors operating in Germany - See Table 11 - SWOT Analysis. Therefore, a transition to private water supply entities is recommended as a temporary solution. This transition is viewed as a springboard for raising Somitra's brand awareness through strengthening its promotional strategy. Subsequently, Somitra can gradually redirect the focal point on Germany's public water supply entities. As Somitra enters the German market at a future stage, this temporary move will substantially reduce two challenges. The sub-sections that follow clarify how the solution alleviates those challenges.

WO₂ - Somitra is facing a highly negative effect as a result of the combination of promotion as a weakness and growing population and urbanization as an opportunity. As previously noted, as Germany's population and urbanization rise, so does water demand for a wide range of applications. As a result, Somitra will need a strong promotional strategy to boost its prospects of forming strategic alliances with German water utilities. This strong promotional strategy is reflected through 3 key factors: the company's customer base, brand familiarity and products' reliability. If all 3 factors are present, end-consumers will be aware and familiar with Somitra's products and services, enabling water utilities to view Somitra as a reliable partner which increases Somitra's chances in forming strategic partnerships with water utilities.

Due to rising competitive rivalry, Somitra's current capabilities do not allow them to prove their product reliability which decreases their brand recognition and thus, failing to build a large customer base in the German market, which triggers German water utilities switch to rivals' products. Therefore, Somitra needs to adopt a blue ocean strategy, in which they can currently concentrate their efforts on private water supply entities outside of Germany, where competition is less intense and narrower geographical areas are covered. In that sense, the number of units required by private utilities will be less than those demanded by public utilities. Somitra will then be able to meet customer demands and generate new revenue streams; thus enlarging their customer base. In the long run, this strategy will increase customers' familiarity with Somitra's products and services, as their products and services will be already tested and proven effectiveness in other regions. As a result, Somitra's prospects of forming strategic alliances with German water utilities in a later stage will improve drastically, as its strong promotion will increase its publicity in communicating with its target market.

WT₄ - Because of the reliability of their products and their large customer base, the 7 leading players operating in the German market have such high brand awareness as a result of their strong promotional approach, providing them an advantage over Somitra during this stage - See Confrontation Matrix Results – WT₄ for an in-depth elaboration. If Somitra transitioned its focus to private water supply entities outside of Germany, as explained above, their promotional strategy will become effective, leading to a higher brand recognition, resulting in a higher brand awareness, which on the wider scheme will benefit Somitra in establishing a solid foothold when they enter the German market in a later stage. However, if Somitra attempts to enter the German market at this current stage, their weak promotional presence when compared to competitors will decrease and negatively affect their brand awareness.

Figure 15 illustrates the expected confrontation if all 3 recommendations are applied successfully.

		Opportunities		Threats			Total
		Growing Population & Urbanization	Synergy	Brand Awareness	Increasing Revenues & Margins	Business Agility	
Strengths	Sustainability	2	0	1	0	0	3
	Certifications	1	1	1	0	0	3
	Diversified Portfolio	2	0	-2	0	1	1
Weaknesses	Suppliers Network	2	0	2	1	2	7
	Promotion	-2	0	-2	0	0	-4
	Service Reliability	2	1	2	0	0	5
Total		7	2	2	1	3	

-2 (Very Negative)	Combination of the two strongly worsen each other.
-1 (Negative)	Combination of the two mildly worsen each other.
0 (Neutral)	Combination of the two has no effect on each other.
1 (Positive)	Combination of the two mildly reinforce each other.
2 (Very Positive)	Combination of the two strongly reinforce each other.

Figure 1 – Expected Confrontation After Recommendations are Applied

Appendix

Chapter 9

7.5 Internal Interview Transcription

Company: Somitra B.V.

Interviewee Name: Mr. Vahid Niroumand

Interviewee Position: Technical Manager

Interview Type: Internal Interview

Q1. What products will Somitra B.V. introduce in the German market?

A. Digital Scanners, Optical Sensors, as well as Electromagnetic Sensors. The Optical sensors detect, measure, and send data received from the analogue counters on the water meter, whereas the Electromagnetic sensor reads only the magnetic counters and sends the information received to the utility.

Q2. What is the purpose of the Counters? What exactly do they read?

A. Different metrics are measured by the counters. So the first counter measures in cubic meters, the second in liters, and the third in CC, so it keeps track of how much water is flowing through the pipeline. Somitra's three products provide three alternative ways to report to the water utility, each monitors a different metric.

Q3. Are there any particular types of meters that should be installed in residential or commercial areas?

A. It depends on the utility's reporting requirements; for example, the Electromagnetic Sensor only reports in cubic meters. In this respect, there are no specific sensor categories for certain areas; instead, it is dependent on the utility's reporting standards. For example, a utility may request an exact number of liters on occasion, but most of the time, measurements in cubic meters are preferred. Therefore, all three sensors can be fitted on any meter while taking into account the utility's metric requirements.

Q4. Why did Somitra introduce the Electromagnetic Sensor, which only reads a single counter? While the Optical Sensor can detect and measure all counters?

A. In comparison to optical sensors, the Electromagnetic Sensor uses 25% less electricity and energy. So, for utilities that don't require a multi-function sensor and is only required to read a single metric offered by an electromagnetic sensor, then the electromagnetic sensor becomes the more cost-effective option in terms of price and resources consumed.

Q5. Then Optical Sensors must be more costly in terms of production?

A. Yes, because optical sensors are far more flexible, and the rotation feature of the sensor allows it to read all counters, whereas the electromagnetic sensors are less flexible because it does not only read magnetic counters, but it also requires changing the placement of the counter inside the meter to properly make use of the sensor, which is not allowed unless the utility changes it. As a result, the electromagnetic sensor is limited by regulatory requirements and might be quite inconvenient to install.

Q6. It was mentioned that Digital Scanners are being launched by Somitra, could you elaborate more on this product?

A. This is a considerably more advanced technology since it accurately monitors the entire screen of the meter after being mounted on top of it, and it then analyzes and transmits all of the information provided on the meter to the software, where everything on the meter is precisely reported to the utility in real-time.

Q7. I can see that the products brand is called "Sleer". Is Somitra outsourcing the production of the sensors?

- A. No, Sleer B.V. is a Somitra Group company that will soon begin operations in Roosendaal. Sohrab Bozorg Pishani, the founder of Somitra B.V., is also the CEO of Sleer B.V. As a top European smart and digital technology developer. So Sleer B.V. is a subsidiary of Somitra B.V.

Q8. In the Digital Scanners, what technological systems does Somitra employ?

- A. The company utilizes AMI technology systems because the software allows for a two-way communication path, allowing the utility to simply break, limit, or increase water flow depending on the situation.

Q9. What limitations would the utility incur when using the Digital Scanner's software dashboard?

- A. The software is a key component of the Digital Scanners bundle; however the only drawback is that it requires a server. For example, if a municipality purchases 100,000 units of the Digital Scanner, each user profile must be created. Meaning that the software is currently developed as a prototype, which implies that it won't be able to handle a large number of user profiles without causing the software to lag and eventually crash. As a result, the R&D department is presently working on building software that will be able to handle numerous users' profiles and will make the process of profiling for utilities easier, allowing them to properly manage the information transmitted through the Digital Scanner. In a nutshell, Somitra is on the lookout for funding to upgrade the software of the Digital Scanner. The software can currently manage up to 100 users flawlessly, but it will have to be improved in order to support bigger user counts.

Q10. What are Somitra's competitive advantage in comparison to the technologies adopted by competitors operating in the German Market?

- A. In Germany, competitors are primarily focused on providing beneficial insights to end-consumers rather than utilities, as their ultimate goal is to influence customer behavior and tailor it towards a more sustainable approach in terms of water consumption. As a result, competitors are primarily focusing on developing mobile applications and other services for end-consumers to keep track of their daily water consumption. Somitra, on the other hand, is largely focused on giving more specific insights and information to water utilities rather than end-consumers by establishing a software dashboard that, as previously indicated, allows for a two-way communication line using AMI technology. In addition, the software dashboard provides very precise information on a user's usage per household by profiling all of the meters used under the name of a certain user. Additionally, Utility companies can also use the software to open and close valves. For example, if a customer fails to pay their bills or if a leak occurs in a certain region, the utility can instantly close the water valve in that area using the dashboard. In the bargain, searching for users is considerably more convenient for utilities. Users can be found by typing their last names, residence, area, postal code, or subscription number into the dashboard's search engine. As a result, Somitra makes it easier for water utilities to find customers. In addition, if an end-user installs energy meters or electricity meters alongside water meters, or owns numerous households, the software automatically builds a dossier and links all meters used under that person's identity. Somitra strives to incorporate as much information about consumers' consumption as possible, as well as the convenience with which that information may be retrieved. Moreover, the software automatically determines the pricing for each user according to their consumption rate using sophisticated programming tools which converts the water flowing through the pipelines to number to an ultimate price ready to be billed to the end consumer. Furthermore, the software issues comparable consumption reports for the same user that compares real-time consumption to the past 24-hours consumption and retrieve an average consumption rate. That way, utilities can keep an accurate track of the customer behavior and helps with detecting other issues such as leakage. Ultimately, the software and the Digital Scanner does not require Wi-Fi or any type of internet connection to transmit or analyze data and this feature contributes enormously to sustainability in terms of reducing carbon footprints. In a nutshell, Somitra's software assists utilities in tracking water use and user behaviour through a mass of options that are simple, and easy-to-use.

Q11. How often does the Digital Scanner provides readings to the Utility?

- A.** The scanner provides reading to the utility on demand, it can be real-time, once per hour, per day, per week, or per month. Depends on what the utility requests from the software.

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