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Digital Transformation and Global Entrepreneurship

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**Topic: Unlocking Value Through IoT-Enabled Digital Transformation in Off-Highway
Vehicle Industry**

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Declaration

I hereby declare that this master's thesis entitled "Unlocking Value Through IoT-Enabled Digital Transformation in Off-highway Vehicle Industry" is my own original work. I have completed this thesis at Bosch Rexroth AG in Ulm, Germany, and have acknowledged all sources of information and assistance as indicated in the bibliography.

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Abstract

Digital transformation has created a dynamic business environment that has greatly affected several industries, including the off-highway vehicle market (Reis, 2018). The potential of IoT-enabled digital transformation in this industry is examined in this master's thesis, with an emphasis on Bosch Rexroth's BODAS Connect IoT ecosystem. Advanced industrial technology company Bosch Rexroth AG has created an IoT platform that makes it easier to connect, monitor, and operate off-highway vehicles while offering vital information for well-informed decision-making. To improve value creation along the value chain, this master's thesis intends to investigate how certified solution partners might close the gap between Rexroth and medium or smaller OEMs.

Furthermore, this master's thesis highlights the difficulties that many stakeholders such as vehicle owners, end users, and OEMs face because of the lack of real-time knowledge (De WAARD, 2019). This study outlines a few goals, including analysing the BODAS Connect platform, showcasing the present business model, contrasting it with peers, investigating market prospects, assessing value creation, and putting up a fresh idea for a business model that makes use of solution partners. Thus, the research question arises based on the current issues and problems, which is: *How can BODAS Connect create value through certified solution partners in the Off-Highway Vehicle Industry?*

In addition, this master's thesis makes practical suggestions for improving the BODAS Connect business model, encouraging greater cooperation with solution partners and broadening the product's market value. Bosch Rexroth can optimize its IoT services and promote industry-wide transformation by attending to the demands of medium or smaller OEMs, fleet managers, and end users. This thorough research highlights how the Internet of Things is revolutionizing the off-highway vehicle sector and offers a path forward for new developments and potential partnerships. Through interdisciplinary collaboration, the incorporation of IoT technology promises to change processes, improve resource management, and boost operational excellence while addressing societal and environmental concerns.

Keywords: Off-highway Vehicles; Digital Transformation; IoT; Digital Business Models; Bosch Rexroth; Value Creation; Operational Efficiency; Market Dynamics; Strategic Partnership; Technological Innovation

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Abbreviations

3G	Third Generation of Mobile Telecommunications
4G	Fourth Generation of Mobile Telecommunications
.dbc	Database Container file (related to CAN)
AE	Automation and Electrification Solutions
AG	Aktiengesellschaft (German for "Stock Corporation")
AI	Artificial Intelligence
AT	Assembly Technology
BODAS	Bosch Rexroth Digital Application Solutions
CAN	Controller Area Network
CCPA	California Consumer Privacy Act
CE	Certified Excellence
CH	Compact Hydraulics
CU	Country Unit
DC	Drive and Control
E/E	Electrical/Electronic
ECUs	Electronic Control Units
EUR	Euro (currency)
FAQ	Frequently Asked Questions
FOTA	Flash Over-The-Air
FOTA	Firmware Over-The-Air
GDPR	General Data Protection Regulation
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HoP2	Homburg Plant 2
IH	Industrial Hydraulics
IP	Ingress Protection
ISO	International Organization for Standardization
IT	Information Technology
LT	Linear Motion Technology
M2M	Machine-to-Machine
MH	Mobile Hydraulics
NAND-Flash	Not AND - type of non-volatile storage technology
OEM	Original Equipment Manufacturer
OHV	Off-Highway Vehicle
PoC	Proof of Concept
PR1	SAP PR1 (Purchase Requisition 1)
Q&A	Question and Answer
RAM	Random Access Memory
R&D	Research and Development
RCU	Rexroth Communication Unit
RCU	Rexroth Connectivity Unit
RC	Rexroth Controller
RCs	Rexroth Controllers
RCUs	Rexroth Control Units
ROI	Return on Investment
SaaS	Software as a Service
SAP	Systems, Applications, and Products in Data Processing
SOTA	Software Over-The-Air
SWOT	Strengths, Weaknesses, Opportunities, and Threats
UI	User Interface
UDS	Unified Diagnostic Services
UX	User Experience

Glossaries

BODAS	Bosch Rexroth Digital Application Solutions (BODAS) - this refers to the full range of IoT products, electronic hardware, and software that Bosch Rexroth AG offers for the off-highway industry.
BODAS Connect	Bosch Rexroth Mobile Hydraulics' digital and IoT portfolio, powered by the Bosch IoT Suite by Bosch.IO & Nexeed Device Portal by Bosch Connected Industry. Includes Device Management, Data Management, and Applications.
Consulted	Those who set up standards for quality reviews or offer insightful feedback.
CU DSO or Legal Expert	Bosch or Rexroth regional expert about certification and legal requirements.
CU IoT Champions	Application and software expert of the country unit or region. Has IoT knowledge and is responsible for technical communication/support with/for the customer.
CU Sales	Sales Engineer/Manager of the country unit or region. Responsible for customer acquisition and communication.
Customer	The intended client, most likely interested in BODAS Connect and IoT.
E/E Architecture	The system that connects in-vehicle ECUs, sensors, actuators etc.
Informed	People who offer suggestions and need to be updated on outcomes or actions made.
Internet of Things (IoT)	An interconnected network of mechanical and digital devices that transfer data across a network without the need for a human-to-human or human-to-computer interface.

IoT Business Model	A business model centred on IoT devices, explaining how a company develops, provides, and gains value.
IoT Expert	Project IoT technical expert responsible for supporting the CU IoT Champions.
IoT feature(s)/solution(s)	A catalogue of Internet of Things capabilities, products, and services that meet the value proposition.
IoT Sales	Business development sales interface responsible for supporting the CU Sales.
Persona	Individuals or organizations sharing the same traits, requirements, and objectives as the target market for the product.
Responsible	The individual who has final responsibility for the task at hand.
Revenue Model	A revenue model is a method of generating income. It outlines the value to be provided, the price to be charged for the value, and the revenue stream to be pursued. It is crucial to the financial plan of an organization. If a new company lacks a defined sales plan, excessive costs will likely be its biggest obstacle.
Supporting	The individuals providing resources, service, or other tangible benefits to support the “actual” effort.
Value Proposition	The advantages that clients can anticipate from a combination of goods and services.
Willingness to Pay	A customer’s maximum willingness to pay, or less, for a product.

Sources: (Telematics and IoT Off-Highway, 2024); (Cambridge Dictionary, 2024); (Wikipedia, 2024); (Strategyzer, 2023); (Software AG, 2023); (Harvard Business School, 2020); (Altexsoft, 2022)

1. Introduction

This introductory chapter provides an in-depth overview of this master's thesis, including the background and context, problem statement, goals and questions of the research, research importance, limitations, and general organization of the thesis.

1.1 Background and Context

The dynamic changes that define the modern business landscape are caused by the widespread impact of digital transformation in a variety of industries (Reis, 2018). This innovative development is also visible in the off-highway vehicle sector, which encompasses industries such as construction or agriculture. Utilizing Internet of Things (IoT) technologies, companies like Bosch Rexroth AG are at the leading edge of an important evolution in the operation, maintenance, and management of off-highway vehicles (Bosch Rexroth, 2024f).

Bosch Rexroth, a dominant industrial force, is leading the development of an Internet of Things platform that allows clients to effortlessly connect, monitor, and manage many off-highway vehicles at the same time. Because of the extraordinary degree of machine connectivity made possible by this IoT ecosystem, data can be collected and analysed more easily, leading to more informed decision-making. The ability to update devices remotely via over-the-air software upgrades is one of its notable features. Additionally, automated diagnostics are offered to aid in the prompt resolution of issues (Bosch Rexroth, 2024f). Bosch Rexroth is currently developing a new business model in collaboration with solution partner organizations. This model is expected to completely transform the way off-highway vehicle stakeholders engage with and profit from one another.

To be more precise, Bosch Rexroth's commitment comprises working directly with big OEMs (focus customers). In this master's thesis, it is analysed that how certified solution partners help to reach medium and small OEMs (non-focus customers). The objective is to deliver more valuable services to current and new clients while also contributing creative ideas and business models in the fields of off-highway vehicles (Bosch Rexroth Internal Information, 2024).

Thus, this master's thesis guides to investigate the unrealized potential of IoT-enabled digital transformation in the off-highway vehicle industry, with a particular focus on Rexroth's IoT ecosystem and its extensive impact on solution partners within the value chain.

1.2 Statement of the Problem

Despite the clear advantages of IoT-enabled solutions, a substantial number of off-highway vehicles continue to operate without real-time data collecting and processing. Several challenges arise from this lack of accessibility, including a shortage of knowledge about important areas like fuel usage, servicing requirements, and the environmental impact of operations (Shuai, 2022). The challenges encountered by stakeholders are multifaceted. Vehicle owners struggle with operational inefficiencies and increased maintenance costs due to the lack of real-time insights. Farmers, end users of off-highway vehicles, experience poor productivity and resource utilization. Manufacturers (OEMs) find it challenging to innovate and tailor products without accurate and timely data. Certified partners, integral intermediaries in the ecosystem, effort to provide value-added services without comprehensive connectivity (DE WAARD, 2023). Solution providers like Bosch Rexroth AG face limitations in delivering complete solutions without real-time insights into machine performance. Bosch Rexroth does

not have direct contact with these small OEMs or end users from different countries. Certified solution partners have direct contact with these customers. There is a great chance to create value for the entire value chain by bridging this gap and putting in place an efficient business model.

1.3 Research Objectives

The principal goals of this master's thesis are comprehensive and complicated, aiming to resolve the complexities of IoT-enabled digital transformation in the off-highway vehicle industry. The objectives are:

1. **Analyse the Bosch Rexroth AG IoT Ecosystem:** This master's thesis will provide a comprehensive overview of the BODAS Connect platform, including its key components, functionalities, and data analytics capabilities. Furthermore, it shows the map of the customer journey who are currently using BODAS Connect, identifying critical touchpoints and potential pain points.
2. **Review the Current Business Model of BODAS Connect:** This study will examine the existing business model components, including revenue streams, cost structures, and key activities etc. This research will propose modifications to the business model to incorporate certified solution partners, enhancing value delivery to non-focus customers such as medium or small OEMs, fleet managers, and end users.
3. **Compare BODAS Connect with Competitors:** To conduct a comparative analysis of BODAS Connect and its main competitors in the Off-Highway Vehicle Industry, focusing on IoT capabilities and digital transformation potential. To identify the strengths and weaknesses of BODAS Connect relative to these competitors, providing recommendations for improvement and differentiation.
4. **Explore Market Opportunities and Strategic Partnerships:** To identify new market opportunities for BODAS Connect by addressing the unique needs of small OEMs, fleet managers, and end users. To outline strategies for developing and managing strategic partnerships with certified solution partners, ensuring mutual benefits and enhanced service delivery.
5. **Evaluate Value Creation and Customer Engagement:** To assess how IoT-enabled digital transformation through BODAS Connect can lead to increased operational efficiencies, reduced costs, and improved decision-making for end customers. To propose strategies for enhancing customer engagement and satisfaction by tailoring the BODAS Connect offering to meet the needs of a broader customer base.
6. **Propose Business Model Concept:** Formulate a comprehensive business model concept that strategically leverages certified partners as intermediaries in the adoption of IoT solutions within the off-highway vehicle ecosystem.
7. **Provide Recommendations:** Offer actionable recommendations for the effective implementation and promotion of the proposed business model. These recommendations are designed to enhance sales, add tangible value to the chain, and catalyse industry-wide transformation.

1.4 Research Questions

This study derives its aim from the problem and the current understanding, which focuses on the reasons how solution partners can create value and bridge the gap between Bosch Rexroth and other stakeholders with the help of digital transformation processes and develop an efficient business model for BODAS Connect.

This study is grounded in the main research question, which is: *How can BODAS Connect create value through certified solution partners in the Off-Highway Vehicle Industry?*

To holistically address this overarching question, a set of interrelated sub-questions will be systematically explored:

SQ1: *What are the key components and functionalities of BODAS Connect within the Bosch Rexroth's IoT ecosystem?*

SQ2: *What are the typical stages in the customer journey for using BODAS Connect?*

SQ3: *What are the current business model components of BODAS Connect?*

SQ4: *What are the strengths and weaknesses of BODAS Connect compared to its competitor?*

SQ5: *What are the roles and importance of solution partners in the value chain?*

1.5 Significance of the Study

This master's thesis aims to provide a comprehensive understanding of how IoT-enabled solutions like BODAS Connect can drive digital transformation in the Off-Highway Vehicle Industry. By expanding the focus to include certified solution partners, the research will explore new business opportunities and value creation for a broader range of stakeholders. The study will demonstrate how integrating IoT technologies can revolutionize the Off-Highway Vehicle Industry, leading to enhanced operational efficiencies, predictive maintenance, and smarter vehicle management. The research will identify strategies for Bosch Rexroth to expand its market reach, particularly by addressing the needs of smaller OEMs, fleet managers, and end users who may have been previously underserved. By understanding the specific needs and pain points of various stakeholders, the study will highlight how digital transformation through IoT can lead to increased productivity, reduced operational costs, and improved decision-making for the customers. The comparative analysis will provide insights into how BODAS Connect can differentiate itself from competitors, highlighting unique features and suggesting areas for enhancement to maintain or gain a competitive edge in the market. By exploring the role of certified solution partners, the study will offer a roadmap for developing strategic alliances that can enhance service delivery and customer satisfaction, creating a robust support network for non-focus customers. Understanding the customer journey for small OEMs, fleet managers, and end users will enable Rexroth to tailor its engagement strategies, fostering stronger relationships and loyalty among a wider customer base.

1.6 Limitations

Due to the proprietary nature of Bosch Rexroth's technologies and business strategies, there may be restrictions on accessing detailed internal data. This could limit the depth of analysis and the specificity of recommendations. Limited resources, including time and access to specific industry data, may constrain the scope of the research. This could affect the comprehensiveness of market and competitor analyses. The research may rely on hypothetical persona development and secondary data due to potential challenges in gathering empirical data from actual certified solution partners. The IoT and digital transformation landscape is rapidly evolving. Consequently, findings and recommendations may become less relevant over time as new technologies and market trends emerge.

1.7 Structure of the Thesis

This master's thesis is methodically organized and proceeds properly from start to finish, aligning with the delineated research objectives. Each chapter contributes to the overall narrative, providing a comprehensive understanding of the multifaceted dimensions of IoT-enabled digital transformation in the off-highway vehicle industry.

Chapter 2 (Literature Review): Chapter 2 delves into the existing literature on digital transformation, the Internet of Things (IoT), and business model innovation specifically within the off-highway vehicle industry. This chapter aims to provide a solid theoretical foundation by examining previous studies, key concepts, and relevant frameworks that inform the current research. It critically analyses how IoT technologies are transforming business models and operational practices in this industry.

Chapter 3 (Methodology): Chapter 3 presents an in-depth analysis of the methodology employed in this study. It focuses on Bosch Rexroth's IoT ecosystem and includes a comparative analysis with a competitor to highlight industry standards and benchmarks. Additionally, this chapter develops a persona of an imaginative solution partner to demonstrate the importance, pain points, and potential benefits for stakeholders. The methodological approach combines qualitative techniques to ensure robust and comprehensive findings.

Chapter 4 (Findings): In Chapter 4, the results of the analysis are presented. This chapter discusses the impact of IoT-enabled digital transformation on various stakeholders within the value chain. It includes scenario analysis and insights from internal employees and solution partners. The findings highlight how different stakeholders are affected and the potential benefits and challenges they face because of IoT integration.

Chapter 5 (Recommendations): Chapter 5 addresses the challenges and gaps identified in the previous chapters. It proposes a new business model tailored to the needs of the off-highway vehicle industry, incorporating IoT technologies. The chapter includes financial projections based on the results and findings, providing a practical roadmap for implementing the proposed model. Recommendations are designed to enhance the industry's digital transformation journey and optimize stakeholder benefits.

Chapter 6 (Conclusions): Chapter 6 summarizes the key findings of the study and discusses their practical implications. It reflects on the research objectives and how they have been achieved through the study. This chapter also identifies areas for future research, suggesting directions for further investigation to build on the insights gained from this thesis. The consequences highlight the significance of IoT-driven digital transformation and its capacity to improve the off-highway vehicle sector.

In conclusion, this structured approach ensures that the thesis systematically addresses the research questions and objectives, providing a clear and comprehensive analysis of IoT-enabled digital transformation in the off-highway vehicle industry.

2. Literature Review

This literature review chapter examines the existing body of knowledge relevant to the study. The review is organized around several key themes and topics, providing a comprehensive understanding of Off-Highway Vehicles and their digital transformation through IoT integration.

2.1 Off-Highway Vehicles: A Comprehensive Study

The technology used in off-highway vehicles, such as industrial, agricultural, and construction vehicles, has advanced significantly over time. The possibilities of gas turbine and electric drive systems for these kinds of vehicles were emphasized by (Kusko and Magnuson, 1968), and Anderson (1976) talked about their uses in the arctic, including air cushioned, rubber-bag tired, and soft tracked vehicles that are used there because of their unique benefits. Air-cushioned vehicles can carry large loads, soft-tracked vehicles perform well in climbing and swamp situations, and rubber-bag fatigued vehicles are best suited for the thawed summer arctic. Beltrami (2021) highlighted the significance of electrification for environmental sustainability in compact off-highway vehicles, considering the intricate load profile of these vehicles, comprehending the distinctions between automotive and off-highway duty cycles, and emphasizing energy control strategies and efficiency gains for electric vehicles. All these studies highlight how different and dynamic off-highway vehicles are, and how much more innovation in both their operation and design is required.

2.2 Exploring Digital Transformation

According to (Kraus, 2021), the digital transformation is a multidimensional and dynamic process that is changing many facets of society and industry. Businesses must modify their operations and plans to fit this new digital reality, as it is causing major changes in software technology and the software industry (Ebert and Durate, 2018; Reis, 2018). By utilizing technology to develop new business models and boost income, digital business transformation is upending established businesses. A solid plan, strong leadership, and a thorough examination of the present business procedures are necessary for a successful digital transition (Schwertner, 2018). This change affects not just businesses but also society, the environment, and institutions more broadly (Kraus, 2021). Even though this subject is receiving more attention, there are still unanswered research questions, especially when it comes to comprehending the effects of digital transformation on business, society, and technology (Kraus, 2021). In light of this, companies must embrace digitization and transformation in order to fully utilize cutting-edge technologies, with an emphasis on tactical implementation strategies (Kumar and Sangtani, 2023).

2.3 Scouting the Impact of IoT

IoT is an innovative technology that is facilitating low-cost communication and has a wide range of applications. Considering its advanced sensors, almost any application can now function fast and precisely (Indira, 2019). It makes it easier to interact between the actual and virtual worlds through Machine-to-Machine (M2M) interaction (Bouk, 2017). According to (Bhayani, 2016), the goal of the Internet of Things (IoT) is to enable connectivity for everything by incorporating short-range wireless transmitters into a variety of extra devices and everyday belongings. On the other hand, (Yang, 2019) claims that IoT will revolutionize global interconnectivity and have numerous potentials use in remote excavation and mining. Although there is now little use of IoT applications, despite its promise, future technical developments should bring about even more innovations (Torğul, 2016).

2.4 Digital Business Model and It's Efficiency

The procedures of digitization for business models, according to Schallmo and Williams, consists of five phases (See Figure 1). They are, 1. Assessing the current model (Digital

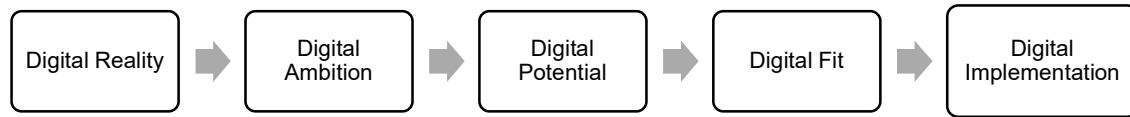


Figure 1 Digital Transformation Process of Business Models (Schallmo, Williams, and Boardman 2018)

Reality), 2. Defining goals for the transformation (Digital Ambition), 3. Discovering best practices (Digital Potential), 4. Determining compatibility options (Digital Fit), and 5. Completing and implementing the digital model, including partner integration and customer experience (Digital Implementation) (Schallmo, 2017; Schallmo, Williams, and Boardman 2018).

The Business models that are digitally transformed may become more efficient and generate additional value (Josheph, 2018); (Shvedun and Seidova-Bohoslovska, 2022) notes that the utilization of digital technology and platforms can offer a competitive edge in the digital economy. Efficiency and business models can also be improved by using data and real-time analytics (Katunskis and Neamtu, 2016). Furthermore, industrial businesses can increase efficiency and streamline management using a digital business model (Muzaliova, 2021).

2.5 Digital Transformation in the Off-Highway Vehicles with IoT Integration

Off-highway vehicle IoT connectivity offers both potential and obstacles. With its quick and inexpensive configuration, (Hankaniemi, 2021) presents a multifunctional IoT device for those vehicles. According to (Datta, 2017), there are several important obstacles to this integration, such as the requirement for an appropriate cloud platform, consistent methods for gathering data, and smooth communication between consumer devices, computer platforms, and automotive sensors. In order to tackle these obstacles, a network structure and architecture that views vehicles as IoT resources and offers methods for integration and interoperability is proposed by (Datta, 2016; Datta, 2017). The immense potential of IoT in off-highway vehicles is demonstrated by these studies collectively, as is the necessity of strong solutions to guarantee an effective integration. The forestry, construction, and agriculture industries have seen tremendous change as a result of IoT utilization in their machinery.

IoT makes it possible to gather data in real-time on a variety of environmental elements, including the weather, crop health, and soil quality. This data may be used to create more sustainable and efficient processes (Hedau, 2023; Vinay and Kothawade, 2020). Additionally, this technology makes it possible to remotely monitor and operate these devices, which decreases the need for manual labour and increases safety (Thamaraiselvi, 2022). All things considered, the IoT-driven digitalization of these devices has completely changed how these sectors run, resulting in higher production, sustainability, and efficiency.

2.6 Enhancing Efficiency for stakeholders through IoT Integration

Off-highway vehicle efficiency might be greatly increased, and stakeholders could gain from the integration of IoT technologies and digital business models. To do this, (Deandres, 2014) highlights the necessity of stakeholder participation and data sharing. This is further supported by (Alsobhi, 2018), who suggests an Internet of Things-based fleet effectiveness tracking

system that can save operating costs and boost productivity. The concept of Internet of Vehicles (IoV) is introduced by (Das, 2019) to improve driver safety and road conditions, and (Baars, 2014) emphasizes the application of IoT to operational logistics to increase energy efficiency. All these studies point to the possibility of lowering costs, increasing safety, and improving performance in off-highway vehicles through the incorporation of IoT and digital business models, which benefits OEMs, solution partners, fleet managers, and end users.

2.7 Challenges of Off-Highway Vehicles IoT Integration

There are various obstacles in the way of Off-Highway Vehicle (OHV) integration into the Internet of Things (IoT) ecosystem. Datta, (2016); Datta, (2017) emphasize the significance of standard data gathering mechanisms from vehicle sensors, the installation of smart devices into transportation networks, and the necessity of an appropriate cloud-based system to facilitate real-time connected vehicular applications. Additionally, they highlight the need for a standardized approach to data integration and analytics as well as the integration of all different elements into a single IoT architecture for connected vehicles (Tyagi and Sreenath, 2023). IoT application in forestry, construction, and agricultural machinery both have potential and problems. Khan and Ismail, (2017) emphasizes the necessity of more technical skill requirements, improved security, and user-friendly software. Mehta and Patel, (2016) highlights how IoT can be used to automate and remotely control conventional agricultural practices. The difficulties with manageability and scalability in IoT communication networks for agricultural monitoring are covered in (Cambra, 2017). When integrating IoT solutions into the agriculture sector, Triblas (2017) emphasizes how crucial it is to take investment costs, data interconnection, management, analysis, and security into consideration. Furthermore, there are several obstacles to overcome in order to fully integrate IoT into construction and forestry machinery. These include the requirement for innovative communication components (Spencer and Torres, 2023), the possibility of trouble-free operation and increased productivity in the construction sector (Paul, 2020), and the improvement of fleet efficiency in the construction industry (Khoury, 2018). IoT-based solutions have been developed for the forestry industry with the purpose of monitoring forest conditions and forecasting changes (Mohammed, 2019). All of these studies demonstrate the potential of IoT in these sectors, but they also emphasize the necessity for more investigation and advancement to overcome the problems that come with it.

2.8 Future Trends in IoT-Enabled Off-Highway Vehicles

Off-highway vehicle IoT technology is a complicated and developing field with various important research avenues. Both (Grewe, 2017); (Datta, 2017) underline the significance of information-centric networking and mobile edge computing in tackling the problems of seamless interoperability and resource-intensive services. Wu and Liaw, (2017); Tyagi and Sreenath, (2023) goes one step further by demonstrating how vehicle-to-sensor connectivity made possible by the Internet of Vehicles might enhance security and provide new services. However, as (Devi and Rukmini, 2016) notes, there are challenges to the IoT and cloud integration in connected vehicles, such as vehicles safety or fuel economy. Moreover, the network of vehicles must incorporate vehicle-to-vehicle and vehicle-to-infrastructure applications, as well as some smart transportation system applications that require incredibly low latency (Radha, 2018). Future studies must solve these problems to benefit the promise of off-highway vehicles equipped with Internet of Things technology.

In conclusion, it can be claimed that this system's integration with the Internet of Things brings in a new era rich in complexity as well as capability. This research has created opportunities

for improved productivity development and innovative discoveries across all industries that include forestry, construction, and agriculture. The following features, which are required to improve workflow efficiency and optimal resource management, are related to the implementation of IoT: real-time data collecting, remote surveillance, and predictive analytics. Beyond that, the complexity arises from special requirements, security concerns, and the selection of specialists that the community needs to work together to build a long-term solution.

From this point forward, the integration of research and practice will be crucial. Through integration with multidisciplinary knowledge and the encouragement of collaboration between the corporate community and researchers, the complexity of equipment becomes reduced. In addition to fostering operational excellence, the new initiative includes aims related to society and the environment.

3. Methodology

This methodology chapter outlines the research design and the specific methods employed in this study. It includes a detailed case study of Bosch Rexroth AG, an analysis of the customer journey, the development of the current business model, a comparison of competitors, and the development of a persona.

3.1 Research Design

The qualitative research of this master's thesis approaches for examining BODAS Connect in the context of Rexroth's IoT ecosystem is based on the necessity of gaining rich, contextual insights in order to fully comprehend complicated phenomena. This research is particularly well-suited for a case study approach since it allows for an in-depth examination of BODAS Connect inside its real-world setting. Considering the ever-changing landscape of Internet of Things ecosystems and the complex interactions among people, technology, and business strategy, a qualitative case study can provide important information.

Bosch Rexroth AG's industry positioning is contextualized by the inclusion of a competitor comparison with Trackunit, which offers a thorough grasp of market dynamics, competitive advantages, and strategic positioning. This research may determine each company's strengths and weaknesses as well as the possibilities and challenges they might face by performing a SWOT and comparative analysis, which are crucial for strategic planning and innovation. Persona creation is yet another essential element of this research plan. A customized study of customer demands, pain points, and potential advantages is made possible by understanding the solution partners that interact with BODAS Connect. Using a human-centred approach ensures that the study remains firmly grounded in real-world applications and outcomes, which increases the practical value of the findings.

In order to get more in-depth feedback and insight into the participants' qualitative responses, surveys were also performed for this master's thesis utilizing the Qualtrics questionnaire platform. There were two predefined survey questions. One is specifically for the internal employees of Bosch Rexroth who oversee BODAS Connect development and sales (See

Figure 2) (See Appendix A) such as sales manager, sales engineer, account development manager or sales technical expert.

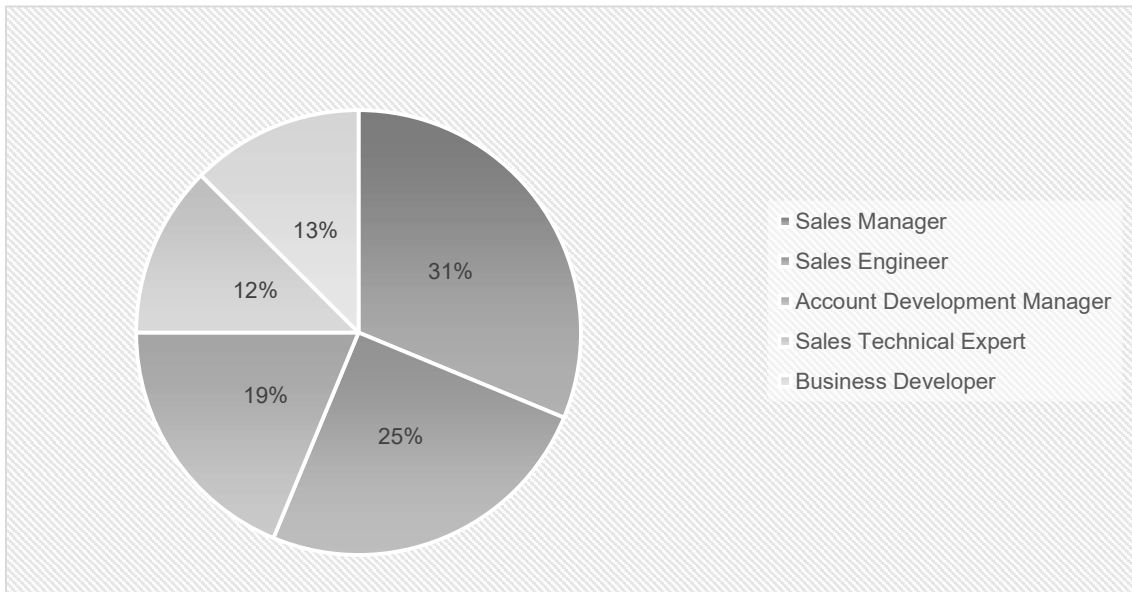


Figure 2 Percentage of Responses from Internal Employees (Analysis from Bosch Rexroth Internal Survey, 2024)

The other is to learn about the primary advantages and difficulties that solution partners from various nations encounter using BODAS Connect. Eleven distinct companies from 7 different countries answered the survey and provided their opinions on BODAS Connect (See Table 1) (See Appendix B).

Table 1 Survey Response from Solution Partners (Analysis from Bosch Rexroth Internal Survey, 2024)

<i>Solution Partners</i>	<i>Countries</i>	<i>Sector</i>
Hidropar Ankara Hidrolik	Turkey	Hydraulics Solutions
RGDH	France	Hydraulics Solutions
HYDBA	Spain	Hydraulics Solutions
Matsui Corporation	Japan	Hydraulics Solutions
Elektro-Szofit 2000 Kft.	Hungary	Hydraulics Solutions
Agtech	Brazil	Hydraulics Solutions
Hidrot Kft.	Hungary	Hydraulics Solutions
GCC (Innovative Motion Control)	United States	Hydraulics Solutions
Hydraulic Controls Inc.	United States	Hydraulics Solutions
Womack Machine Supply	United States	Hydraulics Solutions
Fluid System Components	United States	Hydraulics Solutions

After analysing all the survey results, this master’s thesis will mention the qualitative key points to define where the market potentials are, which pain points to solve for the solution partners and what kind of supports solution partner are asking for to improve the BODAS Connect.

3.2 Case Study: Bosch Rexroth AG's IoT Ecosystem

The overview of Bosch Rexroth AG along with its history, networks as well as its IoT product details are described in this chapter.

3.2.1 Company Overview

Bosch Rexroth AG is the world's leading developer, manufacturer, and supplier of innovative automation and control systems, as well as industrial hydraulics, pneumatics, and electric drives. The company was established in Germany in 1795 and has since expanded to become an international enterprise with activities in more than 80 nations. Numerous industries, including the automotive, construction, and agricultural sectors, employ Bosch Rexroth AG's goods and services. The company provides a wide array of goods, such as digital and industrial IoT solutions, assembly technologies, electric motors and controls, hydraulic and pneumatic components, and linear motion (Bosch Rexroth, 2024d).

Rexroth's emphasis on innovation and R&D is one of its main advantages. The business makes significant investments in the creation of new technologies and procedures to assist clients in increasing their sustainability, efficiency, and production. Due to the company's innovative goods and solutions, this has resulted in multiple industry awards and recognition. Along with its products, Rexroth offers its clients full support and services, such as maintenance, training, and technical assistance. Because of the company's extensive worldwide network of professionals, customers can get the help they require from anywhere in the world (Bosch Rexroth, 2023a).

Following the merger of Mannesmann Rexroth AG and Robert Bosch GMBH in 2001, Bosch Rexroth AG was established as a major German company offering a wide range of industrial solutions for more than 200 years. It is a part of one of the Bosch Group's four businesses, which include energy and building technology, household appliances, power tools, industrial technology, and automotive (Bosch Rexroth, 2024g). It employs more than 31,000 people at 80 locations across the globe, including its headquarters in Stuttgart. Additionally, it has an extensive network of sales and service representatives, and in 2023, its associates brought in almost 7.6 billion euros in revenue. In order to offer top-notch goods and services to clients worldwide, Bosch Rexroth AG allocates approximately 460 million euros, or 6.1%, on research and development (R&D) (Bosch Rexroth, 2023c) (Bosch Rexroth, 2024c).

Bosch Rexroth AG's core values include daring, inventiveness, focus on the client, excellence, and agility. Strong leadership, mutual support, empathy, and trust form the foundation of the organizational structure. Manufacturing businesses need to be more agile and quick-thinking in these days of ever-shorter production and development cycles. Bosch Rexroth is an outstanding provider of powertrain and control technologies worldwide. The company's drive and control is a robust, intelligent, secure, and development ensuring movement. The goals of development and expansion are for Rexroth, its partners, and its clients. (Bosch Rexroth, 2023a).

All things considered, Bosch Rexroth is a reputable and well-established business that provides a wide range of cutting-edge automation and control systems with a strong emphasis on customer service, quality, and innovation.

3.2.2 Classification of the Department

To provide customers, the fastest delivery times possible for a variety of products including hydraulics, linear motion, electric motors and controllers, and aluminium structural frames, Bosch Rexroth has expanded its manufacturing capacity. Six business areas comprise Bosch

Rexroth AG: The following table 2 displays Mobile Hydraulics (MH), Industrial Hydraulics (IH), Automation Electrification Solutions (AE), Assembly Technology (AT), Compact Hydraulics (CH), and Linear Motion Technology (LT).

Table 2 Bosch Rexroth Business Units (Bosch Rexroth AG Internal Information, 2024)

BOSCH Rexroth AG – Drive and Control (DC) – Business Units					
Mobile Hydraulics (MH)	Industrial Hydraulics (IH)	Automation and Electrification Solutions (AE)	Assembly technology (AT)	Compact Hydraulics (CH)	Linear Motion Technology (LT)

Each of the six business units mentioned above has a management department in charge. The Mobile Hydraulics business unit, including business field development, production management, sales management, and logistics, is under the supervision of the DC-MH department. Serving customers through digital transformation and astute teamwork is the primary goal of Bosch Rexroth Mobile Hydraulics. Mobile machines can now access higher levels of intelligence, efficiency, security, and performance with the help of MH (Bosch Rexroth AG Internal Information, 2024)

3.2.3 Bosch Rexroth Purpose

The goal of Bosch Rexroth AG is to empower its clients to generate long-term value by offering them cutting-edge and dependable automation and control solutions that raise their level of competitiveness and productivity (Bosch Rexroth, 2024g). By providing top-notch goods and services that satisfy clients' requirements and go above and beyond their expectations, the company is dedicated to assisting clients in realizing their goals. A dedication to sustainability also serves as the motivation for Rexroth's goals. The company is aware of the effects that its goods and services have on society and the environment, and it works to reduce those effects by creating sustainable products and procedures. This involves lowering back waste and pollution, increasing resource efficiency across the board for operations and the supply chain, and consuming less energy. In the end, Bosch Rexroth AG wants to be a reliable partner for its clients, providing cutting-edge automation and control systems that enable them to thrive in a rapidly changing world (Bosch Rexroth, 2022).

3.2.4 History of Bosch Rexroth

The history of Bosch Rexroth has been shaped by steady movement from its inception. It all began in Lohr am Main with an iron foundry and a water-powered hammer mill. The distinctive industry knowledge of Bosch Rexroth has come to be associated with customized solutions. (Bosch Rexroth, 2024d)

1975 – 1964: Transition to hydraulic solutions from iron foundry

When Rexroth joined the hydraulics industry in the 1950s, it laid the foundation for its eventual rise to the top of the world market by switching from forging iron from ore to running a foundry for cast iron (Bosch Rexroth, 2024d) (See Figure 3).



Figure 3 Logo Rexroth-Guss (1975-1964) (Bosch Rexroth, 2024d)

1965 – 1995: **Switch to a multi-technology supplier from hydraulic**

The company expands into a comprehensive provider of mobile and industrial hydraulics by incorporating linear and assembly technologies, axial piston pumps and motors, electrical drives and controls, and other items into its offering (Bosch Rexroth, 2024d) (See Figure 4).



Figure 4 Logo RR (1965-1995) (Bosch Rexroth, 2024d)

1996–2000: **Offering comprehensive multi-technological approaches**

Rexroth develops multi-technological systems to overcome the constraints of distinct technologies, facilitating advances in software and semi-conductors to increase productivity and flexibility across all technologies (Bosch Rexroth, 2024d) (Refer to Figure 5).



Figure 5 Logo Mannesmann Rexroth (1996-2000) (Bosch Rexroth, 2024d)

2001–2016: **Shift to a single brand for software-driven, network-connected Drive & Control systems**

The combination of Mannesmann Rexroth and Bosch Automations Technik creates a drive and control systems leader in the world. They reach new heights in terms of energy efficiency and safety through the seamless integration of all relevant technologies (Bosch Rexroth, 2024d) (See Figure 6).



Figure 6 Logo Rexroth Bosch group (2001-2016) (Bosch Rexroth, 2024d)

2017 – Today: **Step into the digital transformation of the future**

Bosch Rexroth AG is the innovator of linked hydraulics, a trailblazer in digital transformation for the factory of the future and lays the groundwork for mobile machines that undergo digital transformation. Every product and solution contribute to the sustainability of machines, everyday living, and manufacturing (Bosch Rexroth, 2024d) (See Figure 7).



Figure 7 Logo Rexroth A Bosch Company (2017-Present) (Bosch

3.2.5 Global Network

The worldwide network of numerous industries, Bosch Rexroth AG is a well-known supplier of drive and control systems. Their areas of expertise include automation and hydraulics, which enhance efficiency, boost output, and advance sustainability. With a global reach, they use both local knowledge and global perspectives to customize their products to meet the demands of markets. Bosch Rexroth AG wants to empower companies, encourage innovation, and build a more connected, intelligent, and greener future (Bosch Rexroth AG, 2017b). Products and systems related to the motion and control of mobile and industrial equipment are produced by Bosch Rexroth. solutions fit for the future for mobile devices. The company's digitally networked, electronic, and electrified solutions are contributing to the development of the upcoming generation of mobile machines. The team aims to offer a broad range of services, including machine engineering, after-sales support, and servicing, to the off-highway industry. Moreover, it is also providing its expertise on automation, electric drive, gearboxes on wheels, telematics, electronics on wheels, and hydraulics on wheels. (Bosch Rexroth, 2024g)

3.2.6 Certified Excellence Partners

A cooperative effort called Bosch Rexroth CE Partners unites different businesses and organizations to support Bosch Rexroth AG in developing connected engineering solutions (Bosch Rexroth AG, 2017a). Leading this initiative to promote innovation and improve

technology integration in manufacturing, automation, and engineering sectors is Bosch Rexroth AG, a company well-known for its drive and control technologies. Bosch Rexroth and its partners have a symbiotic partnership whereby they co-develop, integrate, and refine technology through the CE Partners program. The goal of this collaboration is to increase the potential of automation and control systems. Often, the partnership entails combining software and hardware solutions to produce manufacturing processes that are more sophisticated, dependable, and efficient. The CE Partners project is centred around innovation. (Bosch Rexroth, 2024a)

Bosch Rexroth AG collaborates on research and development projects with its partners by combining their resources and skills. Through the introduction of new concepts and the advancement of existing technology, these projects seek to address the evolving needs of the industry. Additionally, Bosch Rexroth offers comprehensive training and technical assistance to its partners. This guarantees that partners have all they need to successfully apply Rexroth technology, upholding the company's high standards of quality and client satisfaction. The CE Partners program places a strong emphasis on adhering to rules and industry standards. To ensure that all integrated solutions satisfy strict quality, safety, and reliability standards a prerequisite for their use in a variety of vital industries, Bosch Rexroth works in tandem with its partners (Bosch Rexroth, 2024b).

There are 4 types of CE partners in Bosch Rexroth AG. They are given below:

- **Distribution Partners:** Distribution Partners assist OEMs and end users in selecting products from a portfolio of the most desirable goods by using the same electronic tools that Bosch Rexroth AG's own sales team employs. They are in charge of the application-connected product selection process and offer options so they can quickly get replacements and avoid paying more (Bosch Rexroth, 2024a).
- **Service Partners:** Bosch Rexroth's service partners uphold the same high standards that customers have grown to expect from Rexroth's own staff. CE Service Partners can find parts and components with ease since they have access to both historical and current product data. When modernizing and upgrading equipment and systems, specialists can offer users unique solutions (Bosch Rexroth, 2024e).
- **Solution Partners:** Solution Partners offer integrated systems and can put together complete solutions for machine operations. As application specialists for a wide range of target sectors, they combine many technologies, such as assembly technology, industrial hydraulics, linear technology, electric drives and controls, and intralogistics solutions. Since they are aware of Bosch Rexroth AG's strategy for the workplace of the future, integrated hydraulic systems, and intelligent mobile machines, they can accompany customers along their digital transformation journey (Bosch Rexroth, 2024a).
- **Training Partners:** Training Partners provides technical training using the same tools and resources as Bosch Rexroth AG. The technology, content, and equipment align with those of the Bosch Rexroth Academy program. Once the training is completed, these partners can give consumers their Bosch Rexroth credentials (Bosch Rexroth, 2024a).

Overall, Bosch Rexroth CE Partners is a dynamic and innovative collaboration platform. It harnesses the collective strengths of Bosch Rexroth and its partners to drive technological progress, expand market reach, and deliver superior solutions across diverse industries.

3.2.7 Product Overview (BODAS Connect)

The acronym BODAS, which stands for Bosch Rexroth Digital Application Solutions, refers to the company's whole line of electronic hardware, software, and IoT solutions for the off-highway industry. Bosch Rexroth AG examines the complete data stream, from the data's origin to its use. Since Rexroth has been developing and implementing drive and implementation control software for many years, it is familiar with cars and their data streams. Bosch Rexroth AG's comprehensive Internet of things solution for off-highway machines is called BODAS Connect. It links any computer to the internet through three basic components: the Connectivity Unit, the Cloud, and the Portal (See Figure 8) (Bosch Rexroth, 2024f). Because of this, Bosch Rexroth is aware of which data is accessible and useful for uses that go well beyond the original intent.

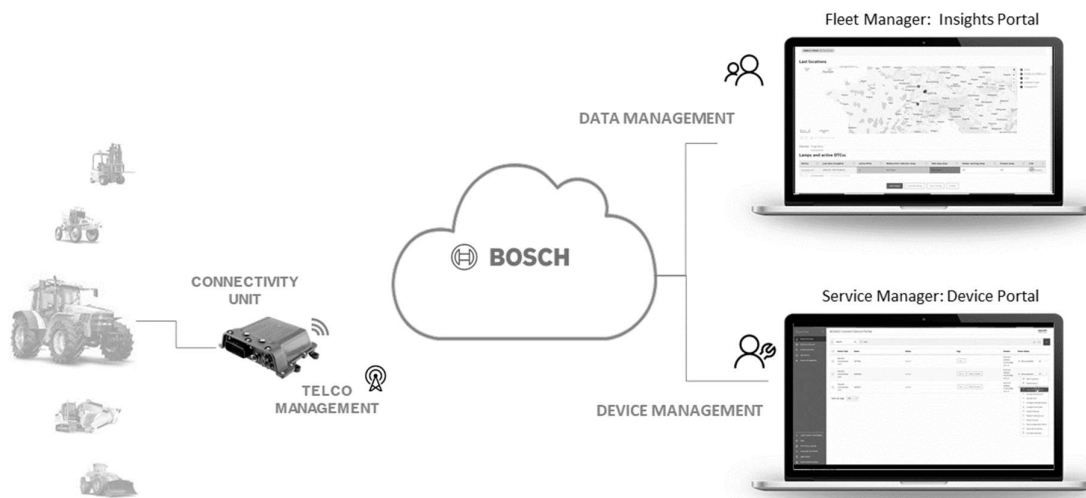


Figure 8 Overview of BODAS Connect (Bosch Rexroth AG Internal Figures, 2024)

- **Connectivity devices:** A dependable, open, Linux-based gateway to customer's computer that combines a fully featured and intuitive device management service with safe, secure, scalable, and programmable connectivity hardware.
- **IT architecture:** Every component of the BODAS Connect architecture is modular and open. Data management and device management are discrete domains that can be booked separately and at various scales.
- **Applications:** Make the necessary analyses and visualizations of the data the customers have gathered. Pick from a wide range of off-highway apps that address remote R&D services, vehicle operations workflows, fleet management, and vehicle health. Additionally, users can incorporate their own cloud-based or edge-based data analysis methods.
- **Over-the-air software maintenance:** Skilled remote campaign management for entire fleets as well as individual vehicles (Bosch Rexroth, 2023b).

Rexroth Connectivity Unit (RCU)

Installed in a machine and connected to the internet, the telematics device forms the core of BODAS Connect. Bosch Rexroth AG calls the Rexroth Connectivity Unit as their telematic device. RCU, to put it briefly. In end-user processes, where performance, availability, and efficiency remain the primary requirements, off-highway machines are mostly utilized to support these activities. Effective process execution through remote machine monitoring is not the only definition of efficiency. Additionally, it entails the safe and effective remote implementation of upgraded or new functionality in response to rapidly shifting legal and commercial demands. In addition to facilitating the creation, remote deployment, and operation of end-to-end Internet of Things use cases and digital services, the connectivity unit offers wireless connectivity in an off-highway machinery (Bosch Rexroth Internal Documents, 2024).

The RCU provides wireless connectivity in off-highway equipment, enabling the development, remote installation, and execution of complete IoT projects and digital offerings. The connectivity units come with the BODAS Connect software solution and the device management technology. The BODAS Connect device software includes an operating system known as Linux and a container-based device management mechanism specifically made for Rexroth. This facilitates the easy, secure, and transactional maintenance or adoption of Bosch Rexroth AG. A software development kit allows users to generate software features on the connectivity unit. More detailed RCU configuration can be seen in figure 9. The Highlights of the RCU are given below:

- Link and keep an eye on off-highway equipment.
- RCU based on Linux for easy migration and future-proof applications
- Software design based on containers that allows for the flexible addition of new features.
- Control and troubleshoot controller networks remotely.
- Wireless services for the Rexroth controllers connected to the RCU.
- Built on the BOSCH Cloud, which has over 10 million connected vehicles.

Moreover, Rexroth Connectivity Units (RCU) are available in 5 variants (See figure 9):

- The RCU4-2A/10 model features a 4G mobile network with two CAN interfaces.
- The RCU4-3A/10 model includes three CAN interfaces Bluetooth and Wi-Fi connectivity.
- The RCU4-3W/10 has 3 CAN interfaces, 4G mobile network.
- RCU4-3X/10 NAND-Flash and Extra RAM.
- The quad-core RCU RCU4-3Q/20 (Bosch Rexroth Internal Documents, 2024).

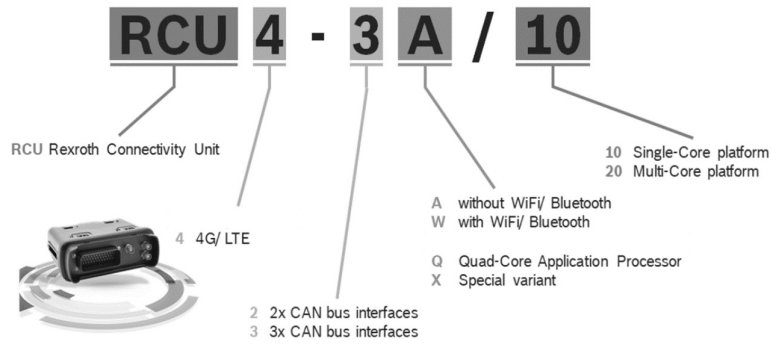


Figure 9 Overview of RCU (Bosch Rexroth AG Internal Figures, 2024)

Telco Management

BODAS Connect has an integrated SIM card and an integrated management system for customer's telecommunication needs, so users may connect their machine to the internet. This implies that an IoT operator or admin can examine and modify SIM card settings using the device portal, a webpage that allows customers to connect the telematics device (Bosch Rexroth Internal Documents, 2024).

Device Management

As an integral component of the BODAS Connect Device Connectivity product, the BODAS Connect Device Management comprises the BODAS Connect Device Portal (See Figure 10). For IoT devices, it serves as the digital manager. These could be sensors, machine controllers, connectivity control units, routers, or even gates. However, even while there are numerous benefits to the Internet of Things, like improved productivity and simpler procedures, handling many IoT devices may easily become difficult, confusing, and costly. Associates must spend time collecting data from each device in question before implementing any software changes. There's also a greater chance of software getting out-of-date and a higher susceptibility to malware like viruses and trojans. These issues can be resolved via the Device Portal (See Figure 10) (Bosch Rexroth Internal Information, 2024). The overview of Device Portal advantages is given below:

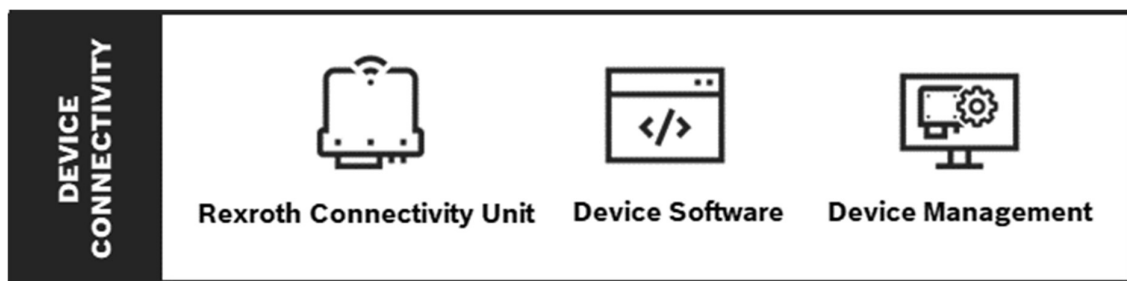


Figure 10 Device Management (Bosch Rexroth AG Internal Figures, 2024)

- **One central location** for all networked device administration.
- **Excellent openness** about the condition of every device in the production network.
- **The most effective method** for updating other applications and device software.
- **Entire industrial environment** and all IoT devices are protected to the highest degree possible.

- **Complete control** over the data.
- **Higher quality and efficiency** can be obtained with real-time maintenance services without requiring on-site presence.
- **Eliminates time-consuming** IT tasks, saving time and providing production associates with more time (Bosch Rexroth Internal Information, 2024).

Data Management

Any activity related to viewing, comprehending, altering, and processing data that has been gathered from the machines is referred to as data management (See Figure 11). Information particular to the machine, such as its GPS position, operating hours, next service interval, etc., or data from the CAN bus may be included (Bosch Rexroth, 2023d).



Figure 11 Data Management (Bosch Rexroth AG Internal Figures, 2024)

Fleet Managers can access their machine data through the Insights Portal (See Figure 11), which has an expanding feature set, like BODAS Connect (Bosch Rexroth Internal Information, 2024).

Benefits of the Customers

The benefits of the customers for using BODAS Connect are given below:

- **Welcome to One Stop Shop:** BODAS is an unmatched ecosystem that seamlessly integrates IoT technologies, state-of-the-art software, and electrical hardware to transform the off-highway sector. Customized to meet the driving and control requirements of customers, BODAS is an all-inclusive off-the-shelf solution that offers an unparalleled holistic experience (Bosch Rexroth Internal Information, 2024).
- **Openness and Modularity:** Characterise the fundamental tenets of BODAS, giving customers the option to adopt the full ecosystem or only some components in accordance with their needs. With this modular approach, BODAS products can be integrated in a way that best suits customer's specific requirements, guaranteeing a bespoke solution (Bosch Rexroth Internal Information, 2024).
- **Functional Safety:** One of the main priorities in the BODAS ecosystem is safety. With its high degree of adaptability and user-friendly design, BODAS is ready to comply with the most recent functional safety standards and machinery directives. Modern mobile machine safety is guaranteed by BODAS Connect, which complies with ISO 13849, ISO 19014, and ISO 25119 standards (Bosch Rexroth Internal Information, 2024).
- **In The Realm of Cyber Security:** BODAS adopts a proactive approach. By utilizing automotive-based security solutions and integrating them seamlessly, the ecosystem covers all necessary layers and offers a strong security against potential cyber threats. BODAS functions as a security lighthouse, guaranteeing the integrity and safety of mobile machine control even in the face of constantly changing cyberthreats (Bosch Rexroth Internal Information, 2024).

- **Ready for Automation:** BODAS combines dependable vehicle surround sensing components with complementary software elements to provide advanced assistance functions. Modern automation is made possible by this integration, which also improves mobile machines' operational capabilities and increases efficiency to unprecedented levels (Bosch Rexroth Internal Information, 2024).
- **The Bosch Factor:** Bosch Rexroth has carefully created and selected an exceptional portfolio that showcases Bosch's innovative vehicles quality and technology. BODAS Connect guarantees performance that endures over time and not only satisfies but beyond the demanding standards of the off-highway market (Bosch Rexroth Internal Information, 2024).
- **Sustainable Hero:** Through its ability to optimize the management of industrial machines and vehicles, BODAS Connect is making a significant contribution to sustainability. Fuel efficiency and operational performance can be significantly improved with real-time monitoring and data analysis made possible by BODAS Connects cutting-edge IoT (Internet of Things) solutions. This system reduces resource consumption and carbon emissions by minimizing needless idle, optimizing routes, and anticipating maintenance needs. Additionally, BODAS Connects capacity to deliver practical insights supports the shift towards greener, more sustainable industrial practices by assisting firms in making more ecologically conscious decisions (Bosch Rexroth Internal Information, 2024).

In conclusion, BODAS Connect is not just a solution. it's a commitment to excellence, innovation, and adaptability. Whether customers seek a complete ecosystem or individual components, it is a trusted partner in driving the future of off-highway technologies. Embrace the power of BODAS and experience a new era of control, safety, and efficiency in the world of mobile machine solutions.

3.3 Customer Journey of BODAS Connect

This guide outlines a detailed procedure to successfully initiate a new IoT project using BODAS Connect as a proof of concept (PoC). The journey involves six crucial steps (See Figure 12) (Bosch Rexroth Internal Document, 2024).

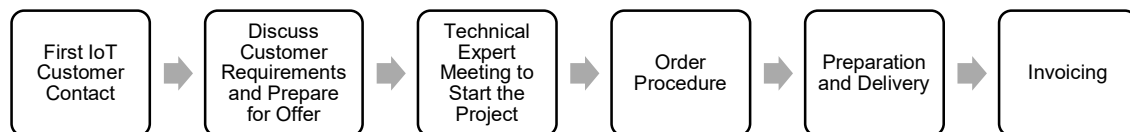


Figure 12 Customer Journey Process (Bosch Rexroth AG Internal Figures, 2024)

1. First IoT Customer Contact

Objective: Understand both the business and technical aspects of the customer's needs.

Roles and Responsibilities: The roles and responsibilities for providing the support to the customer are given below (See Table 3)

Table 3 IoT Customer Contact Roles and Responsibilities (Bosch Rexroth AG Internal Document, 2024)

Responsible	Supports	Recommended Duration
CU Sales or IoT Sales	IoT Sales or IoT Champions	1 to 2 hours

Key Activities:

- **Understand the Business Aspects:** Discuss the customer's business objectives, pain points, and the value they seek from IoT solutions. This helps in aligning the IoT offerings with their strategic goals.
- **Understand the Technical Aspects:** Gain a basic understanding of the customer's technical setup, including existing systems and architectures.
- **Present IoT Services:** Use the BODAS Connect standard presentation and demo videos to showcase IoT services and corresponding hardware.
- **Focus on Value:** Highlight products and services that directly address the customer's specific jobs, pains, and gains to demonstrate immediate value (Bosch Rexroth Internal Information, 2024).

2. Discuss Customer Requirements and Prepare for Offer

Objective: Identify customer needs in detail and provide an indicative offer.

Roles and Responsibilities: The customer requirements and indicative offer are handled by several departments (See Table 4) which are given below.

Table 4 Customer Requirements Roles and Responsibilities (Bosch Rexroth AG Internal Document, 2024)

<i>Responsible</i>	<i>Supports</i>	<i>Informed</i>	<i>Consulted</i>	<i>Recommended Duration</i>
CU Sales	IoT Sales	IoT Expert	CU or Legal Expert	1 to 3 days

Key Activities:

- **Identify Needs:** Understand which BODAS Connect features can address the customer's real needs, pain points, and specific tasks.
- **Clarify E/E Architecture:** Gather details about the vehicle's basic Electrical/Electronic (E/E) architecture to ensure compatibility with BODAS Connect solutions.
- **Consult IoT Experts:** Engage with IoT Sales and IoT Experts to discuss further steps and gather technical insights.
- **Discuss Timeline:** Establish a project timeline based on the scope of services and vehicle complexity.
- **Check Team Availability:** Consult IoT Sales to understand the current workload of the IoT engineering team before committing to timelines.
- **Send Indicative Offer:** Prepare and send an indicative offer for the PoC, outlining the proposed solutions and estimated costs.
- **Document Visit:** Classify the customer visit in the project database for future reference and tracking (Bosch Rexroth Internal Information, 2024).

3. Technical Expert Meeting to Start the Project

Objective: Conduct a detailed technical discussion to align on project scope and plan milestones.

Roles and Responsibilities: The responsible people for technical expert meeting are given below (See Table 5).

Table 5 Technical Expert Meeting Roles and Responsibilities (Bosch Rexroth AG Internal Document, 2024)

<i>Responsible</i>	<i>Supports</i>	<i>Informed</i>	<i>Consulted</i>	<i>Recommended Duration</i>
IoT Champion	CU Sales	IoT Expert	IoT Sales	1 to 4 hours

Key Activities:

a. Technical Discussion:

- **E/E Architecture:** Discuss current, interim (for prototype), and future E/E architecture of the vehicles involved.
- **CAN Signals and Protocols:** Review existing Controller Area Network (CAN) signals and bus protocols.
- **Additional Sensors:** Identify any additional sensor signals required for the project.
- **Hardware Installation:** Analyse the installation of all hardware onsite at the vehicle.
- **Vehicle Volumes:** Estimate potential vehicle volumes for IoT services/hardware.
- **Cable Harness Preparation:** Plan the preparation of the cable harness, which is typically done by the customer.
- **Schematic Diagram:** For the professional starter kit, create a schematic diagram to outline the project scope clearly (Bosch Rexroth Internal Information, 2024).

b. **Plan Milestones:** Establish key milestones and deadlines for the project.

c. Exchange Technical Documents:

- **Form Customer:**
 - .dbc files with relevant signals and messages.
 - Vehicle identification numbers.
 - Pictures or logos of vehicles for customized IoT dashboard views.
 - Vehicle geometry if Monitor Mechanics is ordered.
- **From Rexroth IoT champion to Customer:**
 - Technical specifications of the connectivity unit.
 - Installation recommendations for the sensor.
 - Video tutorials (under development) on navigating the interface, generating individual dashboards, and flashing software updates via IoT Rollouts.

- d. **Re-classify Project:** Update the project classification in the project database based on the latest discussions (Bosch Rexroth Internal Information, 2024).

4. Order Procedure

Objective: Order the necessary materials and services for the project.

Roles and Responsibilities: The roles and responsible department for handling order procedure are given below (See Table 6).

Table 6 Order Procedure Roles and Responsibilities (Bosch Rexroth AG Internal Document, 2024)

<i>Responsible</i>	<i>Supports</i>	<i>Recommended Duration</i>
CU Sales	IoT Sales	1 to 2 hours

Key Activities:

- **Select SAP Material Numbers and Prices:** Selected SAP material numbers for the RCUs and all other accessories are given below (See Table 7 and 8):
 - **RCU Types and SAP Material Numbers:** The RCU types and SAP Material Numbers are given below (See Table 7).

Table 7 RCU Types and Particular SAP Material Numbers (Bosch Rexroth AG Internal Document, 2024)

<i>RCU-Type</i>	<i>SAP Material No.</i>
RCU4-2A/10	R917012851
RCU4-3A/10	R917012849
RCU4-3W/10	R917012850
RCU4-3X/10	R917014169
RCU4-3X/10-N	R917014170
RCU4-3Q/20	R917014167
RCU4-3Q/20-N	R917014167

- **Accessories:** The accessories are needed with RCU. The types and SAP Material No. are given below (See Table 8).

Table 8 Accessories for RCU (Bosch Rexroth AG Internal Document, 2024)

<i>RCU-Type</i>	<i>SAP Material No.</i>
RCU Antenna	R917012707
RCU Cable and Connector Set	R917012714

- **Create Order in SAP PR1:**
 - **Place the Order:** Include all chosen SAP material numbers in SAP PR1.

- **Non-SAP PR1 Users:** Country units and non-Rexroth sales representations without SAP PR1 access must send their order details (including material no., price, quantities, starter kit type, customer no. and name, and the name of the sales interface contact person) to the designated contact.
- **Vendor Plant:** The vendor plant for the order is Homburg (HoP2).
- **Reference:** Add "IoT service" in the position text of the SAP material numbers for IoT services.
- **Notify Sales Interface Contact:** After creating the SAP order, send an email to the sales interface contact with:
 - SAP-Order number.
 - Material numbers with prices and quantities.
 - Starter kit type.
 - Customer number and name.
 - Name of the sales interface contact person.
 - Any other relevant information, such as the requested delivery date (Bosch Rexroth Internal Information, 2024).

5. Preparation, and Delivery

Objective: Ensure all components are prepared, delivered, and commissioned correctly.

Roles and Responsibilities: The roles and the responsibilities for preparation and delivery are given below (See Table 9).

Table 9 Preparation and Delivery Roles and Responsibilities (Bosch Rexroth AG Internal Document, 2024)

<i>Responsible</i>	<i>Supports</i>	<i>Informed</i>	<i>Recommended Duration</i>
CU IoT Expert	IoT Sales or Technical Experts	CU Sales	1 to 5 days

Key Activities:

- **Coordinate with Teams:** Depending on the project and the customer, the CU IoT Expert will coordinate either with the IoT Sales Team or directly with the technical experts to ensure smooth preparation and delivery.
- **Deliver and Install:** Ensure all components are delivered on time and installed correctly. This includes configuring the hardware and software according to the project specifications.
- **Commissioning:** Conduct necessary tests and commissioning activities to ensure the system operates as expected (Bosch Rexroth Internal Information, 2024).

6. Invoicing

Objective: Invoice the customer for the services and materials provided.

Roles and Responsibilities: The roles and the responsibilities for invoicing are given below (see table 10).

Table 10 Invoicing Roles and Responsibilities (Bosch Rexroth AG Internal Document, 2024)

<i>Responsible</i>	<i>Supports</i>	<i>Recommended Duration</i>
CU Sales	IoT Sales	1 to 2 hours

Key Activities:

- **Generate Invoice:** CU Sales will prepare and send the invoice to the customer, detailing the services and materials provided.
- **Input from IoT Sales:** Depending on regional responsibility, CU Sales may need input from IoT Sales to ensure all relevant costs and services are accurately included.
- **Follow Up:** Ensure any customer queries or issues related to the invoice are addressed promptly (Bosch Rexroth Internal Information, 2024).

This detailed process ensures a structured approach to starting a new IoT project with BODAS Connect, covering all necessary steps from initial contact to invoicing.

3.4 Business Model Development

The current business model of BODAS Connect has lots of aspect. In this chapter, first the present business model will be explained in detail in each area in the following chapter, which will also introduce the idea of a business model canvas. The BODAS Connect sales team and the sales and distribution management team have collaborated to build the following business plan.

3.4.1 Conceptualization of Business Model Canvas

The Business Model Canvas, created by Yves Pigneur and Alexander Osterwalder, is now a standard method for clearly describing business models across a wide range of industries. Its presentation as a visual chart with nine fundamental building blocks (see figure 13, next page) (Montenegro, 2021). On the one hand makes it transparent for an actual analysis of the current business model; on the other hand, it provides a clear foundation for discussion, validation, adaptation, and development, as well as for a list of potential future business models (Ematinger, 2018) (Mulaudzi, 2020). A business model is a framework that outlines the fundamental ideas behind how a company generates, distributes, and acquires value (Schallmo, 2018). The four primary fields of financial viability, offer, customers, and infrastructure are all covered by the nine fundamental building pieces (Osterwalder and Pigneur, 2010); (Karami and Madlener, 2021). These nine blocks are examined in further detail in the section that follows.

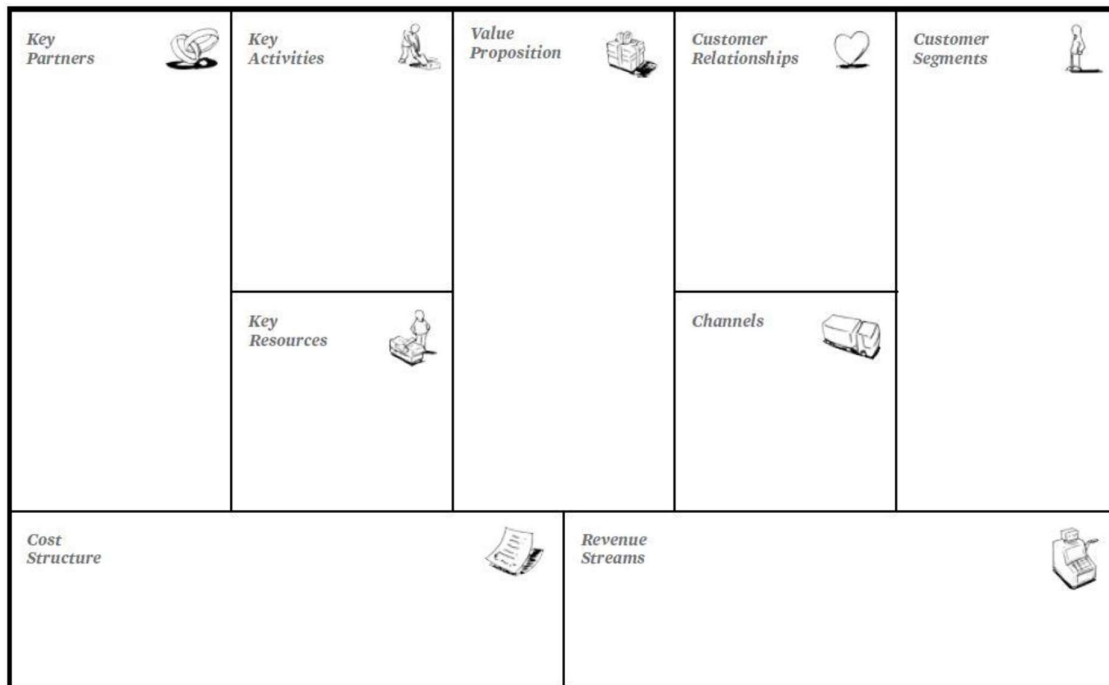


Figure 13 Business Model Canvas (Illustrated by Osterwalder and Pigneur, 2010)

The model's central component is the value proposition. This module discusses the advantages of products and services for consumer segments. Values can take two forms: they can be qualitative, like layout, user experience, or satisfaction, or they can be quantitative, like costs, service speed, and life cycle. These value propositions enable the fulfilment of customers' needs and desires as well as the resolution of problems (Osterwalder and Pigneur, 2010).

Without lucrative customers, all organizations would fail, which is why the customer segment is crucial to their success. To maximize business success, customers need to be segmented into specialty markets that a business wants to service based on shared characteristics and needs. The next step is to decide which sections to emphasize and which to ignore. To find out, companies need to answer the following questions: to whom is the company providing value, as well as who are its biggest customers? (Osterwalder and Pigneur, 2010).

Regarding the customer relationships, this block answers the following queries, Which kind of relationship is the organization's goal for each customer group to establish and sustain? What choices are available for integrating them with the rest of the business model along with how much will they cost? Relationships can be automatic or personalized, driven by factors such as upselling, client acquisition, or customer retention. Automated services, for instance, can provide order details and identify clients and their characteristics (Osterwalder and Pigneur, 2010).

Which channels of communication work best for reaching the target customer groups of the business? This question arises at the channels, which addresses the transaction structure of the business model. It describes how customers are given the value propositions (Osterwalder and Pigneur, 2009).

The revenue stream shows the profits the business receives from each segment of its customers (Gaglio, 2020). What is the consumers' price range and preferred method of

payment? Moreover, what proportion of each source of revenue contributes to overall revenue? These questions are addressed by this building element. Every client segment has the potential to generate one or more sources of income for the company when a response is successful. A variety of strategies, such as the sale of assets, consumption, cost of subscriptions, renting, outsourcing, and marketing, can be used to create these streams (Osterwalder and Pigneur, 2010).

This brings to the critical resource building part, which completes the resource architecture and enumerates the resources required to run the business model (Gaglio, 2020). In this instance, the most important query is: which facilities are needed to guarantee the business model's success? (Schallmo, 2018). These assets, which might be psychological, monetary, cognitive, or physical, are crucial in knowledge-based and creative industries (Campos, 2022). Depending on the specifics of the business plan, important partners may be owned, leased, or acquired. The key activities cover the transaction structure and, like the channels, highlights the most important processes that a business must do to function correctly (Becker and Bocker, 2018). The relevant questions here are which key tasks are necessary for the value offer, the channels of distribution, customer relationships, and the revenue sources. (Osterwalder and Pigneur, 2010)

Having strong networks of suppliers and partners might be essential for handling difficult situations. These networks, which are critical to the business model's operation, are described in the crucial partnerships (Schallmo, 2018). As a result, an answer to the question of which partners are the most important must be given. (Osterwalder and Pigneur, 2010).

A model for business would not be viable if it excluded consideration of the cost structure from the list of prerequisites. As a result, the ninth building block contains a description of all costs such as both fixed and variable which incurred because of utilizing the other eight parts of the structure. To overcome this challenge, the most important costs included in the business plan need to be determined. And which resources and activities are the most expensive? There are two broad types of business model cost structures such as value-driven, which prioritizes value creation through highly personalized services, and cost-driven, which focuses on cost savings wherever possible. (Osterwalder and Pigneur, 2010).

3.4.2 Current Business Model Canvas for BODAS Connect

The following is the current BODAS Connect with 9 blocks business model explanation and illustration (please refer to figure 14).

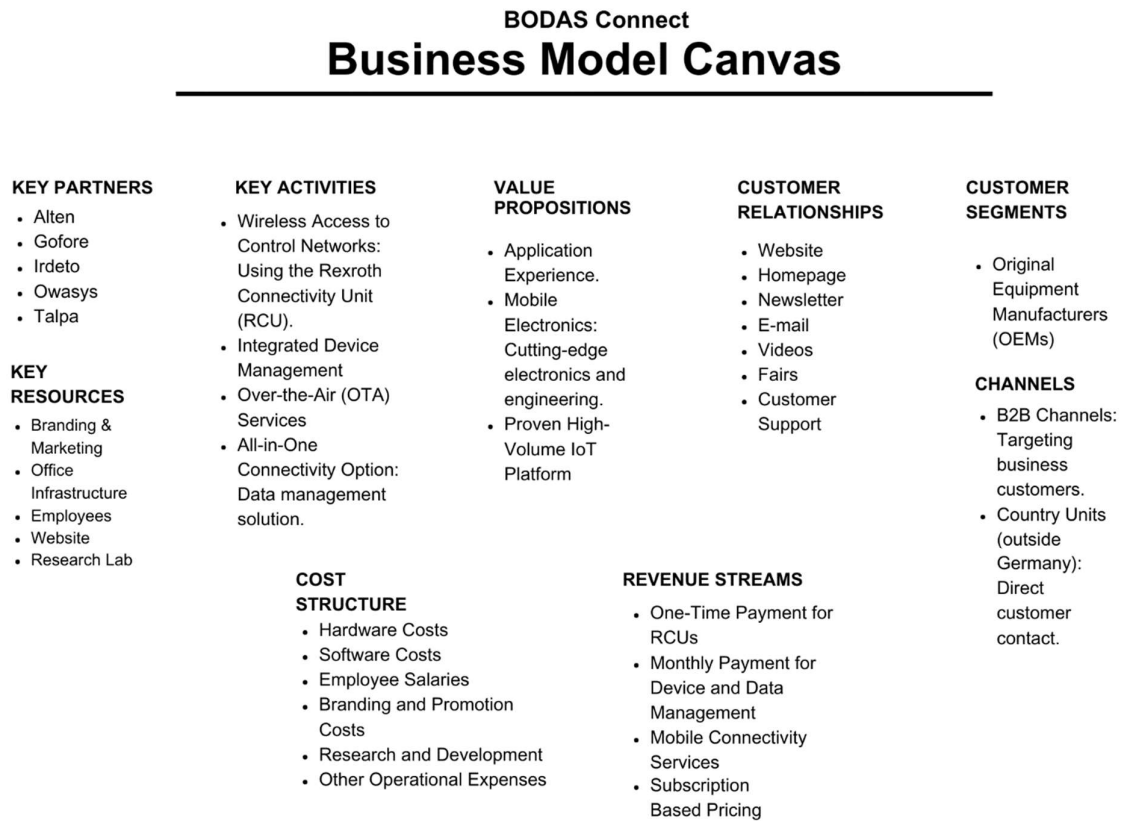


Figure 14 Current Business Model of BODAS Connect (Bosch Rexroth Internal Information, 2024)

1. Customer Segments

- **Original Equipment Manufacturers (OEMs):** OEMs are companies that manufacture a wide variety of mobile machinery, including agricultural vehicles like harvesters and tractors, construction equipment like loaders, bulldozers, and excavators, and specialized machinery for mining, forestry, and material handling industries. (OEM Off-Highway, 2023). These producers assemble different parts and systems to create machines that are delivered to customers that are completely operational. Manufacturers want cutting-edge technology solutions to improve the functionality, dependability, and efficiency of their equipment. They need solutions that support over-the-air upgrades, facilitate remote diagnostics and maintenance, enable smooth interaction with current components, and provide strong data security. These features are essential for preserving competitive advantage and guaranteeing client contentment. To meet these demands, BODAS Connect offers a complete solution that combines enhanced diagnostics, remote management, and wireless control network connectivity. As a result, OEMs can differentiate their goods in the market by providing their clients with machines that are not only dependable and high performing, but also have sophisticated connection and IoT capabilities (Bosch Rexroth Internal Information, 2024).

2. Customer Relationships

- **Website:** The BODAS Connect website serves as a single information hub, giving present and prospective consumers comprehensive details about the products available. Product descriptions, technical details, user guides, frequently asked questions, and support resources are all included. The website is jam-packed with information, including user testimonials that emphasize customer pleasure, white papers that explore technical topics and industry trends, and case studies that illustrate successful deployments. Furthermore, the website provides interactive resources like ROI calculators and configurators to assist users in comprehending the possible advantages of BODAS Connect (Bosch Rexroth Internal Information, 2024).
- **Homepage:** The homepage's eye-catching graphics, neat text, and interactive features are intended to draw in and hold users' attention. It highlights the distinctive value propositions of BODAS Connect, such as its proven IoT platform, cutting-edge mobile electronics, and application experience. Call-to-action buttons, sliders, and banners are used to draw attention to important features and advantages (Bosch Rexroth Internal Information, 2024).
- **Newsletter and E-mail:** Email campaigns and newsletters on a regular basis are crucial tools for keeping in touch with clients. Updates on new features, events, and product developments are sent out in these emails. Additionally, they provide information on industry trends and best practices, assisting clients in staying updated and optimizing their use of BODAS Connect. Newsletters frequently contain instructional material, such as how-to manuals, pointers for making the most of BODAS Connect, and customer success stories, in addition to updates. This contributes to the development of an informed clientele that can effectively utilize the product's potential (Bosch Rexroth Internal Information, 2024).
- **Videos:** Videos are an effective way to show off BODAS Connects features and advantages. These consist of in-depth product demonstrations that take viewers through a variety of features and use cases, customer testimonial that showcase the accomplishments and experiences of other customers, and technical tutorials that offer consumers precise usage instructions. Videos are employed in marketing campaigns as well as for demonstrations. To boost engagement and reach a wider audience, they are featured on the website, shared on social media, and included in email marketing (Bosch Rexroth Internal Information, 2024).
- **Fairs:** Attending business exhibitions, conferences, and fairs tailored to off-highway sector is an important way to interact directly with prospective clients. These gatherings offer chances for in-person contacts, networking with business leaders, and live demos. These events provide BODAS Connect with the opportunity to present its most recent developments, get input from clients and industry insiders, and investigate emerging market trends and prospects (Bosch Rexroth Internal Information, 2024).
- **Customer Support:** Sustaining client happiness and loyalty requires outstanding customer assistance. BODAS Connect has a committed support staff on hand to help users with technical problems, respond to inquiries, and offer advice on how to use the product efficiently. Customers can also access a comprehensive knowledge library with thorough documentation such as factsheet or datasheet, troubleshooting instructions, and a community forum where users can exchange solutions and experiences, in addition to direct help (Bosch Rexroth Internal Information, 2024).

3. Channels

- **B2B Channels:** To reach its business clients, BODAS Connect uses a range of channels tailored to industries. These consist of trade journals, internet discussion boards, trade associations, and professional networks. BODAS Connect may successfully target and engage with its key audience by engaging in various channels. BODAS Connects reach is increased by strategic alliances with technology companies and other industry participants. These alliances allow for cooperative product offerings, cooperative marketing campaigns, and integrated customer-value-adding solutions (Bosch Rexroth Internal Information, 2024).
- **Country Units (outside Germany):** By establishing direct communication with clients via regional country offices, BODAS Connect guarantees its ability to offer customized, area-specific service. Local specialists who are aware of the requirements and preferences of clients in their areas staff these units. Local country units assist in modifying sales and marketing plans to suit the customs, laws, and commercial climate of each market. This guarantees that BODAS Connects products and services are appropriate and desirable to clients in many areas (Bosch Rexroth Internal Information, 2024).

4. Value Propositions

- **Application Experience:** By utilizing Bosch Rexroth AG's vast experience in the mobile machinery industry, BODAS Connect can offer solutions that are specially designed to satisfy the distinct requirements of various applications. Because of this in-depth application knowledge, the solutions are guaranteed to be extremely pertinent and useful for the unique problems that OEMs encounter. The depth of experience and knowledge that Bosch Rexroth AG offers to the table benefits the customers. This includes knowledge of the most recent developments in technology, industry best practices, and tried-and-tested methods for enhancing the performance of machinery (Bosch Rexroth Internal Information, 2024).
- **Advanced Mobile Electronics:** Boasting cutting-edge electronics and engineering, BODAS Connect expands upon BOSCH Automotive Technology to provide cutting-edge solutions. This guarantees that customers will receive cutting-edge technologically innovative items with exceptional functionality, dependability, and performance. Because of Bosch's dedication to ongoing innovation, BODAS Connect is constantly changing and getting better, giving clients access to cutting-edge solutions that help them stay one step ahead of the competition (Bosch Rexroth Internal Information, 2024).
- **Proven High-Volume IoT Platform:** A solid and scalable infrastructure that can manage large volumes of data and devices is offered by the Bosch IoT Suite. By doing this, BODAS Connect is guaranteed to be able to meet its clients' expanding needs as they develop their businesses and roll out additional connected devices. The Bosch IoT Suite prioritizes security and has sophisticated security features to safeguard data and guarantee system integrity. Customers may rest easy knowing that their operations and data are safe thanks to this. The platform makes it simple for customers to adopt and use BODAS Connect without experiencing a major disturbance to their

operations by offering seamless connection with current workflows and systems (Bosch Rexroth Internal Information, 2024).

5. Key Activities

- **Wireless Access to Control Networks:** BODAS Connect facilitates wireless connectivity to off-highway vehicle control networks, offering a smooth and effective approach to machinery performance optimization and management. This covers functions like updates, diagnostics, and remote monitoring. By allowing wireless access, BODAS Connect lowers the requirement for manual updates and physical interventions, improving operational effectiveness and decreasing downtime (Bosch Rexroth Internal Information, 2024).
- **Interactions:** The system can communicate with Rexroth Controllers (RC) in a number of ways, such as flashing (firmware updates), diagnosing (problems found and fixed), and parametrization (performance-enhancing parameter adjustments). These features guarantee that equipment is constantly operating at peak efficiency and that problems may be found and fixed right away (Bosch Rexroth Internal Information, 2024).
- **RCU Features:** One essential part of BODAS Connect is the Rexroth communication Unit (RCU), which supplies the hardware required for communication and data management. Because Linux is its foundation, it has a great deal of flexibility and futureproofing. Additionally, the RCU can endure the demanding conditions of off-highway applications because to its sturdy design and IP67 compliance, which guarantees dependable operation in all settings (Bosch Rexroth Internal Information, 2024).
- **Integrated Device Management:** To keep track of and control the health of linked devices, BODAS Connect provides a full suite of diagnostic tools. This enables clients to proactively manage their equipment and stop problems before they arise by providing real-time monitoring, alerting, and reporting. The system's snap features make it possible to manage software updates and packages effectively, keeping devices up to speed with the safest and most recent versions. Ensuring secure connection between devices, safeguarding data integrity, and preventing unauthorized access are all made possible by robust certificate management (Bosch Rexroth Internal Information, 2024).
- **Over-the-Air (OTA) Services:** Remote updates for RCUs, RCs, and external UDS-based controllers and displays are made possible by OTA services. This guarantees that all devices are constantly running the newest firmware and software upgrades, reducing the need for on-site maintenance. Customers can maintain their equipment's functionality and keep it up to date with ease thanks to OTA updates, which streamline the device maintenance and updating procedure (Bosch Rexroth Internal Information, 2024).
- **All-in-One Connectivity Option:** BODAS Connect provides a comprehensive solution for data management, encompassing device connectivity, data processing, and analytics. This integrated approach offers consumers a seamless and integrated solution while streamlining the system's deployment and use (Bosch Rexroth Internal Information, 2024).

6. Key Resources

- **Branding and Marketing:** Building consumer familiarity and trust requires creating and sustaining a strong brand presence. BODAS Connect makes strategic investments in marketing and branding to develop a strong brand identity and successfully convey its value propositions. Constant marketing initiatives, such as events, digital marketing campaigns, and advertising, aid in raising brand awareness and drawing in new clients (Bosch Rexroth Internal Information, 2024).
- **Office Infrastructure:** Encouraging productivity and collaboration among staff members requires offering a physically comfortable office. BODAS Connect makes sure that all the amenities and resources required to support its employees are present at its offices. Modern equipment and technology are part of the office setup, which helps staff members do their work quickly and successfully (Bosch Rexroth Internal Information, 2024).
- **Employees:** For BODAS Connect, having a workforce with talent and skill is essential. The business makes investments in attracting and keeping top personnel across a number of divisions, such as operations, support, and development. Employees are equipped to provide consumers with high-quality solutions and assistance when they participate in ongoing training and development programs that keep them abreast of industry best practices and the newest technological advancements (Bosch Rexroth Internal Information, 2024).
- **Hardware:** RCUs are among the essential hardware elements that BODAS Connect needs in order to function properly in terms of communication and data management. These gadgets are made to function and dependability to very high standards. Strict quality control procedures guarantee that every hardware component satisfies the necessary requirements, standards, and specifications, offering clients robust and enduring solutions (Bosch Rexroth Internal Information, 2024).
- **Software:** The software solutions that support BODAS Connect must be created and maintained using cutting-edge development tools and platforms. Software updates and enhancements may be developed, tested, and deployed more quickly thanks to these tools. BODAS Connects all-inclusive software solutions, which include connectivity, data management, and analytics, provide the functionality and user experience required to satisfy client demands (Bosch Rexroth Internal Information, 2024).

7. Key Partners

- **Alten:** Working with Alten gives BODAS Connect access to development capabilities and specific technical knowledge. This collaboration improves BODAS Connects capacity to provide creative, superior solutions. Working together with Alten on development projects speeds up product innovation and expedites the release of new features and improvements (Bosch Rexroth Internal Information, 2024).
- **Gofore:** BODAS Connect will always have access to the best software engineering skills and resources thanks to its partnership with Gofore for software development and deployment. This partnership facilitates the development of reliable and effective software solutions. Gofore's proficiency in software implementation contributes to the seamless and prosperous implementation of BODAS Connect solutions, hence reducing interruptions and optimizing client contentment (Bosch Rexroth Internal Information, 2024).

- **Irdeto:** For BODAS Connect to function, security and intellectual property protection must be guaranteed. By collaborating with Irdeto, users may take advantage of cutting-edge technology and security procedures that safeguard data and guarantee system integrity. Irdeto's knowledge of intellectual property protection contributes to the protection of BODAS Connect's innovations and competitive advantages (Bosch Rexroth Internal Information, 2024).
- **Owasis:** Owasis improves the overall solution by contributing to the IoT platform capabilities, such as providing hardware (RCUs), and by offering the infrastructure and support required for scalable and dependable communication. BODAS Connect is able to concentrate on its core skills and provide customers with a holistic solution thanks to the cooperation with Owasis, which enables it to harness external experience and resources (Bosch Rexroth Internal Information, 2024).
- **Vodafone:** For BODAS Connect to function, dependable mobile connectivity services must be enabled. Customers will always have access to a strong and dependable mobile network thanks to our partnership with Vodafone. Vodafone's worldwide reach and substantial network infrastructure enable BODAS Connect to provide connectivity services to customers globally, guaranteeing dependable and consistent performance (Bosch Rexroth Internal Information, 2024).

8. Cost Structures

- **Hardware Costs:** The costs associated with creating and sustaining hardware components are high. This covers expenditures for production, R&D, and continuing maintenance to guarantee that hardware satisfies strict performance and reliability requirements. Strict quality control procedures are implemented to guarantee that every hardware part is dependable and satisfies the necessary standards, hence augmenting total client contentment (Bosch Rexroth Internal Information, 2024).
- **Software Costs:** Software license and use fees can add up, particularly for sophisticated development tools and platforms. To keep the software solutions current and functional, ongoing costs for development, upgrades, and maintenance are essential. This covers the pay for development teams, the price of tools, and the expenditures associated with deployment and testing (Bosch Rexroth Internal Information, 2024).
- **Employee Salaries:** Pay and benefits for highly qualified workers in a variety of sectors, such as operations, support, and development, make up a sizeable amount of the total cost structure. Investing in ongoing training and development initiatives helps guarantee that staff members possess the abilities and know-how required to provide superior solutions and assistance (Bosch Rexroth Internal Information, 2024).
- **Branding and Promotion Costs:** Building and sustaining brand presence and drawing in new clients require investments in marketing campaigns, events, and promotional activities. Long-term consumer trust and awareness are bolstered by ongoing efforts to establish and enhance the BODAS Connect brand (Bosch Rexroth Internal Information, 2024).
- **Delivery Expenses:** The whole cost structure includes a significant portion of expenses for shipping, handling, and storage as well as other costs associated with the distribution of hardware devices and components. Supply chain interruptions and delays are minimized when hardware components are delivered in good shape and on

schedule due to efficient supply chain management (Bosch Rexroth Internal Information, 2024).

9. Revenue Streams

- **One-Time Payment for RCUs:** One important source of income for BODAS Connect is the proceeds from the one-time sale of Rexroth Connectivity Units (RCUs). The initial hardware purchases made by clients wishing to put the connection solutions into practice are what propel these sales. Adoption of RCUs is accelerated by efficient sales and marketing tactics, which grow the clientele and boost revenue (Bosch Rexroth Internal Information, 2024).
- **Monthly Payment for Device and Data Management:** Part of BODAS Connects revenue model is the provision of device and data management services, which generates ongoing subscription-based revenue. For ongoing access to these services which include data analytics, upgrades, and remote diagnostics, customers must pay a monthly subscription. This subscription model gives BODAS Connect a consistent and predictable flow of recurring revenue, which supports the company's expansion and financial stability (Bosch Rexroth Internal Information, 2024).
- **Mobile Connectivity Services:** An extra source of income comes from selling services related to mobile network access. Connectivity services are paid by customers, allowing their devices to send and receive data over mobile networks. By giving clients a complete, integrated solution with all required connectivity and data management features, mobile connectivity services improve BODAS Connects overall value proposition (Bosch Rexroth Internal Information, 2024).

Overall, BODAS Connect maintains a subscription-based business model. It is possible to understand how the many parts of the BODAS Connect business model interact to produce a strong and unified product by going further into each one. This thorough examination demonstrates the methods and assets that BODAS Connect uses to satisfy client demands, prompt innovation, and ensure long-term success (Bosch Rexroth Internal Information, 2024).

3.5 Competitor Comparison (with Trackunit)

3.5.1 Main Focus

Each company has its own goal or focus on their business. BODAS Connect and Trackunit has different focuses. They are described below.

BODAS Connect

BODAS Connect's over the air Service supports remote management, diagnosis, and updates for RCUs, RCs, and third-party UDS-based ECUs and displays (See Figure 15). The OTA services offered by BODAS Connect increase machine performance overall, decrease downtime, and boost flexibility. Software Over-the-Air, Firmware Over-the-Air, and Remote Device Management are all included in the OTA (Bosch Rexroth AG, 2023b). For instance, a software bug impacting the hydraulic control system of excavators was discovered by the owner of a fleet of construction machines. He can concurrently send a targeted update to all pertinent RCUs using SOTA. It is not necessary for operators to transport the machines to the workshop to have them fixed remotely. In addition, a new rule regulating emissions is implemented. All their bulldozers' engine management firmware must be updated. The owner may easily coordinate this upgrade for the whole fleet via FOTA (Bauunternehmer, 2022).

Moreover, there is an abrupt decrease in hydraulic pressure in one of their wheel loaders. The owner locates a malfunctioning sensor with the help of remote diagnostics. To save money on a repair call, the owner recalibrates the sensor remotely (Bosch Rexroth Internal Information, 2024).

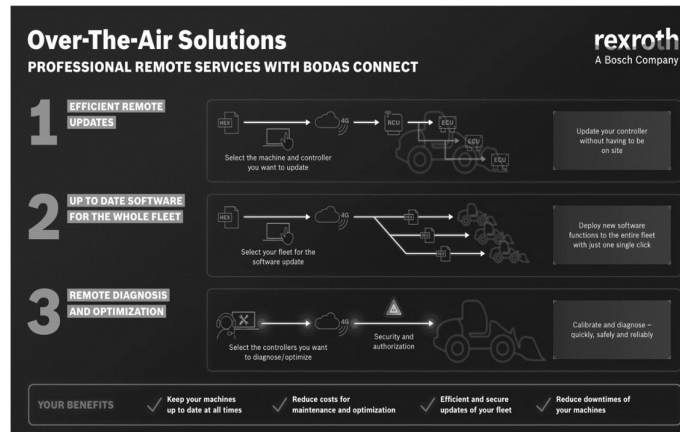


Figure 15 Over the Air Solutions by BODAS Connect (Bosch Rexroth AG Internal Figures, 2024)

Trackunit

The goal of Trackunit is to eliminate downtime because they think it will allow construction to become a positive force again (Trackunit, 2024d). The Eliminate Downtime initiative seeks to address the inefficiencies that plague the construction industry (See Figure 16). An industry that is more integrated and productive will contribute to eliminating downtime and guaranteeing that machinery is used more sensibly and efficiently (Trackunit, 2024b). Optimizing machinery utilization not only makes financial sense, but it may also have a significant impact on sustainability in the surrounding environment and start the difficult process of releasing the hold downtime has on the industry. It's not just about electrification. It involves utilizing data to instantly address problems and strategically deploy personnel, equipment, and fleets on-site to produce the finest, most effective results.

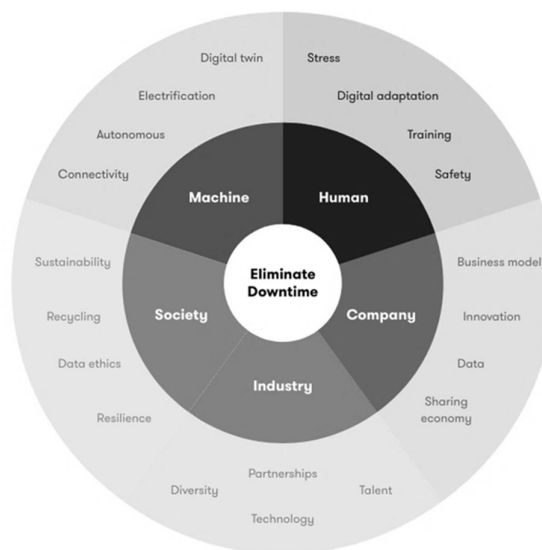


Figure 16 Trackunit Eliminate Downtime Model (Trackunit Annual Pdf, 2021)

The foundation of Trackunit is the eliminate downtime paradigm (See figure 16), which powers an ecosystem aimed at resolving construction inefficiencies, bringing stakeholders together, and collaboratively tackling societal issues (Trackunit Annual Report, 2021).

Furthermore, A detailed comparison table between **BODAS Connect** from **Bosch Rexroth** and **Trackunit**. The extended descriptions for each features are given below (See Table 11):

Table 11 Features of BODAS Connect and Trackunit (Bosch Rexroth AG Internal Information, 2024); (Gupta, 2023); (Trackunit Annual Report, 2021); (Trackunit, 2024c); (Trackunit, 2024d); (Bauunternehmer, 2024); (International Rental News, 2024); Bosch Rexroth AG, 2024f)

Features	BODAS Connect	Trackunit
Connectivity	<ul style="list-style-type: none"> Off-highway machinery and trucks are the target market for BODAS Connect. Wireless connectivity is offered for data collection and transmission. Up to four Ethernet ports and CAN busses can provide data to the system. Because of its IP67 compliance and tough design, it is guaranteed to last under challenging conditions. Modular software design enables functionalities to be customized according to particular use cases. 	<ul style="list-style-type: none"> Trackunit is a fleet management tool that focuses on real-time GPS tracking. It offers personalized geofencing and notifications to improve fleet security and visibility. The platform facilitates data-driven decision-making by providing sophisticated analytics and reporting. A comprehensive understanding of fleet operations is ensured by seamless connection with current systems.
Customization	<ul style="list-style-type: none"> BODAS Connect makes use of Rexroth Control Units (RCUs) that are Linux-based, making customization simple. Flexible software features are made possible by the container-based architecture. Custom features can be integrated more easily with the help of securely managed interfaces. 	<ul style="list-style-type: none"> Trackunit provides an environment in which it is possible to freely program both software and hardware. BODAS Connect connectivity is now possible. Updates to the program allow for faster advancements.
Applications	<ul style="list-style-type: none"> Digital services and end-to-end IoT use cases are made possible by BODAS Connect. It facilitates operations management and remote deployment. It improves efficiency and performance, making it perfect for off-highway machinery. 	<ul style="list-style-type: none"> Trackunit links people, processes, and construction assets. It improves fleet efficiency and operator safety. Real-time insights improve the overall effectiveness of the firm.
Industry Focus	<ul style="list-style-type: none"> The heavy machinery and industrial sectors are the main markets that BODAS Connect serves. 	<ul style="list-style-type: none"> Trackunit is designed exclusively with the construction sector in mind. It talks about the difficulties that equipment makers and contractors have with downtime.
Customer Base	<ul style="list-style-type: none"> Customers in the industrial, agricultural, and heavy machinery sectors are drawn to BODAS Connect. 	<ul style="list-style-type: none"> Trackunit is extensively utilized by equipment makers, contractors, and construction firms.

Ease of Use

- The RCUs based on Linux make deployment and customization easier.
- BODAS Connect seeks to enhance mobile machines' availability, performance, and efficiency.
- Trackunit offers fleet managers and operators an intuitive user interface.
- Trackunit is dedicated to reducing downtime and improving worker safety on building projects.

3.5.2 SWOT Analysis of BODAS Connect and Trackunit

A SWOT analysis is a method for evaluating these four characteristics of a business, which stand for Strengths, Weaknesses, Opportunities, and Threats. A useful technique for assessing a company's strengths and weaknesses and creating a winning long-term plan (Mindtools, 2024).

BODAS Connect: There are several strengths, weaknesses, opportunities, and threats of BODAS Connect so that Bosch Rexroth AG is able to analyse company's internal and external factors (SEE Figure 17) .

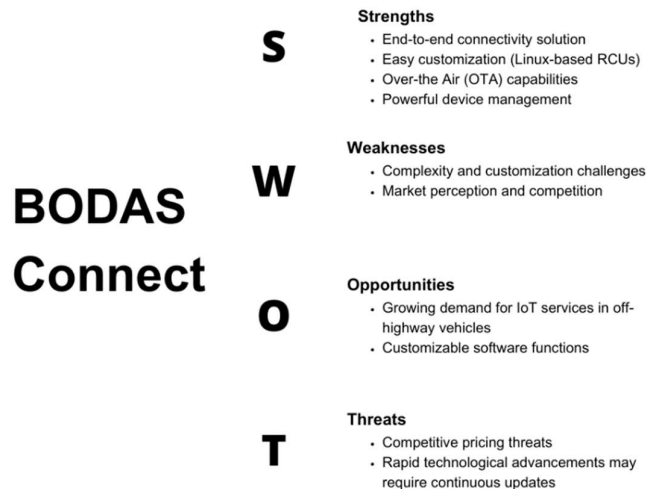


Figure 17 SWOT Analysis of BODAS Connect (Bosch Rexroth Internal Information, 2024)

- **Strengths:**
 - **Flexible solution for end-to-end connection:** Because of its modular architecture, BODAS Connect may be easily integrated into a variety of mobile devices and facilitate effective data transfer. This flexibility guarantees interoperability with a wide range of equipment, including farm machinery and construction trucks (Bosch Rexroth Internal Information, 2024).
 - **Linux-based RCUs (Connectivity Units) allow easy customization in multiple languages:** RCUs based on Linux provide easy modification and

versatility. The solution can be customized by developers to meet needs and support a variety of languages (Bosch Rexroth Internal Information, 2024).

- **Powerful device management for remote management and diagnosis:** Robust tools for remote management and diagnosis are offered by BODAS Connect. This function lowers downtime and improves operational efficiency.
- **Over-the-Air (OTA) capabilities for RCUs, RCs, and third-party ECUs:** The OTA feature of BODAS Connect guarantees that updates are sent to RCUs, RCs, and third-party ECUs without the need for physical contact. The system is kept secure and up to date by this function (Bosch Rexroth Internal Information, 2024).

- **Weaknesses:**

- **Complexity and customization challenges:** Users can move data to and from mobile devices with the help of BODAS Connect's flexible connectivity options. The customization procedure, nevertheless, can be difficult. Technical know-how may be needed to tailor the Linux-based RCUs (Connectivity Units) to certain use cases. To prevent unexpected problems, users need to carefully configure the system (Bosch Rexroth Internal Information, 2024).
- **Market perception and competition:** Other connectivity options on the market compete with BODAS Connect. Adoption rates are influenced by its value proposition in comparison to rivals. Attractive positioning of BODAS Connect requires effective marketing and differentiation (Bosch Rexroth Internal Information, 2024).

- **Opportunities:**

- **Growing demand for IoT services in off-highway vehicles:** BODAS Connect can make profit from the growing trend of industries implementing IoT solutions. Providing dependable internet access for off-highway vehicles will draw clients.
- **Customizable software functions for flexible deployment:** Because of the versatility of its software, BODAS Connect can develop capabilities specifically for certain applications. Working together with end users and equipment manufacturers will open new opportunities.

- **Threats:**

- **Competition from other connectivity solutions:** Competing businesses could provide different connectivity options. BODAS Connect needs to stay ahead of the curve, constantly innovate, and offer exceptional value.
- **Rapid technological advancements may require continuous updates:** The industry is changing quickly. In order to remain competitive and stay up to date with evolving technology, BODAS Connect ought to allocate resources into research & development.

Trackunit: The SWOT analysis of Trackunit to study the internal and external factors are given below (See Figure 18).

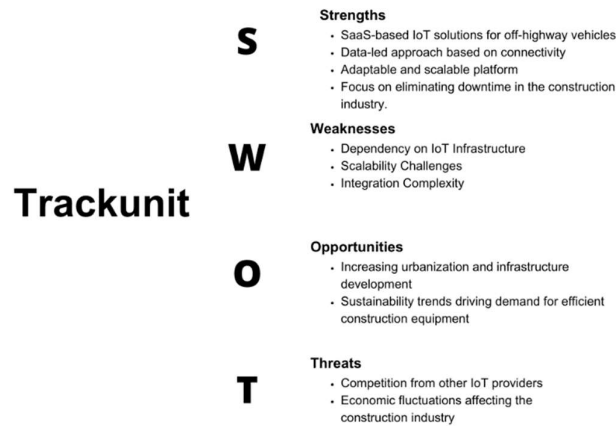


Figure 18 SWOT Analysis of Trackunit (Trackunit Annual Pdf, 2021)

- **Strengths:**
 - **Global leader in brand-agnostic, SaaS-based IoT solutions for off-highway vehicles:** For off-highway vehicle IoT solutions, Trackunit is a global leader in SaaS-based, brand-neutral solutions. Their market presence and wide reach offer them a competitive edge (Trackunit, 2024a).
 - **Data-led approach based on connectivity:** Trackunit's emphasis on data-driven insights, made possible by connectivity, enables them to give their clients useful information. This method improves operational effectiveness and decision-making (International Rental News, 2024)
 - **Adaptable and scalable platform:** The platform of Trackunit is built to scale and adjust to different types of equipment with ease. This adaptability guarantees that a diverse clientele can be served by their solutions (Trackunit, 2024c).
 - **Focus on eliminating downtime:** Trackunit provides substantial value by eliminating downtime difficulties in the construction industry. Their solutions contribute to reducing equipment downtime, which raises output (Trackunit, 2024b).
- **Weaknesses:**
 - **Dependency on IoT infrastructure:** The dependability and accessibility of IoT infrastructure are critical components of Trackunit's success. Any interruptions or technical problems can affect their offerings (Trackunit Annual Report, 2021).

- **Scalability Challenges:** Scalability becomes more important as Trackunit's clientele grows. It can be difficult to maintain constant performance for an increasing number of users (Trackunit Annual Report, 2021).
- **Integration Complexity:** There may be difficulties when integrating Trackunit's solutions with construction businesses' current systems. Success requires compatibility and a smooth integration process (Trackunit Annual Report, 2021).
- **Opportunities:**
 - **Increasing urbanization and infrastructure development:** For Trackunit, the continuous trend of urbanization and infrastructure development presents a huge market opportunity. The need for their services will probably increase as cities expand and as building projects grow in scope.
 - **Sustainability trends:** The need for eco-friendly and sustainable building equipment is fuelled by these factors. Trackunit can benefit from this by providing environmentally friendly options.
- **Threats:**
 - **Competition from other IoT providers:** In the intense IoT industry, several businesses are battling for market share. Trackunit needs to continuously develop and differentiate themselves if they want to hold onto their lead.
 - **Economic fluctuations affecting the construction industry:** Economic downturns can affect the building industry, which in turn affects Trackunit's operations. It is crucial to have contingency plans for changes in the economy.

To sum up, BODAS Connect works best in situations where speed optimization, remote deployment, and real-time data collection are crucial. Construction machinery, machinery for agriculture, and industrial automation are a few examples. BODAS Connect offers significant flexibility and connectivity, making it a reliable choice for off-highway vehicles and industrial gear. Conversely, Trackunit is ideal for contractors, building firms, and equipment manufacturers. It tackles issues with efficiency, safety, and fleet management on building sites. It excels in the construction sector by placing a strong emphasis on analytics, safety, and real-time tracking.

3.6 Persona Development (Imaginative)

The persona development helps to realize how a solution partner thinks in regards of Internet of Things. In this case, HYDIO is an imaginative solution partner. The overall description is given below.

Persona: HYDIO - The Solution Partner (Imaginative)

Background:

- **Company Name:** HYDIO
- **Location:** Spain
- **Industry:** Off-Highway Vehicle (OHV)
- **Role:** Solution Partner of Bosch Rexroth

Overview:

As a proactive and innovative solution partner, HYDIO helps to close the communication gap between different OHV ecosystem stakeholders. HYDIO is an important partner that works closely with End Users, OEMs, Fleet Management businesses, and Country Units. Now let's explore HYDIO's persona in more detail:

Persona: HYDIO – (Imaginative Solution Partner of BOSCH Rexroth)



- **HYDIO is a Bosch Rexroth Certified Excellence Partner**
- **Industry and Specialization:**
HYDIO operates in the field of **mechanical and industrial engineering**.
- **Company Information:**
 1. **Size:** HYDIO has **11-50 employees**.
 2. **Headquarters:** Their main office is in **Mallorca, Spain**.
- **HYDIO's Vision:**
 1. Connected Machines
 2. Sustainable Practices
 3. Empowering Field Operators

Figure 19 Hydio Persona Overview (Own Illustration)

3.6.1 Roles

The roles are very vital for HYDIO. How they are important as a solution partner is given as follows.

1. **Connector and Facilitator:** The backbone of the OHV ecosystem is HYDIO, which acts as an essential bridge that joins disparate parties together. Their function goes beyond simple transactions; they play a crucial role in creating long-lasting connections between OEMs, Fleet Management firms, Country Units, and End Users. By means of efficient communication and cooperation, HYDIO establishes a bridge between these businesses, guaranteeing the smooth functioning of the entire value chain. In addition to improving operational effectiveness, this cooperative strategy fosters mutual trust and benefits for all parties involved.
2. **Strategic Advisor:** With a thorough understanding of the particular difficulties that every stakeholder faces, HYDIO takes on the role of a strategic counsellor in the intricate and quickly changing OHV scene. They are able to offer priceless advice and insight because of their deep awareness of the dynamics and trends in the business. HYDIO helps stakeholders make decisions that are in line with their goals and objectives by providing strategic insights. In addition to reducing risks, this advisory function opens doors for growth and innovation, which advances the ecosystem.
3. **Customization:** Realizing that a one-size-fits-all strategy is insufficient in the heterogeneous OHV sector, HYDIO takes a customized approach to providing solutions. They carefully craft their products to meet the unique requirements and inclinations of OEMs, Fleet Managers, and End Users.

HYDIO demonstrates a talent for customizing, whether it is in the form of improving safety procedures, reducing operational procedures, or optimizing vehicle performance. By guaranteeing that every stakeholder obtains the most value possible, this dedication to customizing solutions promotes long-term pleasure and loyalty.

3.6.2 Pain Points for HYDIO in IoT Adoption

There are several pain points for HYDIO as a solution partner. They are described below.

- **Costly Data Collection:**
Issue: For HYDIO, traditional data collection techniques come with a high price tag and operational overhead. Furthermore, gathering data by hand has inherent dangers, especially in dangerous industrial settings. HYDIO investigates the use of wireless data collecting systems as a solution to this issue.
Solution: By utilizing wireless technology to monitor geotechnical and structural sensors in real-time, HYDIO may improve efficiency and safety while also cutting expenses. HYDIO will be able to help OEM make data-driven decisions with more accuracy and agility due to this move toward automated data collection.
- **Harsh Industrial Environments:**
Issue: In harsh and brutal conditions were measuring of certain parameters and factors which might lead to failure of the machine or system is difficult because of human risk or physically not possible, HYDIO must provide a sustainable, risk free and reliable robust solution.
Solution: By utilizing robust data nodes that can digitize a range of sensors, HYDIO is able to endure the harsh conditions found in industrial environments. Furthermore, fast setup and installation are made possible by the seamless integration of mobile applications, reducing downtime and increasing operational uptime.
- **Protecting Traditional Sensor Investments:**
Issue: Traditional sensor networks are still essential to the operations of many industrial firms, for which they have made significant investments. But these current expenditures must not become outdated as IoT-enabled solutions develop.
Solution: HYDIO understands the value of maintaining and utilizing traditional sensor networks as important resources. HYDIO protects these investments by guaranteeing compatibility and interoperability between legacy systems and upcoming IoT platforms, opening new opportunities for efficiency gains and innovation.

3.6.3 Needs and Demands for IoT

HYDIO has different needs and demands as a solution partner. They are:

1. **Real-Time Monitoring:**
Need: For HYDIO, real-time insights are critical, especially when it comes to geotechnical and structural data. With real-time monitoring, HYDIO can quickly identify deviations and anomalies, allowing for preventive measures and the reduction of possible hazards.
Solution: By putting in place wireless solutions for quick reaction and ongoing monitoring, HYDIO can keep a close eye on important metrics and guarantee operational dependability and resilience.

2. **Durable and Sharp Solutions:**

Need: Industrial environments are severe and unpredictable, thus HYDIO needs sensors that can survive hostile situations without sacrificing dependability or performance. Solutions that are robust and resilient are essential for maintaining data integrity and uninterrupted functioning.

Solution: HYDIO can reduce the chance of sensor failures and interruptions by choosing robust data nodes that can withstand temperature changes, severe weather, and physical impacts. These resilient solutions maintain assurance and tranquillity of mind, even in the most demanding operational settings.

3. **Standardization and Ease of Installation:**

Need: HYDIO needs to streamline the deployment and installation procedures in order to effectively expand their IoT projects throughout a variety of locations. Implementation activities are streamlined by standardization and simplicity of installation, which lowers complexity and shortens deployment timescales.

Solution: HYDIO maintains uniformity and dependability throughout their IoT infrastructure by using portable data nodes that are simple to build and deploy using user-friendly mobile applications. This uniform method improves the effectiveness of operations and makes it easier to integrate with current workflows and systems.

3.6.4 Potential Benefits from IoT-Enabled Solutions

As a solution partner, HYDIO believes they have potential benefits from IoT-Enabled Solutions. They are given below:

- **Predictive Maintenance:** By implementing IoT-enabled predictive maintenance solutions, HYDIO is able to identify possible problems before they become expensive breakdowns. HYDIO can minimize unplanned downtime by enabling proactive maintenance interventions and identifying patterns and abnormalities through the analysis of real-time sensor data.
- **Remote Monitoring and Control:** No matter where they are physically located, cloud-based dashboards give HYDIO, fleet managers, and end users real-time visibility into system performance. Stakeholders may make pre-emptive decisions and adjust operations to maximize efficiency thanks to this remote monitoring feature.
- **Efficiency Optimization:** HYDIO can optimize hydraulic system efficiency and fine-tune system parameters by using machine learning algorithms and data analytics. HYDIO can increase overall performance and productivity by identifying areas for improvement and implementing targeted interventions by utilizing insights from IoT-enabled sensors.

- **Eco-Friendly Practices:** HYDIO can track contaminants, encourage fuel-efficient driving, and implement environmentally friendly habits due to IoT-enabled technologies. In compliance with wider industry trends and laws, HYDIO may minimize environmental impact and help achieve sustainability goals by tracking and optimizing resource consumption (See Figure 20).

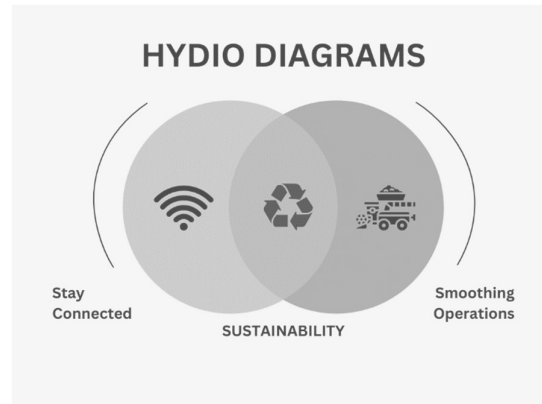


Figure 20 HYDIO Sustainability Diagram (Own Illustration)

- **Condition-Based Alerts:** Condition-based alerts enabled by the Internet of Things give HYDIO early notice when maintenance is needed or when components need to be replaced. HYDIO can minimize disruptions and maximize asset longevity by proactively addressing possible difficulties through the establishment of threshold-based triggers.
- **Enhanced Safety:** Safe hydraulic system operation is guaranteed by IoT-enabled emergency shutdown features and safety sensors. HYDIO may reduce risks and give employee safety top priority by keeping an eye on vital metrics in real-time and initiating automatic shutdowns in the event of anomalies or safety breaches.
- **Enhanced Customer Experience:** By utilizing IoT data, HYDIO is able to provide end users with individualized services that are catered to their specific requirements and preferences. In addition to improving operational efficiency, proactive alerts, remote diagnostics, and prompt support also improve the customer experience overall, which promotes happiness and loyalty.

In conclusion, HYDIO's critical position as an OHV industry solution partner is highlighted by their aptitude for navigating through complexities, resolving issues, and maximizing the revolutionary potential of IoT-enabled solutions. Through acting as a reliable partner for all parties involved, HYDIO promotes creativity, builds resilience, and releases value along the whole value chain. HYDIO is at the forefront of innovation as the sector develops, promoting wealth and sustainable growth for all parties.

4. Findings

This chapter presents the findings of the research, focusing on the significance of solution partners in the value chain, scenario analysis of the current business situation, and perspectives gathered from internal employees and solution partners through a survey.

4.1 Significance of Solution Partners in the Value Chain

Companies must constantly modify and improve their value chains in the quickly changing industrial landscape to seize new market possibilities and boost operational effectiveness. A strong value chain comprising Drive and Control (DCs), Country Units (CUs), Large OEMs, Fleet Management, and End Users has been developed via Bosch Rexroth AG's BODAS Connect. Although the present methodology has demonstrated efficiency, it primarily targets large Original Equipment Manufacturers (OEMs), potentially overlooking the significant market sector comprised of medium and small OEMs. It is suggested that solution partners be introduced to close this gap and improve market penetration even more. The importance of adding Solution Partners to the value chain is discussed in length in this chapter, along with the advantages and outcomes for Bosch Rexroth AG (Bosch Rexroth Internal Information, 2024).

4.1.1 Current Value Chain

The existing value chain for Bosch Rexroth AG's BODAS Connect operates as per the diagram below (See Figure 21):

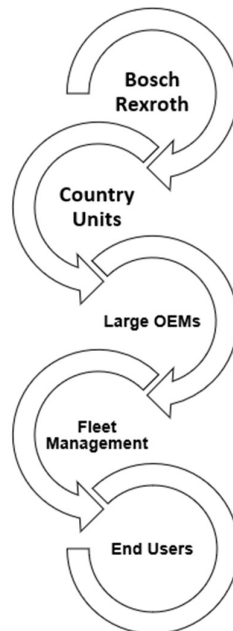


Figure 21 Current Value chain of BODAS Connect (Bosch Rexroth Internal Information, 2024)

Because of this organizational structure, Bosch Rexroth AG has been able to efficiently manage its connections with major OEMs by utilizing its wide network of country units. Because of their large purchase quantities, these OEMs are important sources of income for

Bosch Rexroth AG. Targeting these big OEMs directly with invoices guarantees smooth transactions, effective supply chain management, and strong commercial ties.

This approach does have certain limitations, though, as it mainly serves major OEMs and may not reach the profitable medium and small OEM segments. Even if each of these tiny businesses brings in less money on its own, taken as a whole, they have a sizable market potential. It is suggested that solution partners be introduced in order to take advantage of this potential (Bosch Rexroth Internal Information, 2024).

4.1.2 Value Chain with Solution Partners

The proposed value chain aims to incorporate Solution Partners to facilitate better engagement with medium and small OEMs, as detailed below. This modification introduces Solution Partners between the Country Units and medium or small OEMs, creating a crucial link for expanded market access (See Figure 22).

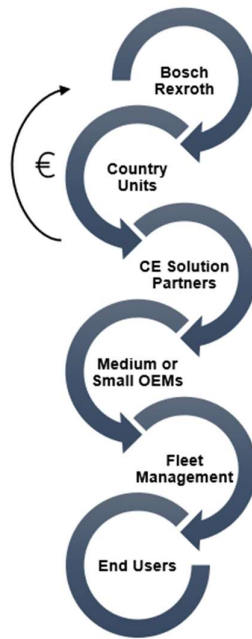


Figure 22 Proposed Value Chain of BODAS Connect (Own Illustration along with Bosch Rexroth Internal Data, 2024)

4.1.3 Importance of the Solution Partners

Several importance of solution partners in this value chain are identified, they are:

1. Market Penetration: In order to get traction in the medium and small OEMs market segments, solution partners are essential. Due to the extensive local market expertise and established networks of these partners, Bosch Rexroth AG is able to effectively access and service these segments. Bosch Rexroth AG may increase its competitive edge by customizing

its offerings to the unique requirements and preferences of medium and small OEMs by utilizing the experience of its solution partners.

2. Revenue Diversification: Bosch Rexroth AG can diversify its revenue streams by lowering its reliance on major OEMs through the introduction of solution partners. By distributing revenue risk over a larger client base, this diversification improves financial stability. Bosch Rexroth AG connects with more income streams by billing solution partners, potentially increasing overall profitability.

3. Enhanced Customer Support: Solution partners provide customized solutions and regional assistance, which are especially important for medium-sized and small OEMs that might need more specialized methods than big OEMs. In addition to increasing client happiness and loyalty, this specialized knowledge makes sure Bosch Rexroth AG's solutions are used and deployed efficiently, optimizing value for end users.

4. Scalability: A scalable methodology for market expansion is made possible by the integration of solution partners. Bosch Rexroth AG may increase its reach without making large extra expenditures in direct infrastructure or sales staff because Solution Partners operate in different countries. Due to its scalability, Bosch Rexroth AG is able to react quickly to possibilities and market demands, which ensures continued growth and a competitive edge.

5. Innovation and Collaboration: Solution partners and medium and small-sized OEMs can work together more closely to promote innovation. These OEMs frequently bring special demands and difficulties that can inspire creative fixes and modifications to Bosch Rexroth AG's product line. Bosch Rexroth AG can maintain its leadership position in industry trends and technical breakthroughs by collaborating closely with solution partners, which guarantees that its products and services will always be state-of-the-art.

4.1.4 Benefits of the Proposed Value Chain

In this proposed value chain, there are several benefits, they are mentioned below:

1. Increased Market Share: Bosch Rexroth AG can more easily reach the medium and small OEM market segments by integrating solution partners, which will raise its overall market share. In addition to increasing revenue, this increased reach solidifies Bosch Rexroth AG's position in the market.

2. Improved Flexibility and Responsiveness: Because of solution partners, Bosch Rexroth AG can react to customer needs and market developments more swiftly. Bosch Rexroth AG can quickly adjust to local market conditions and tastes due to its network of solution partners, which allows it to maintain the relevance and competitiveness of its offers.

3. Cost Efficiency: Due to the elimination of the need for substantial direct sales and regional support infrastructure, using solution partners can result in cost savings. Bosch Rexroth AG can lower operating expenses by using solution partners' localized presence and expertise to manage sales and support activities.

4. Enhanced Innovation Pipeline: Bosch Rexroth AG may access a wider innovation stream by working with solution partners. Medium-sized and smaller OEMs frequently have distinct viewpoints and needs that might spur the creation of novel and creative solutions. Bosch Rexroth AG is able to maintain an advantage over its competitors and expand its product line by cultivating strong partnerships.

Bosch Rexroth's BODAS Connect value chain has benefited strategically from the integration of solution partners, which opens up new markets and maximizes income streams. Solution partners use local networks and knowledge to provide customized solutions, bridging the gap to medium and small OEMs. In addition to gaining market share, this extended value chain supports a more robust and varied revenue model, which is in line with Bosch Rexroth's strategic goals for development and innovation in the cutthroat industrial solutions sector. Bosch Rexroth AG can guarantee long-term success and ongoing industry leadership by adopting this strategy.

4.2 Scenario Analysis of current business situation of BODAS Connect

The matrix table illustrates the business scenarios for BODAS Connect based on the given descriptions and colour codes. It analyses different component and service combinations provided by Bosch Rexroth and its rivals and breaks down the matrix table into individual scenario descriptions (See the table 12). All the information is collected by the collaboration meeting with Sales and Distribution Management and Technical Sales Manager to discuss all the current BODAS Connect business possible scenarios. The detailed information is given below:

Table 12 Scenario Analysis of BODAS Connect (Own Analysis)

	<i>Bosch Rexroth Device Management (Cloud Portal)</i>		<i>Competitors Device Management</i>		
<i>Rexroth Gateway (RCU)</i>	1. Possible	2.Possible	3.Possible	4. Only RCU	<i>Rexroth RC</i>
	5. Possible	6.Possible	7.Possible	8. Only RCU	<i>Competitors Controller</i>
<i>Competitors Gateway</i>	9. Not possible	10.Possible	11.Possible	12. Not possible	
	13. Not possible	14.Possible	15.Possible	16. Not possible	<i>Rexroth RC</i>
	<i>Competitors Data Management</i>	<i>BOSCH IoT Cloud (Data Management)</i>		<i>Competitors (Data Management)</i>	

Matrix Table Description: The Notes for the scenario analysis are described below (See Table 13).

Table 13 Notes Description of Matrix Table (Bosch Rexroth Internal Information, 2024)

<i>Notes</i>	<i>Notes Description</i>
Left Side	<ul style="list-style-type: none"> • Rexroth Gateway (RCU) • Competitor's Gateway
Top Notes (Cloud Portal)	<ul style="list-style-type: none"> • Rexroth Device Management (Cloud Portal) • Competitors Device Management
Right Side (Controller)	<ul style="list-style-type: none"> • Rexroth Controller (RC) • Competitors Controller
Bottom Notes (Data Management):	<ul style="list-style-type: none"> • BOSCH IoT Cloud (Data Management) Visual Dashboard • Competitors Data Management Visual Dashboard

Scenario 1:

Bosch Rexroth AG finds itself in an exceptionally strong position with BODAS Connect, demonstrating both practicality and profitability. The addition of the Flash Over the Air Service has significantly enhanced its value proposition. This service allows clients to perform remote updates and seamlessly integrate control units and other CAN bus devices in off-highway vehicles. This innovation underscores Bosch Rexroth's strong market presence and competitive edge, making it a formidable player in the sector. The company's ability to offer all-inclusive solutions not only meets current market demands but also sets a high standard for competitors to match.

Scenario 2:

Much like Scenario 1, this scenario paints a rosy picture for Bosch Rexroth AG. It suggests a continuation of success and profitability for BODAS Connect. The overall market context remains favourable, indicating sustained demand and a strong market position. Although specific details are not provided, the scenario implies that Bosch Rexroth AG can expect to maintain its competitive advantage and continue reaping significant financial rewards from BODAS Connect.

Scenario 3:

In this scenario, Bosch Rexroth encounters a challenge despite the technical feasibility of BODAS Connect. The issue arises when a critical component like device management is not provided by the customer. This gap makes it difficult for Bosch Rexroth AG to deliver the full value of BODAS Connect. Without device management, clients cannot fully utilize the system's capabilities, rendering the business scenario impractical. To address this, Bosch Rexroth might need to find ways to incentivize customers to adopt this essential service or develop alternative solutions to bridge the gap.

Scenario 4:

Here, Bosch Rexroth AG faces profitability challenges because customers are unwilling to purchase the necessary hardware, specifically the Rexroth Connectivity Unit (RCU). Despite having other elements in place, the inability to sell the RCU limits revenue potential. This situation highlights the importance of the hardware component in the overall business model. To overcome this, Bosch Rexroth AG could consider strategies such as bundling the RCU with other services, offering financing options, or demonstrating the long-term cost benefits to encourage hardware adoption.

Scenario 5:

This scenario represents a work in progress for Bosch Rexroth AG. BODAS Connect is well-positioned for future growth and innovation, with efforts focused on developing a Universal Flash service. This service aims to enable remote updates for third-party control units and CAN bus devices, broadening the scope and appeal of BODAS Connect. Although not yet fully realized, this ongoing development showcases Bosch Rexroth's commitment to enhancing its product offerings and staying ahead of the competition. The company is laying the groundwork for future success by investing in innovative solutions.

Scenario 6:

Building on Scenario 5, this scenario sees clients actively using BODAS Data Management alongside the developing Universal Flash service. The integration of extensive data analytics and management capabilities significantly enhances the value proposition of BODAS Connect. Customers benefit from a comprehensive solution that not only manages devices but also provides valuable insights through data analytics. This added functionality can drive better decision-making and operational efficiency, making BODAS Connect an indispensable tool for clients.

Scenario 7:

This scenario mirrors Scenario 3 but introduces an additional complication: customers using a competitor's controller. While Bosch Rexroth AG provides Device Management and other services, the use of a rival controller hampers the full integration and effectiveness of BODAS Connect. This reduces its potential value to customers and presents a significant hurdle. Bosch Rexroth AG might need to develop strategies to either integrate more seamlessly with competitors' controller's customers to switch to their controllers to ensure maximum benefit from BODAS Connect.

Scenario 8:

Similar to Scenario 4, this scenario involves customers using a competitor's controller. This choice diminishes the overall value proposition of BODAS Connect, limiting both profitability and market potential. Even though Bosch Rexroth AG can still provide its hardware and services, the preference for a rival's controller undermines the system's full integration and efficiency. Addressing this challenge may require strategic partnerships, better demonstrating the superiority of Bosch Rexroth AG's controllers, or enhancing compatibility with competitors' products to ensure broader adoption.

Scenario 9:

In this scenario, Bosch Rexroth AG faces a significant setback as customers do not adopt BODAS Connect services. Without the uptake of these components or services, there is no opportunity for revenue generation or market penetration. This scenario underscores the critical importance of customer adoption for profitability and market reach. Bosch Rexroth AG may need to re-evaluate its marketing strategies, improve customer engagement, and demonstrate the tangible benefits of BODAS Connect to drive adoption and secure a foothold in the market.

Scenario 10:

While technically possible, this scenario presents financial difficulties for Bosch Rexroth AG. When customers rely solely on BODAS Connect for Device and Data Management without leveraging other services, the potential revenue is limited. Although these elements are beneficial, the business model's overall profitability is reduced without widespread adoption of the full suite of services. To mitigate this, Bosch Rexroth AG could explore ways to cross-sell additional services, highlight the comprehensive benefits of a fully integrated solution, and create bundled offerings to encourage broader use.

Scenario 11:

This scenario is similar to Scenario 10, where clients use BODAS Connect primarily for Data Management. Despite the strong data analytics and management capabilities, the limited adoption of other services impacts Bosch Rexroth's total profitability and market potential. To enhance profitability, Bosch Rexroth AG could focus on upselling and cross-selling strategies,

emphasizing the synergistic benefits of utilizing the complete range of BODAS Connect services. Additionally, they could develop targeted campaigns to showcase success stories and case studies demonstrating the value of a holistic approach.

Scenario 12:

Much like Scenario 9, this scenario highlights the challenges posed by the limited adoption of BODAS Connect services among customers. Bosch Rexroth AG struggles to generate revenue and establish a market presence if customers do not use BODAS Connect components or services. This scenario emphasizes the need for deliberate actions to drive adoption and profitability. Bosch Rexroth AG might need to invest in customer education, improve the perceived value of their solutions, and potentially re-evaluate pricing strategies to lower barriers to entry and encourage wider use.

Scenario 13:

In this scenario, customers only use Rexroth's controller, which is neither viable nor profitable for Bosch Rexroth AG. Even with additional parts and services available, the business model's market potential and profitability are limited by sole reliance on Rexroth's controller. This scenario calls for strategic changes to enhance the value proposition for clients. Bosch Rexroth could consider offering integrated solutions that bundle the controller with other essential services, providing comprehensive packages that deliver greater value and encourage broader adoption.

Scenario 14:

Although technically feasible, this scenario presents challenges due to the low utilization of BODAS Connect hardware (RCU) by customers. While Bosch Rexroth offers all-inclusive solutions, the lack of RCU adoption affects the overall efficacy and integration of BODAS Connect. This results in suboptimal profitability and market potential. To address this, Bosch Rexroth AG could explore ways to demonstrate the critical role of the RCU in maximizing system benefits, offer promotional incentives for early adopters, and ensure that the value of the hardware is clearly communicated to potential customers.

Scenario 15:

In this scenario, customers choose not to use BODAS Connects Hardware (RCU) and Device Management, significantly reducing the solution's overall value proposition. Although theoretically possible, the absence of these essential components diminishes BODAS Connects efficacy and integration, impacting its profitability and commercial potential. Bosch Rexroth AG might need to reassess their customer engagement strategies, provide compelling evidence of the benefits of a fully integrated system, and potentially restructure their offerings to make the adoption of these components more attractive.

Scenario 16:

Similar to Scenario 13, this scenario highlights the difficulties faced when clients only use Rexroth's controller. The low uptake of additional BODAS Connect components and services renders the business unprofitable and impractical for Bosch Rexroth AG. This scenario underscores the necessity for strategic adjustments to increase market share and profitability. Bosch Rexroth AG could consider developing comprehensive marketing campaigns to educate customers on the advantages of a complete solution, foster partnerships to enhance service offerings, and implement feedback loops to continuously improve their value proposition.

These thorough explanations offer a thorough grasp of every situation, stressing the benefits, difficulties, and ramifications for Bosch Rexroth AG in relation to BODAS Connect and its market stance.

4.3 Perspective from Internal Employees

BODAS Connect is an advanced platform that is intended to simplify and optimize several fleet and machine management functions. Here's a thorough explanation of the main ideas under each of the three categories. Such as, important factors, main benefits, and main challenges based on the 15 survey replies from internal employees' (See questionnaire in Appendix A).

Important Factors of BODAS Connect

A number of important considerations must be made when looking at a fleet and machine management system such as BODAS Connect to make sure the platform satisfies all operational and strategic requirements. Here's a closer look at these variables:

- **Product Features:** Internal employees believe that BODAS Connect provides an extensive feature set to meet the needs of effective fleet and machine management. Among these is real-time monitoring, which enables operators to follow the condition and functionality of their assets in real time. Another important component is predictive maintenance, which uses machine learning and sophisticated analytics to foresee maintenance requirements before they develop into serious problems. BODAS Connect moreover should offer comprehensive analytics, providing insights into operational data that can promote wise decision-making and enhance overall performance.
- **Customer Support:** Any technology solution needs to have dependable and easily reachable customer support. In this regard, BODAS Connect should enhance specialized support services to its users to guarantee prompt problem-solving. In order to fully realize the advantages of the platform, users must have this support, which enables them to overcome obstacles and keep up continuous, effective operations.
- **Price and Commercial Conditions:** As per internal employees, businesses with different sizes and requirements should access BODAS Connect with its competitive and adaptable pricing plan. The commercial terms need to be designed to offer value and take financial limits into account, regardless of the size of the business. This adaptability makes sure that companies can use the platform without having to pay a disproportionate amount of money.
- **Customization:** BODAS Connects tremendous level of customisation is one of its best qualities. The platform can be customized by users to match their own operating needs, guaranteeing a smooth interaction with current operations. For companies that operate in specialized industries or have unusual needs, this customization feature is essential since it enables them to modify the platform to precisely match their needs.
- **Flexibility:** BODAS Connect should consider providing a great deal of scalability and deployment flexibility. Companies may grow the solution as their needs change and implement it in a way that best fits their existing infrastructure. This flexibility guarantees that users may continue to gain from the platform without requiring a total redesign, which is especially crucial for expanding companies or those that see seasonal variations in demand.

- **End User's Benefits:** BODAS Connect should present user-friendly interfaces and practical insights because it was created with the end user in mind. Because of the platform's user-friendly design, operators of all skill levels may use it to their advantage, increasing productivity and efficiency overall. Users can make decisions more quickly and efficiently thanks to the platform's actionable insights, which also improve operational performance by decreasing downtime.
- **Legislation Issues:** Several internal employees believe that compliance with both domestic and global regulatory frameworks is an essential consideration. Compliance with these requirements should be a top priority for BODAS Connect, so users may operate within the law without worrying about anything else. Businesses operating in regulated environments can feel secure knowing that data security, environmental regulations, and industry-specific standards are being complied with.

Main Benefits of BODAS Connect

Internal employees believe there are several benefits, they are:

- **Open Core:** With its open architecture, BODAS Connect may be easily integrated with a variety of platforms and systems. Its versatility greatly improves its usefulness and compatibility, enabling companies to integrate it into their current infrastructure without requiring major changes. BODAS Connect guarantees that customers can effortlessly connect and manage a variety of devices and systems inside a single framework by supporting a number of industry standards and communication protocols.
- **FOTA (Flash Over-The-Air):** The capability of BODAS Connect to carry out remote firmware updates is one of its best features. Without requiring physical assistance, all linked devices will be able to obtain the most recent security patches and software upgrades thanks to this Flash Over-The-Air feature. This feature guarantees that devices stay safe and current with little downtime, while also lowering the operational load on IT and maintenance staff.
- **Easier to do Global Software Update:** The difficult process of distributing software updates globally is made simpler via BODAS Connect. By implementing automated deployment and centralized control, companies may guarantee uniformity throughout their whole fleet. This lowers the possibility of errors or discrepancies resulting from manual updates and cuts down on the time and effort needed for maintenance.
- **Total Service Available:** The platform provides an all-inclusive service package that addresses each aspect of its implementation and utilization. Installation, setup, instruction, and continuing support and upkeep are all included in this. BODAS Connects end-to-end services guarantee that customers may take full advantage of the platform's capabilities without having to work with numerous service providers, which improves user happiness and overall efficiency.
- **Device Management:** BODAS Connect has strong device management features that let customers efficiently monitor and manage the devices in their fleet. In order to guarantee peak performance and uptime, these technologies offer real-time insights into device status, operational parameters, and performance metrics. This allows for proactive management and prompt interventions.
- **Machine Monitoring:** One of the main functions of BODAS Connect is the continuous monitoring of machine performance and health. Through the use of sophisticated sensors and data analytics, the platform is able to anticipate probable malfunctions and plan maintenance tasks before problems get worse. This predictive maintenance

strategy increases the longevity of machines and helps to minimize unscheduled downtime.

- **Fleet Control:** BODAS Connect is improved fleet management features give users real-time insight and control over their whole fleet. This involves monitoring each machine or vehicle's position, condition, and output. Managers can make well-informed decisions to increase operational efficiency, lower costs, and improve service delivery when they have access to comprehensive fleet data.
- **Data Management:** The powerful data management solutions provided by BODAS Connect make it easier to gather, store, and analyse enormous volumes of operational data. Businesses may find important insights, spot patterns, and generate analytical judgments by utilizing analytics with big data. Strategic planning and ongoing improvement depend heavily on this capacity.
- **Repair Service:** BODAS Connect offers comprehensive repair services to guarantee little disturbance to operations. Through a network of service providers, the platform enables prompt diagnosis and treatment of issues when they arise. By doing this, downtime is reduced, and smooth operations are maintained.

Main Challenges of BODAS Connect

Internal employees point out different challenges of BODAS Connect. They are:

- **Pricing:** Some users may have serious concerns about the expense of BODAS Connect, especially small OEMs with limited resources. Larger businesses might be able to afford the expenditure, but smaller businesses might find the one-time cost and recurring membership costs too much. Furthermore, these users' budgets may be further strained if there are unanticipated price hikes or hidden charges.
- **Difficult to Use:** The platform could be difficult or complicated for certain users to utilize without sufficient assistance and training. This is particularly true for people who are unfamiliar with digital platforms or are not tech-savvy. A high learning curve can cause users to get frustrated and less productive when they find it difficult to use the system's capabilities and traverse it.
- **Customer Support:** To resolve any problems and keep users satisfied, it is imperative to provide excellent, timely customer service. Inadequate answers or slow response times might make users even more irate and damage their impression of the platform. Reducing these worries can be accomplished by offering round-the-clock assistance and having trained personnel on hand.
- **Legislation:** It can be difficult to navigate and comply with different legal standards, especially for organizations that operate in many locations. Laws pertaining to data protection vary by region, for example, the CCPA in California and the GDPR in Europe. The platform must make sure it assists users in maintaining compliance because non-compliance might result in substantial fines and legal ramifications.
- **Data Safety:** Strong security measures are necessary to protect sensitive data from breaches and to ensure data privacy. Users want reassurance that their data is secure in an age where cyber threats are constant. To reduce the danger of data breaches, encryption, strict access rules, and routine security audits are crucial.
- **Lack of Technical Knowledge:** The platform's possibilities may not be completely utilized by users lacking significant technical skills, underscoring the necessity of thorough training and assistance. Without this assistance, users might not take

advantage of the platform's full potential, which could result in less-than-ideal results and possibly system abandonment.

- **Confusion:** Some users may find the platform too complex or have too many capabilities, in which case a better user-friendly design and comprehensive instructions would be necessary. Users may become discouraged from fully utilizing a platform due to confusion, mistakes, and a high learning curve caused by too complex interfaces.
- **Trial Contracts:** Trial contracts' terms and restrictions could not be advantageous to all prospective users, which could impede uptake. Users might not have enough time or access to adequately assess the platform if the trial duration is too short or if the capabilities offered during the trial are too limited. This can discourage them from committing to a full year of service.
- **Invoicing:** Uncertain and complicated billing procedures may cause users' confusion and discontent. Clear and simple billing procedures are essential. It should be simple for users to comprehend what services, how often, and for what they are being charged. Any vagueness in an invoice can breed distrust and annoyance.
- **Additional Expense:** Some consumers can be discouraged by additional expenses related to using BODAS Connect, such as maintenance, integration, or training charges. Even though the platform might have a lot to offer, these additional costs can mount up and cause the total cost of ownership to be more than expected. Effective budgeting and avoiding unforeseen financial hardship can be achieved by users through upfront and transparent information about potential additional expenditures.

4.4 Perspective from Solution Partners

The main ideas raised by the 15 solution partners who replied to the survey (See Questionnaire in Appendix B) in relation to the three categories of market potential, pain points, and Bosch Rexroth support. This will offer a thorough grasp of their viewpoints and requirements in relation to BODAS Connect.

Market Potential

Solution Partners believe that there are a few areas where BODAS Connect has the potentiality. They are described below.

- **Railway and Forestry Vehicles:** There are many prospects for the use of BODAS Connect, an advanced vehicle management and optimization system, in the railway and forestry industries. Ensuring the safety and operating efficiency of vehicles is crucial in these sectors. Continuous monitoring enables predictive maintenance and the prompt resolution of possible problems before they cause major interruptions for railway vehicles, including locomotives and maintenance cars. In a similar vein, forestry vehicles like harvesters and forwarders frequently work in difficult, remote locations where reliable monitoring systems are essential. Real-time data on vehicle performance may be obtained using BODAS Connect, which enables operators to maximize productivity and minimize downtime.
- **Construction Machines:** The availability and dependability of its machinery is crucial to the construction sector. The incorporation of BODAS Connect can yield notable advantages for construction equipment, including but not limited to excavators, bulldozers, and cranes. BODAS Connect's real-time monitoring features let operators keep tabs on the condition and efficiency of their machinery, allowing for predictive maintenance and lowering the risk of unplanned malfunctions. This lowers the cost of

unplanned maintenance and increases overall project efficiency in addition to increasing equipment uptime.

- **Trucks:** Effective fleet management is essential for preserving competitive advantage in the trucking sector. A complete solution for monitoring vehicle performance, streamlining routes, and guaranteeing on-time delivery is provided by BODAS Connect. Through the provision of vehicle health and fuel usage analytics, BODAS Connect assists fleet managers in making well-informed decisions that improve operational efficiency and logistics. With dependable and prompt service, the capacity to remotely monitor and manage a whole fleet can result in significant cost savings as well as increased customer satisfaction.
- **Tractors:** Effective tractor use, and maintenance are critical to agricultural productivity. With the ability to provide real-time tractor status and usage monitoring, BODAS Connect can be a key player in this industry. This makes it possible to plan maintenance tasks at the best possible times, avoiding expensive malfunctions during busy farming seasons. BODAS Connect's data-driven insights can also assist farmers in making the most use of their equipment, which will boost output and improve resource management.
- **Agricultural Machines:** Beyond tractors, BODAS Connect's capabilities can also be advantageous for other agricultural gear, including combine harvesters, planters, and sprayers. Precision farming is becoming more and more popular in the agriculture sector, and BODAS Connect can help by providing in-depth data on equipment performance and operational effectiveness. Better decision-making, increased crop yields, and lower operating costs can result from this.
- **Tunnel Construction Machines:** Specialized equipment must be used during the construction of tunnels, and this equipment must function in difficult and frequently dangerous conditions. These devices, such drilling rigs and Tunnel Boring Machines (TBMs), can have their safe and proper operation guaranteed by BODAS Connect. BODAS Connect makes tunnel construction projects safer by reducing downtime through real-time monitoring and diagnostics. This is especially crucial considering the enormous expenses and intricate difficulties involved in building tunnels.
- **Concrete Pumps:** Concrete pumps are essential for many types of construction projects, and keeping projects on schedule depends on their effective operation. Concrete pumps may be effectively monitored and maintained with the help of BODAS Connect, ensuring their dependable and effective operation. Through monitoring metrics like engine health, flow rate, and pump pressure, BODAS Connect assists operators in maintaining peak performance and promptly resolving any problems.
- **Arm Mowers:** Another industry category where BODAS Connect can be useful is arm mowers, which are utilized for landscaping and roadside vegetation maintenance. The machine health and performance monitoring capabilities of the system can result in more efficient maintenance scheduling and less downtime. This increases the effectiveness of landscaping activities by guaranteeing that arm mowers are always prepared for usage.

Pain Points to Solve

Solution partners expect that Bosch Rexroth AG needs to solve different pain points. They are mentioned as follows.

- **Optimization of Service Cycle Time:** BODAS Connect's real-time data and predictive analytics can play a crucial role in optimizing service cycles. As a result, maintenance procedures become more effective and cause less interruption to continuing operations. Service teams can prevent problems before they start by using data-driven insights. This allows for prompt actions that reduce machine downtime. By using proactive maintenance techniques, this optimization not only increases overall output but also prolongs the life of machinery.
- **Knowing Machine Operation Time:** Precise monitoring of the duration of machine operations is essential for efficient maintenance planning and enhancing machine efficiency. Planning and resource allocation should be made possible by BODAS Connect's accurate operational hour monitoring and reporting. Service personnel can prevent interruptions to vital operations by scheduling maintenance tasks during off-peak hours with the help of this information. Furthermore, knowing the precise usage patterns of every machine aid in predicting wear and tear and improves spare part inventory management.
- **Improvement of Repair Service Activity:** BODAS Connect should provide accurate real-time data and sophisticated diagnostics enable enhanced repair service operations. Technicians can identify problems faster and with greater accuracy when they have access to precise machine performance data. This instantaneous insight minimizes machine downtime by cutting down on the time needed to find and address issues. Furthermore, having access to historical data facilitates the long-term problem-solving and identification of reoccurring difficulties, which enhances machine dependability and service effectiveness.
- **Promote New Sales Opportunity:** New sales prospects can be found with the help of the insightful and useful data that BODAS Connect produces. It is simpler to determine whether repairs or upgrades are required when machines are kept under observation for their performance and condition. This proactive strategy creates opportunities for the sale of additional goods and services in addition to guaranteeing that clients enjoy the greatest performance possible from their equipment. Moreover, data-driven suggestions for machine improvements may result in happier and more devoted customers.
- **Troubleshooting:** Reducing downtime and guaranteeing smooth operations require efficient and effective troubleshooting. The diagnostic features of BODAS Connect include comprehensive error codes, performance indicators, and operational logs to help technicians identify problems quickly. This cuts down on the amount of time and guesswork required to determine an issue's underlying causes. Additional advantages of the system include remote troubleshooting, which can improve reaction times and minimizes operational disruptions by enabling specialists to identify and resolve problems without the need for physical presence.
- **Ease of Way for Collecting Data:** BODAS Connect should make data collection procedures simpler. The platform gathers data automatically from several machine sensors and systems and presents it in a style that is simple to comprehend. Because of this automation, gathering data manually takes less time and effort, allowing for quicker analysis and more informed decision-making. Service teams can monitor many machines at once, spot patterns, and carry out optimization tasks more successfully with consolidated data access.

- **Hassle-Free Maintenance:** Another important pain points BODAS Connect need to solve is that the streamlines maintenance procedures to make them less laborious and more predictable. To make sure that no important tasks are missed, the platform provides automated alerts and reminders for scheduled maintenance operations. An organized and well recorded maintenance schedule enables service staff to carry out their tasks with increased precision and efficiency. This lessens the workload for maintenance staff and guarantees that the machines stay in top working order, which improves overall operating efficiency.

Support from Bosch Rexroth AG

Solution Partners also urged several supports from Bosch Rexroth AG which are very crucial for them to conduct the business.

- **Webinar and Presentations:** Frequent presentations and webinars may greatly improve partner engagement and guarantee that they are aware of the newest BODAS Connect features, best practices, and updates. Partners can ask questions and get immediate feedback during these sessions, which can function as a forum for interactive learning. Webinars can also be recorded and made available on demand, which makes them an excellent tool for continuing education and reference.
- **Better Pricing:** A wider spectrum of potential customers may find BODAS Connect more appealing and accessible if more flexible and competitive price structures are implemented. Bosch Rexroth AG may satisfy to the various financial demands and interests of their customers by providing tiered price choices, bulk discounts, or subscription-based models. Higher adoption rates can result from this strategy, which increases BODAS Connect's viability as a choice for both small and large companies.
- **Training for Sales:** Giving solution partners thorough sales training is essential to ensuring they have the know-how and abilities needed to market and maintain BODAS Connect successfully. Along with the platform's technical features, this training ought to go over its value propositions, use cases, and customer success stories. Bosch Rexroth AG can make sure that the sales personnel are equipped to successfully close deals, handle client inquiries, and overcome objections by providing them with this expertise.
- **Commercial Revision:** By providing flexible payment choices, such the ability to avoid monthly payments, Bosch Rexroth AG can accommodate its clients' diverse financial needs and preferences. Offering yearly payment plans, pay-as-you-go choices, or financing agreements, for example, might allow clients the freedom to select a payment option that fits their spending plan and cash flow. Because of its adaptability, BODAS Connect may appeal to a larger market, which will improve client acquisition and retention.
- **Set-Up Complexity:** For the deployment process to go smoothly and effectively, the complexity associated with setting up BODAS Connect must be addressed and reduced. Sales and Distribution Management or Bosch Rexroth AG's IoT team can assist the partners in deploying the solution more swiftly and trouble-free by streamlining the onboarding process, supplying thorough and comprehensible documentation, and providing committed support during the first setup phase. Higher satisfaction levels and a quicker time to value for the clients may follow from this.
- **Better Value Proposition:** Effectively communicating the distinct advantages and benefits of BODAS Connect to consumers is imperative for partners to support its value

proposition. This entails showcasing the platform's outstanding characteristics, including scalability, dependability, and the business issues it resolves. Bosch Rexroth AG are able to present verifiable proof of the advantages and competitive advantages that BODAS Connect provides through the creation of thorough case studies, client endorsements, and ROI assessments. Furthermore, creating customized value proposition statements and marketing collateral for various markets and clientele can help partners better communicate the benefits of the platform.

- **Develop Custom Dashboard:** Giving users the option to create custom dashboards is a great method to improve BODAS Connect's usability and efficacy. Partners can modify the platform to suit the unique requirements and tastes of their clients with the use of modified dashboards. Personalized data visualizations, key performance indicators (KPIs), and real-time analytics that meet each customer's particular operational needs are a few examples of this personalization. Rexroth can assist their partners in providing a more impactful and relevant user experience, which will eventually increase customer happiness and retention, by providing this flexibility.
- **Continuous Support and Feedback Loop:** Maintaining a solid and cooperative connection with solution partners requires us to establish an ongoing feedback and support loop. This entails giving partners the chance to express their opinions and views, as well as continual technical assistance and frequent check-ins. Rexroth can make iterative enhancements to BODAS Connect and make sure that it continues to suit its partners' evolving needs by actively listening to them and addressing their issues. To further develop the partner ecosystem, establishing a user community or partner advisory board can help with peer-to-peer learning and information exchange.
- **Marketing and Co-Branding Opportunities:** By providing marketing and co-branding opportunities, BODAS Connect may improve the way its partners advertise BODAS Connect. Collaborative marketing efforts, co-branded materials, and attendance at trade exhibitions and industry gatherings are a few examples of this. Bosch Rexroth AG can take use of each other's advantages and reach a larger audience by working together on marketing campaigns. Giving partners access to a complete marketing toolbox that includes guidelines, templates, and best practices can also enable them to carry out their marketing plans more successfully.
- **Performance Metrics and Analytics:** Solution partners may assess the effectiveness of their BODAS Connect deployments and pinpoint areas for development by using its comprehensive performance data and analytics. This can contain information about ROI, customer satisfaction, system performance, and rates of user adoption. We empower solution partners to make decisions based on data and continuously optimize their use of BODAS Connect by providing strong analytics capabilities. Furthermore, partners can find chances for growth and innovation and see how they stack up against industry standards by exchanging best practices and benchmarking data.

In conclusion, the solution partners believe that BODAS Connect has a sizable market across a range of machinery types and industries. Additionally, they point out a number of issues that the platform can resolve, like enhancing data collecting and service cycle optimization. In addition, they ask Bosch Rexroth AG for further help in the form of improved pricing, setup support, and training in order to optimize the platform's efficiency and market penetration.

5. Recommendations

This chapter provides recommendations based on the research findings. It addresses the challenges and gaps of BODAS Connect, proposes a new business model for Bosch Rexroth, and discusses the implementation of this business model along with financial projections.

5.1 Addressing Challenges and Gaps in BODAS Connect's Digital Transformation

It is essential to take a comprehensive and strategic approach to addressing highlighted challenges in order to ensure that BODAS Connect achieves high user satisfaction and widespread adoption. The following extensive strategy, which focuses on digital transformation, clarifies on the essential measures required to overcome these obstacles and enhance the user experience.

1. Flexible and Competitive Pricing Structure

Implementing a dynamic and competitive pricing model is essential for accommodating businesses of varying sizes and budgets. Such as, Bosch Rexroth AG can offer tiered pricing options, so that they can target more customers. Moreover, Bosch Rexroth AG can attract potential customers, by giving regular promotions and discounts, thus it can lower the entry barrier. These could also include limited time offers, seasonal discounts, or introductory pricing for new users. Such strategies can particularly attract solution partners, small OEMs, fleet management and end users. Additionally, offering bundle packages that combine various services at a discounted rate can provide comprehensive solutions at competitive prices, which will further create value to the stakeholders.

2. User Interface and Experience Enhancement

Enhancing the user interface (UI) to improve the user experience (UX) is a crucial component of the digital transformation. Comprehensive usability testing will assist in identifying and addressing complicated areas that require simplification. The objective is to create a user-friendly design that makes it easier for non-technical people to easily navigate the device management installation or usage of data management platform. To support this, training programs needed to be designed to make it easier for the solution partners. These could include instructional videos, detailed user guides that offer step-by-step instructions, and interactive webinar sessions. Furthermore, solution partners can gain practical experience through live seminars and training sessions by logging in, which can accelerate their platform proficiency, and thus they can reduce their discomfort.

3. Superior Customer Support

Maintaining a high level of customer satisfaction is essential and important in this competitive industry. Bosch Rexroth needs to ensure that they can provide customer support 24 hours, because they have solution partners from different countries around the world with different time zones, allowing for rapid issue resolution and minimal downtime.

Bosch Rexroth AG should also provide multi-channel support via phone, email, online chat, and social media platforms which will make sure that customers especially solution partners may get assistance through their preferred communication channels.

4. Legal Compliance and Advisory Services

Legal regulations are a significant challenge, especially product like BODAS Connect which is operating in multiple regions. For example, some countries do not allow to use BODAS

Connect if Bosch Rexroth AG does not establish servers inside their countries or if there are any global trade sanctions on a particular country.

Thus, they can keep the platform updated with the latest legal and regulatory developments ensures ongoing compliance and reduces the risk of legal complications. Bosch Rexroth should also update solution partners about these changes through newsletters, webinars, and alerts which can help them stay informed.

5. Enhanced Data Security

Data security is a vital concern in the digital age. Protecting sensitive data from breaches requires executing advanced security measures such as multi-factor authentication, comprehensive encryption, and regular security audits. These measures ensure that data is always protected, reducing the risk of unauthorized access and data breaches.

Bosch Rexroth AG can disclose specific data privacy standards which will build user trust and confidence in the platform's data security. This could involve publishing a detailed privacy policy, conducting regular security training for users, and offering transparency reports that outline security practices and incident responses. Additionally, obtaining certifications such as ISO 27001 which can demonstrate the platform's commitment to data security and provide an added layer of assurance to users.

6. Simplifying Complex Features

There have several features in BODAS Connect which are very complex to use for the solution partners. Bosch Rexroth AG should provide clear, concise guides and FAQs with step-by-step instructions which will help solution partners effectively understand and utilize the platform's capabilities. These resources should be easily accessible and regularly updated to reflect any changes or new features.

In addition to written guides, creating interactive tutorials can enhance the learning experience. Moreover, offering regular webinars and Q&A sessions where users can learn about new features, ask questions, and receive live demonstrations can also enhance their understanding and confidence in using the platform.

7. Transparent Communication

In order to increase customer satisfaction, transparency and straightforward communication is very crucial. Bosch Rexroth AG can Offer clear and complete documentation that explains all features and functionalities. This documentation can minimize user confusion. It should be well-organized, easy to understand, and include examples to help solution partners get the most out of the platform.

A regular feedback system to gather insights is very important for continuous improvement. This could involve regular surveys, feedback forms, and user forums where users can share their experiences and suggestions. Actively listening to user feedback and making necessary improvements based on their input will demonstrate the platform's commitment to meeting user needs and enhancing their experience.

8. Starter Kit and Flexible Trial Agreements

Solution partners are demanding starter kit (hardware) from Bosch Rexroth AG, so that they can use BODAS Connect, make themselves comfortable by understanding the technical aspects of the product and thus, it is easier for them to sell it to their customers. Furthermore, flexible trial agreements can fulfil the diverse needs of solution partners for using device management, data management and mobile connection. This smaller trial period will allow solution partners to explore the platform without restrictive conditions. This flexibility can help

solution partners assess the platform's suitability for their needs before making a financial commitment with BOSCH Rexroth AG.

Clearly communicating starter kit and trial terms help manage solution partner's expectations and prevent dissatisfaction. As Bosch Rexroth AG is Providing a seamless transition from the trial period to a paid subscription, there should be clear guidance and support which can also enhance user experience and increase conversion rates. Additionally, offering a money-back guarantee or satisfaction guarantee during the trial period can provide further assurance to solution partners.

9. Streamlined Billing Process

Simplifying the billing process is another crucial step for enhancing user experience for solution partners. Bosch Rexroth AG needs to develop an easy-to-understand, transparent invoicing system which will minimize confusion and clarify charges. This could involve creating detailed invoices that break down charges by service, providing clear explanations for each charge, and offering online billing portals where users can view and manage their invoices.

Automated billing process with detailed information to solution partners can increase accuracy and satisfaction. Applying automated reminders for upcoming payments, expiring subscriptions, and overdue invoices can also help solution partners stay on top of their payments and avoid service interruptions. Bosch Rexroth AG can provide flexible payment options, such as monthly or annual billing, multiple payment methods, and instalment plans, can further adjust partner's financial preferences and needs.

10. Minimizing Additional Costs

Minimizing additional costs associated with BODAS Connect, such as maintenance, integration, and training, is essential for user satisfaction. Offering all-inclusive packages that cover these expenses provides customers with a clear view of the total cost, avoiding unexpected charges. These packages can include regular updates, technical support, and training sessions, ensuring users receive ongoing value without additional costs.

Demonstrating the long-term benefits and return on investment (ROI) of using BODAS Connect can help justify these additional costs. This could involve providing case studies, user testimonials, and ROI calculators that highlight the platform's impact on productivity, efficiency, and cost savings. By clearly communicating the value and benefits of the platform, users will be more likely to see the investment as worthwhile.

By addressing these challenges with thoughtful and strategic solutions, BODAS Connect can significantly enhance user experience and satisfaction. This will drive wider platform adoption and successful digital transformation, ensuring that BODAS Connect remains competitive and valuable in an increasingly digital world. Through continuous improvement and a user-centric approach, BODAS Connect can build a loyal user base and achieve long-term success.

5.2 Proposed Business Model of Bosch Rexroth (Canvas model)

In align with the current business model (Please see point 3.4.2), Bosch Rexroth AG can develop their customer segments and offer several value propositions. This is why in this proposed business model, the changed areas are described below (See figure 23 the proposed business model).

Customer Segments

Solution partners are the only change in customer segments to this suggested business plan that is advised. The gap that exists between Bosch Rexroth and other value chain participants, including small or medium OEMs, fleet managers, and end users, can be filled

by solution partners. As a result, Bosch Rexroth is able to grow its clientele to include small OEMs from other nations. Bosch Rexroth can reach those small businesses to market BODAS connect because solution partners have direct contact with those OEMs. These small businesses can also be reached through the cooperation of solution partners (See Figure 23).

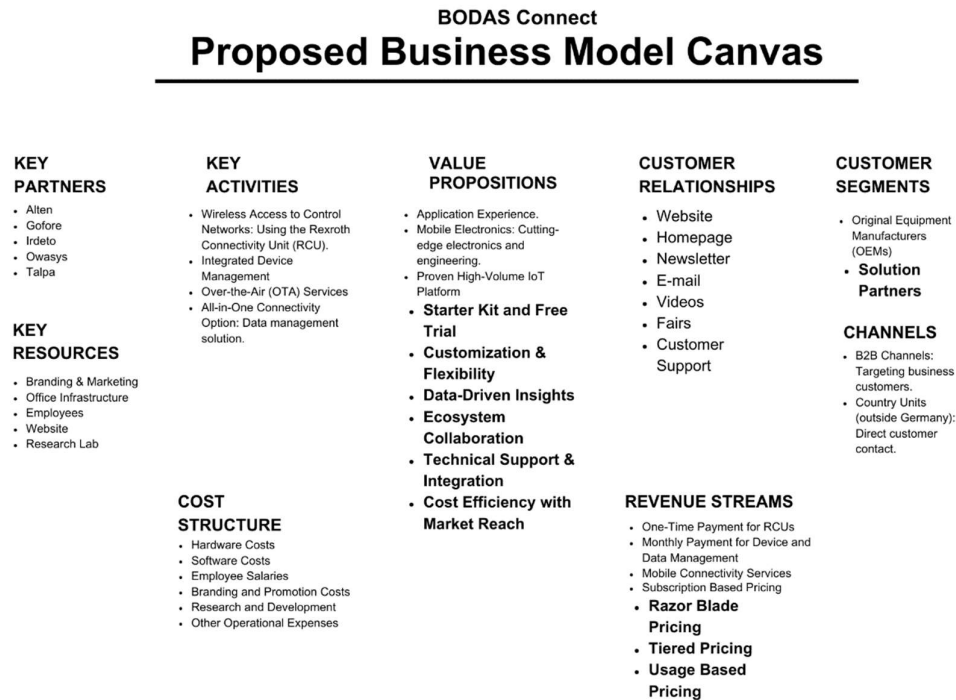


Figure 23 Proposed Business Model of BODAS Connect (Own Illustration along with Bosch Rexroth Internal Data, 2024)

Value Proposition

BODAS Connect integrates solution partners into their business model, highlighting multiple important aspects that together provide a compelling and all-complete service, thus generating a unique value proposition. Through the establishment of extraordinary value to Bosch Rexroth AG’s clients and their varied demands, this value proposition aims to draw in and keep solution partners.

- **Starter Kit and Free Trial:** Understanding the value of giving solution partners real, practical experience, BODAS Connect needs to provide a thorough starter kit and a free trial period. This enables them to become acquainted with the features and functionalities of the platform before to entering a long-term engagement. Essential tools, documentation, and example data are usually included in the starter kit, which helps solution partners immediately become familiar with BODAS Connect's offerings. During the free trial time, users can evaluate the platform in real-world settings to make sure it satisfies their unique requirements and expectations. BODAS Connect facilitates the adoption process by lowering the entry barrier and promoting confidence in the platform's value to solution partners through the provision of this first support.

This strategy not only shows how dedicated BODAS Connect is to its partners' success, but it also lays the groundwork for a fruitful and long-lasting partnership.

- **Customization and Flexibility:** The flexibility to adapt BODAS Connect's services to the demands of industries is one of the main benefits it should provide to solution partners. Various sectors and applications have various needs in the highly specialized and diversified world of off-highway vehicles. Because of the platform's great degree of adaptability, solution partners can precisely customize BODAS Connect's features and functionalities to match the needs of their customers. Their end users will be more satisfied and loyal because of the personalization, which guarantees that the solutions offered are both extremely effective and pertinent. Because of the platform's inherent flexibility, BODAS Connect's solution partners can innovate and set themselves apart from the competition by offering custom solutions that handle the complex problems.
- **Data-Driven Insights:** The capacity to use data to inform decisions and drive changes is crucial in today's data-centric environment. Solution partners should have access to extensive data insights from connected off-highway vehicles with the help of BODAS Connect. Predicting maintenance requirements, increasing overall operating efficiency, and maximizing machine performance can be possible by this data. With the usage of these data, solution partners may assist their clients minimize downtime, boost output, and prolong the life of their equipment by offering practical advice. Through strategic planning and well-informed decision-making, solution partners may establish themselves as competent advisors and provide actual value by utilizing the data-driven approach made possible by BODAS Connect.
- **Ecosystem Collaboration:** BODAS Connect marks itself as a platform for collaboration, creating a thriving ecosystem that enables easy collaboration between OEMs, solution partners, and other stakeholders. This ecosystem will foster information, best practice, and creative idea exchange, resulting in a dynamic atmosphere of mutual gain and ongoing progress. Being a member of this cooperative network will help solution partners because it will give them the chance to share their knowledge, learn from others, and together develop solutions that propel the industry forward. Solution Partners will be able to forge solid bonds with OEMs and other important actors because to the cooperative character of the BODAS Connect ecosystem, which will broaden their professional network and creates new business prospects.
- **Seamless Technical Support and Integration:** When implementing new technologies, solution partners will ensure seamless integration with current systems. In order to meet this need, BODAS Connect will provide committed technical help during the integration process. With the help of this support, solution partners can seamlessly and as efficiently as possible integrate the BODAS Connect platform into their current systems. The provision of proficient aid facilitates the resolution of potential technological obstacles, permitting solution partners to furnish their clients with a seamless and dependable encounter. BODAS Connect will also provide solution partners more confidence in their ability to utilize and use the platform efficiently by offering strong technical assistance.
- **Cost Efficiency:** It might take time and money to create new technologies and solutions from the ground up. Bosch Rexroth AG gives solution partners access to its current infrastructure and services, making it an affordable substitute. As a result, less money needs to be spent on development, and solution partners can launch their

products faster. Through this relationship, cost savings can be passed on to clients, increasing the competitiveness and appeal of the solutions. Solution partners also have a strategic edge in this fast-moving business since they can react to new trends and customer needs more quickly thanks to the shorter time-to-market.

- **Market Reach:** Solution partners will gain access to an established customer base of medium or small OEMs and other industry participants by partnering with BODAS Connect. Bosch Rexroth AG can now reach out to prospective customers who are currently using BODAS Connect due to its enlarged market reach, which will ensure growth and new business prospects.

To summarize, BODAS Connect will offer solution partners a distinctive value offering that includes customization, cost-effectiveness, technical support, ecosystem collaboration, data-driven insights, and market reach. By taking care of these important details, BODAS Connect will provide a compelling and all-inclusive package that caters to the various demands of solution partners and lets them give outstanding value to their clients. In the end, BODAS Connect's strategic choices and implementation will determine if this value proposition succeeds, but the foundation is well-positioned to draw in and keep solution partners while promoting a creative and cooperative business environment.

5.3 Implementation of the Business Model with Financial Projections

1. Razor-Blade Business Model

According to the Razor-Blade concept invented by King Gillette (creator of the renowned Gillette firm), a product is first sold at a low price, possibly even at a loss, to generate profit on a related product later on (Anderson, 2008). Gillette's personal experience with a straight razor that was so worn out that it was no longer useful is said to be the inspiration behind his invention of disposable razors (Palmer, 2023). The primary product in this Razor-Blade business is offered for free or at a discounted price, and supplementary items are sold with large profit margins (Marrelli, 2021). Thus, this business model can attract customers with the lower price RCU and then generate revenue through the high-margin services. a possible structure is given below:

- **RCU:** 400€
- **Device Management:** €7.50/month/vehicle.
- **Data Management:** €4.50/month/vehicle.
- **Mobile Radio:** €2.00/month/vehicle.

Assuming all 600 vehicles require these services, the total monthly cost per vehicle would be €14.00 and the total annual cost per vehicle would be €168.00. The total annual cost for all 600 vehicles would be €100,800.00. Here's a comparison table (See Table 14) of the costs for a customer with 600 vehicles:

Table 14 Razor-Blade Model Financial Projections (Own Analysis along with Internal Data from Bosch Rexroth, 2024)

Business Model	RCU (One-time €)	Device Management (€/Month/Vehicle)	Data Management (€/Month/Vehicle)	Mobile Radio (€/Month/Vehicle)	Total (€/Month/Vehicle)
Current Subscription	600	7.20	4.37	1.79	13.36
Razor Blade	400	7.50	4.50	2.00	14.00

(Please take note that these are only recommendations; a complete cost and market study should be used to establish the exact costs. While the Razor Blade models may save companies' expenses and grow their user base, the total profitability is contingent upon the pace at which users convert to paid services. When determining prices, it is important to consider the expenses associated with delivering the services.)

2. Tiered Pricing Model

With tiered pricing, customers may choose from a variety of product plans and packages at different price points, each with a unique set of advantages (Fastercapital, 2024). These advantages may come in the shape of storage capacity, supported users, functionality, and more. Businesses that use tiered pricing may have three, five, or even more distinct price tiers. A price system with three plans (Basic, Advanced, and Premium) might serve as an illustration. There will be less features, customer service, and service performance levels under the Basic, or "base," package. In this model, services are bundled into different packages with varying prices (Slingerland, 2023). Here's a possible structure below for 600 machine owners:

- **Basic Package (€9.50/month/vehicle):** Includes Device Management and Mobile Radio.
- **Advanced Package (€13.00/month/vehicle):** Includes Device Management, Data Management, and Mobile Radio.
- **Premium Package (€15.00/month/vehicle):** Includes Device Management, Data Management, Mobile Radio, and additional premium features.

Assuming all 600 vehicles require these services, the total monthly and annual costs per vehicle and for all 600 vehicles would be as follows (See Table 15):

Table 15 Tiered Pricing Model Financial Projections (Own Analysis along with Internal Data from Bosch Rexroth, 2024)

Business Model	Package	Device Management (€/Month/Vehicle)	Data Management (€/Month/Vehicle)	Mobile Radio (€/Month/Vehicle)	Premium Features	Total (€/Month/Vehicle)
Current Subscription	-	7.20	4.37	1.79	-	13.36
Tiered Pricing	Basic	Included	-	Included	-	9.50
Tiered Pricing	Advanced	Included	Included	-	-	13.00
Tiered Pricing	Premium	Included	Included	Included	Included	15.00

(Please consider that these are only recommendations and that a complete cost and market study should be used to establish the real costs. Although the Tiered Pricing model has the potential to lower customer expenses and grow the user base, the total profitability is contingent upon the pace at which users convert to premium services. When determining pricing, it's crucial to take the cost of delivering the services into account. A balance that maximizes revenue and customer pleasure is the aim. Additionally, it's a good idea to periodically evaluate and modify pricing plan as necessary.)

3. Usage-Based Pricing model:

The usage-based pricing (UBP) or consumption-based pricing model allows customers to buy products depending on how often they use them. Usage metrics are determined by the client's method of getting value out of the product (Fastercapital, 2024). Within SaaS, usage-based pricing is displacing more conventional subscription and seat-based pricing structures and is becoming more common (OpenView, 2024). There is a possible price structure below:

- **Number of Vehicles:** 600
- **Current costs:** 13.36 EUR/Month/Vehicle or 160.32 EUR/Year/Vehicle (Bosch Rexroth AG Internal Document, 2024)
- **Pricing:** based on usage (data utilized, service hours)
- **Average usage per vehicle:** Low (50% of vehicles), Medium (30% of vehicles), High (20% of vehicles)
- **Pricing:** Low usage (9.68 EUR/month), Medium usage (13.02 EUR/month), High usage (16.36 EUR/month)

Here's a potential financial projection table below (See Table 16):

Table 16 Usage-Based Pricing Model Financial Projections (Own Analysis along with Internal Data from Bosch Rexroth, 2024)

<i>Business Model</i>	<i>Monthly Cost per Vehicle (€)</i>	<i>Yearly Cost per Vehicle (€)</i>	<i>Total Yearly Cost (€)</i>
Current Subscription	13.36	7.20	4.37
Usage-Based	Varies	Varies	$(600 * 0.5 * 116.16) + (600 * 0.3 * 156.24) + (600 * 0.2 * 196.32) = 86,529.4$

(Please be understandable that these are only estimates, and that the real figures may differ depending on a variety of variables, including the actual consumption patterns and the prices established for each usage level. This model's objective is to provide a fair price system where clients only pay for the services they use. If clients utilize the services more frequently, this model may attract more clients and increase income for the company. But it's also critical to make sure that the prices are both long-term viable and lucrative for the business.)

6. Conclusion

This chapter provides the summary of key findings, contributions to knowledge, practical implications, and areas for future research based on the research conducted.

6.1 Summary of Key Findings

The master's thesis explores the important role that Bosch Rexroth AG's IoT ecosystem plays across different stakeholders in the industrial value chain, with an emphasis on the BODAS Connect platform. The results show that advanced device and data management capabilities help certified excellence solution partners benefit from improved market position and service performance. BODAS Connect helps OEMs increase customer happiness and productivity by enabling predictive maintenance, real-time analytics, and product optimization. Predictive maintenance results in significant cost savings, performance monitoring, real-time tracking, and a dramatic shift in operations for fleet management organizations. The ultimate benefactors of industrial solutions driven by Bosch Rexroth are the solution partners, who will take all the benefits from increased cost-effectiveness, efficiency, and dependability. Furthermore, the scenario analysis reveals a number of viable and profitable business possibilities. While scenarios 3, 4, and other examples emphasize the need for strategic revisions, scenarios 1 and 2 demonstrate strong market potential and profitability. While solution partners highlight market prospects in industries including construction, forestry, and railroads, internal employee feedback emphasizes the value of product features, customer service, and flexibility. It also highlights the need for improved training and support from Bosch Rexroth.

6.2 Contributions to Knowledge

The integration and transformative effects of IoT ecosystems inside industrial value chains are now well understood due to this master's thesis. Through an analysis of BODAS Connect's effects on different stakeholders, this master's thesis offers important insights into the real-world advantages and difficulties of its implementation. The comprehensive scenario analysis clarifies the various combinations of parts and services, assisting in the identification of the best approaches for profitable market penetration. Internal employees' and solution partners' viewpoints add to the body of knowledge by emphasizing obstacles, crucial success factors, and particular industry requirements. This thorough analysis adds to the larger conversation on technological innovation and integration in industrial settings by providing a basis for future research on the role of IoT ecosystems in industrial applications.

6.3 Practical Implications

The findings of this master's thesis have several applications for Bosch Rexroth and its partners. With BODAS Connect, certified excellence partners can offer cutting-edge services like proactive maintenance and real-time monitoring, which improves their capabilities and market positioning. Real-time analytics and predictive maintenance, OEMs may use the platform to enhance customer happiness, manufacturing procedures, and product design. BODAS Connect's real-time tracking and performance monitoring tools help fleet management companies save money, allocate resources more efficiently, and operate more efficiently. Improved cost-effectiveness, dependability, and efficiency benefit all the stakeholders in the value chain, who also can take advantages from an improved user experience overall. These findings will help Bosch Rexroth fine-tune its strategic approach, with an emphasis on improving customer assistance, offering thorough training, and providing more personalized solutions. In order to increase market adoption and overall profitability, it

will be imperative to address the issues raised by the obstacles, which include pricing concerns, ease of use, and setup complexity.

6.4 Areas for Future Research

Future research should look at the long-term effects of IoT ecosystem adoption on the industrial value chain, with a focus on case studies that demonstrate real benefits and return on investment for different stakeholders. Furthermore, it's critical to explore the unique technological and organizational difficulties that come with putting IoT platforms like BODAS Connect into practice. Research should concentrate on understanding the changing needs of the market and the most recent technological developments as the market and technology continue to change. This will ensure that IoT solutions stay valuable and relevant over time. Furthermore, to lead future advancements in this field, it will be essential to look into the broader effects of IoT integration on data security, industry standards, and regulatory compliance. Long-term research on user experience and satisfaction with IoT platforms could provide significant findings on how these systems can be enhanced over time. These observations will be crucial for improving the general effectiveness of IoT solutions and improving the user experience. The potential for IoT platform applications across industries is another interesting area to explore. Examining possibilities for combining BODAS Connect and related technologies with other innovative developments, such as AI, may open new creative paths and result in better industrial solutions. The function of digital twins and predictive maintenance in IoT networks should also be considered in research. Through the creation of virtual copies or prototypes of physical machines, businesses can enhance efficiency, anticipate malfunctions before they happen, and minimize downtime. This proactive strategy can greatly increase cost savings and operational effectiveness. It could also be very helpful to find out how blockchain technology can be integrated with IoT platforms. In order to maintain data integrity and build stakeholder confidence, blockchain technology can offer an open and safe method of managing data and transactions inside the Internet of Things ecosystem. Ultimately, exploring the prospect of cloud computing in collaboration with IoT can create innovative possibilities for processing and analysing data in real-time. Edge computing lowers the latency to speed up response times and makes better use of network resources possible by bringing computation closer to the data source. In conclusion, it can be said that future studies can offer a complete understanding of how IoT ecosystems might transform the industrial value chain by tackling these topics, opening the door for more creative, effective, and safe industrial solutions.

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Appendix

Appendix A

Questionnaire for internal employees is given below.

1. What is your current role and position in Bosch Rexroth?

2. Do you have experience with telematics (IoT)?

Yes

No

3. Have you realized projects with telematics (IoT) in the past?

Yes

No

4. What are the most important factors that influences your decision to recommend BODAS Connect Telematics to Solution Partners? (Multiple answers are allowed)

Product Features

Price and Commercial Conditions

Customer Support

Other (Please Specify)

5. What are the main benefits of BODAS Connect Telematics for the following?

	Please Mention
Solution Partners	
OEMs	
OEM-Dealers	
Fleet Management	
End Users	

6. What are the main Challenges of BODAS Connect Telematics for the following?

	Please Mention
Solution Partners	
OEMs	
OEM Dealers	
Fleet Management	
End Users	

Appendix B

Questionnaire for solution partners.

1. Company name

2. Country Location

3. Do you have experience with telematics (IoT)?

Yes

No

4. Where do you see market potential of BODAS Connect Telematics? (Please Explain)

In which Application (Ex: Tractors, Excavators etc.) _____

Quantity of Machines _____

5. Which pain points telematics (IoT) can solve at next target groups? (Please Explain)

Solution Partners _____

OEMs _____

OEM-Dealers _____

Fleet Management _____

End Users _____

6. What do you need from Bosch Rexroth BODAS Connect Telematics to be successful at the market? (Please Explain)

