SWOT-Analysis of Business Models for the External Storage of Spare Parts

Bachelorarbeit

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1. Introduction

"Information technology and business are becoming inextricably interwoven. I don't think anybody can talk meaningfully about one without the talking about the other." — Bill Gates, co-founder of Microsoft

Companies in the engineering business face many different entrepreneurial challenges and changes. Increasing automation and digitalization of fundamental business processes become ubiquitous and inevitable to any engineering company striving for success. In order to compete and sustain in a heavily competitive and also globalized environment, it is sooner or later necessary for engineering companies of any size to initiate the integration of new information technologies into virtually all levels of operations-, supply chain-, manufacturing-, storage-, and maintenance related processes as well as introducing new business networks and models to exploit untapped innovation potentials. To be precise, estimations made by the German Federal Ministry of Economics and Energy (*Bundesministerium für Wirtschaft & Energie*) state that 83% of all operating engineering companies in Germany see digitalization as a crucial industry-transforming factor[1]. In other words, recent developments of the so-called "Industry 4.0" trend entail the establishment of modern production facilities and warehouses, known as "*smart factory*" as well as *"smart spaces"*. In fact, based on a definition made by the German Federal Ministry of Economics and Energy, "Industry 4.0" is characterized as "*an intelligent network of people, machines and industrial processes"*[2]. Management consulting firm Deloitte has branded this development as "*vertical networking*" because of cyber physical production systems emerging as a key technology to handle the digital transformation of the engineering industry[3]. To underline the importance of digital transformation, it is also very necessary to stress that this trend has ushered in a fundamental renewal of interface functions comprising both engineering and management alike. In the wake of fast-paced Industry 4.0 developments, both engineering and management systems are now interconnected through the latest automation, communication and information technologies. For example, the development of these innovative technologies has enabled automation of both work force and manufacturing, most notably due to robotics, cloud computing, sensor

[1] Bundesministerium für Wirtschaft: "Digitale Transformationen der Industrie": https://www.bmwi.de/Redaktion/DE/Dossier/industrie-40.html (retrieved 18.06.2017)
[2] Bundesministerium für Wirtschaft: "Digitale Transformationen der Industrie": https://www.bmwi.de/Redaktion/DE/Dossier/industrie-40.html (retrieved 18.06.2017)
[3] Schlaepfer & Koch (2015), P. 6

technology, artificial intelligence and other innovations. These newly emerged technologies have enabled an environment in which humans and automated machinery can efficiently interact, being called "smart spaces" as previously indicated in brief. Based upon research findings by Deloitte, cyber physical production systems allow smart factories and warehouses to work and efficiently coordinate value added processes such as manufacturing and maintenance with a high degree of autonomy and also interdependence. This means that production has more customization opportunities towards individual customer needs with the technical support of sensor technology that reliably monitor the value-added processes.

With regards to the development in the long run, the Economics and Energy Ministry of Germany predicts impressive numbers in terms of growth for businesses impacted by this digital transformation. By 2020, 40 bio EUR will be invested in industry 4.0 applications. In addition to this, the macroeconomic point of view suggests that industry 4.0 allows the German economy to grow by 153 bio EUR[4]. Nowadays, 20 percent of manufacturing companies in the automobile industry have already embraced the use of automated systems as an integral part of daily business operations. Moreover, the globally renowned management consulting firm McKinsey & Company has gone much further by forecasting that by 2025, companies from various industries mostly see their revenues rise by 23 percent and productivity by 26 percent due to "Industry 4.0". In addition to this prediction, 80 percent of all companies including Industry 4.0 suppliers and major engineering firms surveyed by McKinsey & Company stated that "Industry 4.0" would severely influence their business models[5]. In a different representation of the survery, 92 percent of Industry 4.0 suppliers reported that Industry 4.0 has an impact on their present business models, while in comparison, just 74 percent of engineering companies observe the same development[6].

To maintain, leverage and consolidate control of operations under the conditions of competitive Industry 4.0 business environment, there is always a constant need to renewing and optimizing existing business models and the associated supply chain management processes within a business network. Thus, an array of management measures will be designed and presented in this present investigation in order to identify new entrepreneurial potentials that characterize competitive edge for engineering companies. To do so, it is vital to take a look at possible aspects of competition that drive the market, forcing companies to change and frequently reinvent both business strategies and business culture to the core. One very central aspect of competition is the trend of outsourcing key business activities to external contractors,

[4] Bundesministerium für Wirtschaft: "Digitale Transformationen der Industrie": https://www.bmwi.de/Redaktion/DE/Dossier/industrie-40.html (retrieved 18.06.2017)
[5] Wee, Kelly, Cattell and Breuning (2015), P. 16
[6] Wee, Kelly, Cattell and Breuning (2015), P. 39

which this research primarily deals with. From that, optimization potentials for a new business model with its corresponding network built upon the premise of external servicing can be identified and examined in depth. In a business network, the importance of cooperation and interdependence between suppliers and customer companies in the engineering field increasingly becomes prevalent for this investigative purpose. Deloitte has also defined the so-called process of "*horizontal integration"* between customers and business partners[7]. Horizontal integration marks an intensification of much closer cooperation between business partners and customers. Therefore, new alliances and strategic partnerships are forged to unlock new synergy potentials that further stimulate and enhance synergy effects highlighting the importance of investigating new business networks in this work. One sophisticating aspect in the engineering business, which this investigation will be dedicated to, is the application of maintenance and storage on engineering systems and components. Meeting basic safety and quality requirements is a very universal ambition engineering practitioners share so that a smooth operation of business is permanently secured. In specific, investments and general capital commitment to the maintenance and storage field are inalienable to management decision-making. This concern purposefully puts the focus of this research on the use of modern innovative technology across value creation processes and supply chains in order to examine and determine key contributors to the minimization of costs and time. To be more precise, the application of sensor technology plays a very central role to the most basic maintenance interventions as described by Deloitte[8]. As a result of this market trend, companies collect and use sensor information from machines, which is also colloquially known as *"smart data"* to tailor their services to customer needs[9]. Based on the German government's and the management consulting firms' view of the market situation, such as the increasing demand for innovative information technology like CM and other innovations supporting the trends of the forth industrial revolution era, it seems best to dedicate the purpose of this qualitative investigation to possible market gaps and new optimization potentials to foster the improvement of financial performances and moreover, the tightening of overall business stability for engineering companies. This is why designing and developing business models is extremely necessary.

Hence, the thesis of this investigation is all about reviewing the *"strengths"*, *"weaknesses"*, *"opportunities"* and *"threats"* of a brand new business model through SWOT analysis. In short, the second chapter develops the new business model based on the so-called *"Business Model Canvas"*. After the details of the new business model are

[7] Schlaepfer & Koch (2015), P. 7
[8] Schlaepfer & Koch (2015), P. 22
[9] Schlaepfer & Koch (2015), P. 22

revealed, research questions are developed with strong respect to the business model's interdependence with information technology. In the third chapter, an extensive SWOT analysis is undertaken on the formulated research questions. In addition, the SWOT analysis is accompanied by expert interviews as well as formal literature backing to enhance the outline of the business network's major characteristics that facilitate an in-depth discussion of the research results in terms of the business model's sustainability. Thereafter, the fourth chapter gives a critical evaluation of the SWOT analysis findings and outlines recommendations for practitioners to implement. The evaluation also encompasses the methodology constraints and research limitations. At last, chapter 5 concludes the investigation and brings up approaches for future research.

2. Theoretical Framework

2.1. Business Model Canvas and Research Questions

The so-called "*business model canvas"* is a basic strategic management tool for start-ups and young companies to create, design, document, develop, visualize and test new business ideas or business models respectively. In specific, the layout of this template, originally developed by Alexander Osterwalder in his work "Business Model Generation", consists of nine central elements: *Key partners, key activities, key resources, value propositions, cost structure, customer relationships, channels, customer segments and revenue streams.* In the next chapters of this work, these elements will be addressed in detail and completely incorporated into the SWOT analysis to study the new business model. For this investigative work, figure 1 provides a very concise overview of essentials tools to create or redefine business models. Particularly, it lays a fundament on which the research thesis and questions can be developed. Now, the purpose of the following newly designed business model is to target market gaps from which the derivation of optimization opportunities is facilitated. Potentials for optimization set the design and development of new cost saving operating guidelines for engineering companies into motion, from which a presumably new concise business strategy can be formulated. The goal of this business model is to generate both profit and consistent customer demand on a long-term basis. Therefore, this research intends to explore and predict the marketability of the optimized business model. Prior to conducting the main investigation, it is necessary to be exposed to the fundamental ideas and structure of the new business model being derived from the nine elements. Traditionally, for an engineering company to conduct a mere maintenance procedure and storing bulk

practitioners in the wake of changing market conditions. Generally, statistical modeling of the above mentioned problems use sophisticating computational methods such as programming in *R* or *MATLAB* for implementation. Overall, these areas contain very significant research opportunities and should be treated in detail much further.

5. Final Conclusion

The SWOT analysis has made it evident that maintenance and storage as core elements constituting extensive inventory control are subject to changing conditions in the engineering business. Changing market conditions redefine the rules for engineering companies in how to operate. Interview results suggest that mass production and mass processing of commodities as well as higher engine load factor and higher equipment operating frequencies become a prevalent ubiquity to engineering companies. Time and money invested into the value creation process are highly valuable assets and play a very central role in the business model's long-term sustainability in the competitive environment. Subsequently, external inventory control comes in handy in optimizing costs. To do so, the endeavour of maximizing output value, while simultaneously minimizing input, requires the external servicing contractor to make compromises with these contradicting objectives. As a result of this, this brings about the challenge of identifying optimal mass customization solutions in order to deal with the uncertainties of fluctuating customer demands and most importantly, individual customer requirements in terms of equipment handling. In this very context, varying technological and design specifications of customer commodities require different servicing and inventory management strategies, which drive the storage and maintenance costs. Accordingly, expenses ranging from strategy diversification, facility management to location planning so that some degree of physical proximity to the customer base can be achieved, play a very central role in shaping the cost structure and financial feasibleness of the business venture exclusively built upon external servicing that encompasses the flow of *materials*, *information* and *finances*.

Furthermore, penetration potentials for the servicing contractor lie in mainstream customer segments such as the automobile industry and civil aviation since operational frequency and the general demand for inventory have proven to be very costly in those disciplines. Also, the notion and criteria of targeting certain customer segments have been extended in this investigation. In spite of the economic significance and promising potentials of the industries carefully selected for analysis, judging penetration opportunities of customer segments based on business size is of overriding importance.

Smaller-sized and medium-sized engineering customers are considered the safest options for forging strategic and cooperative business partnerships because these customers in particular are less likely to backwards integrate. As an outcome of this, the external contractor has more entrepreneurial choices and freedoms of reaping the benefits of economies of scale, which overall paves the way for the business venture's consolidation of market influence and sustainability in the competitive environment as an independently working supplier. In short, industry selection is one subordinate criterion, whereas business size is the more superior criterion for the external supplier in decision-making and strategy determination.

To fully conclude this investigation, one has to underline that CM is deemed very essential for practitioners in solving managerial problems related to this business network. The technical nature of CM, which is based on state of the art sensor technology, allows the operator to slash machine downtimes as well as lead time. Shortened lead time translates into competitive edge enfolding cost reduction in terms of maintenance and storage, increased engine operating frequency and extended time in commercial service due to extended equipment lifespan. Finally, the dependence on CM sensor data becomes incrementally vital in making the facility to accommodate extensive maintenance interventions and storage activities a productive and efficiently functional smart space in the wake of inevitable fast-paced competition stimulated by current Industry 4.0 trends.