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INNOVATORS 5 FORCES APPROACH TO INCREASE THE STRATEGIC ACCURACY OF TECHNOLOGICAL SME-INNOVATIONS

Abstract: *We live in times of rapid technological advancements across industries facilitated by innovative trends such as the digitalization of supply chains, massive data analytics and the concurrent development of products with increasing technical complexity and functionality. The need for firms to advance research and development (R&D) processes proves to be a challenge particularly for highly specialized small and medium-sized enterprises. Innovator_Institut developed a practical approach, based on the traditional 5-Forces Model by Michael E. Porter. This approach aims to increase the strategic accuracy of technological SME innovations by considering the effect of innovations on industry structure.*

Keywords: *SME; Data-driven innovation; Strategic management; Time-to-market*

1. Introduction

The economy in Germany relies heavily on Small and Medium-sized Enterprises (SMEs). It consists to more than 99 % of SMEs. Besides this high share, SMEs add considerable 35 % to total company-based revenues and 47,5 % to gross value added (Statistisches Bundesamt, 2017). For Germany the so called Mittelstand (Small and Medium Sized Enterprises; SME) is both, driver of the economy and innovations, making it the key competitive factor for Germany. To emphasize this, it is important to note that Germany has next to no significant natural resources. Therefore, Germany is dependent on a process of constant development of technological knowhow. Consequently, this paper sets focus on plant construction and engineering companies, in accordance with Innovator_Instituts core business activities. To grasp the circumstances of completely different industry structures of IT-services,

software- and general service providers the theory needs to be adapted to a situation that has a much different dynamic. This is facilitated by a weaker patent law and rapid development processes in software which rely much less on an advantage in industry experience but instead on the practice of efficiently handling complex data and customer benefit. We will see in this paper how these trends are also leaking into more traditional engineering industries.

The problem dynamics of the Mittelstand and innovation need to be assessed from a statistical perspective first. All prevalent research shows that bigger industrial companies with more than 500 employees invest significantly more of their yearly revenue into R&D activities than smaller companies. In accordance statistics show a positive correlation between innovation and company size in all industries except services. This results in overall less innovation not just in the form of patents for SMEs. The underlying factors for the underdeveloped

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R&D activities are the over-all absence of risk-capital, distinct and dynamic strategy-assessment and forces to innovate product or business model. However, there are structural and market specific advantages that positively impact SMEs power to innovate (Maaß & Führmann, 2012).

The importance of the Mittelstand and innovation to the German economy have been largely examined and respective programs have been developed to ease and foster those company's business activities. For instance, there is a specific subsidy program for SME-Research & Development (R&D) activities funded with about 600 m. EUR each year. Nonetheless there exists an increasing need for applicable strategic innovation theory under those business circumstances since most university theory focuses on mantra-like concepts or highly subjective interpretation. These concepts aim to be generally applicable and seemed to be useful so far mostly for a Konzern (affiliated group of enterprises), which is considered a trust-like enterprise environment of significant size and importance to the economy on its own, or joint-stock companies.

The paper starts with an overview about the theoretical background followed by a specification of the primary scope and assumptions underlying the model. The main findings will be found in chapter three and four, dedicated to the model. Section five is devoted to the research design and concluded by a section presenting further activities of research.

2. Scope and theoretical Background

2.1. Strategy and innovation as a seemingly contradictive decision-making process

To understand how prevailing theoretical concepts for business strategy have been developed a few key definitions for company success have to be made. Company success can be looked at from different perspectives

but the most obvious or relevant factor for a company is profitability. This leads to the question of measuring (sustainable) profitability. The most widely accepted measure in corporate finance is return on equity (ROE). To increase the ROE a company needs to minimize cost or increase revenue. These are contradictory goals since minimizing cost or investment (equity) often leads to a product with reduced functionality or quality, which reduces revenue. Therefore, decisions need to be made which balance both goals resulting in the highest ROE.

The contradiction between short-term and long-term profitability, appears especially when companies are presented with decisions that concern R&D activities which are made to eventually introduce innovative products or business models. This decision-making process can be understood as one of many that impacts company success or performance according to future profitability. On that account two general assumptions are made. These are loosely defined as that innovation or a better product trumps a cheaper product and that more revenue is better than less cost. These assumptions are made according to Michael E. Raynor and Mumtaz Ahmed of Deloitte Research (Raynor & Mumtaz, 2013). Their search aimed to find reliable data on general organizational excellence and revealed these three surprisingly simple rules after examining thousands of firms and their success over time. (The third rule being that there are no other rules – even when numbers are disagreeing.)

These assumptions reveal that innovation and (monetary) strategy are fundamentally and traditionally considered different goals which are manifested in company structure by having an R&D department that is structurally and often locally separated from the corporate strategy department. Considering the average success rate of innovations, measured in terms of recurring revenues, is only at 2-10 % In accordance to these circumstances it seems necessary to assess innovation projects and ideas in an early stage, in order to budget the needed

resources for realization and increase potential in terms of financial success (Gackstatter, 2015; Ladwig, 1996).

This is an even bigger question for SMEs and affects the way SMEs do business. Especially in companies with less than 100 employees it can be recognized, that the least do have an own R&D-department or follow an elaborated innovation strategy. Instead the main part of the staff is involved in daily business activities and customer projects most of the time. Those projects usually require treading a path and making up innovative solutions to satisfy the customers` demands. In course of these projects companies naturally look for and bring up solutions that are innovative, although they are originally not meant to be innovative but rather help solving a problem. To illustrate, the average time between research and development and commercialization of a new technical product takes two to five years in SMEs (Brem, 2008).

Recognizing that most of the German engineering company`s success is based on high specialization and an innovative product range meeting the prevailing needs of a defined customer group, strategy and innovation are fundamental to persevere and any optimization of the innovation process may have a direct positive effect on the company`s profitability and thus the overall economy. Therefore, it is necessary to access how traditional economic theory can be applied to optimize the scope of an innovation from a strategic point of view. Because standard theory tends to overlook a lot of modern market laws that correlate with innovation, it is necessary to analyse theory with an accompanying innovation perspective.

2.2. Basics of Traditional Economic Theory

Going back to the assessment of profitability and the overshadowing factors of strategy and innovation there are many frameworks that

have proven useful in developing a strategy. Of course, there is the option of analyzing an innovation solely from the firms` perspective but that is often overlooking many factors that may have a much bigger effect on profitability. Hence it is necessary to take into account competition, regulations of local or global form and many other factors. A standard that has attempted to organize economic theory and its most common streams of thought is the Journal of Economic Literature (JEL) (American Economic Association, n.d.). The JEL classification codes for industrial organization (IO) are divided in different subcategories. Category JEL:L1 is mainly concerned with Market Structure, Firm Strategy, and Market Performance while JEL:L2 assesses Firm Objectives, Organization, and Behavior. The following analysis will focus on the former category but will try to adapt the necessary principles and factors from the latter category.

The assessment of market structure when determining a company`s strategy and its performance goes back to the structure-conduct-performance (SCP) paradigm from the previous century introduced by economists Edward Chamberlin and Joan Robinson (Faccarello & Kurz, 2016). The paradigm makes many key assumptions that are fundamental for the further inspection of market structure in IO. As formulated in the name, the SCP paradigm assumes that industry structure and the following more or less appropriate conduct of the firm in its environment determines firm performance manifested in its ROE. It is important to note here that conduct has to be seen as highly dynamic variable which is subject to a constantly changing market structure. Market structure and its dynamics will be the major focus of all following theory since there are many factors that cannot be measured directly and reliably and are thus subject to probability. So, data either is not available at all, due to various reasons or data is not accessible for analysis. Both leading into a decision-making process with incomplete

information. Other approaches rely on analyzing product lifecycles as it is done with the Hype-Cycle by Gartner or the Crossing the Chasm Theory by Moore (Moore, 1991; Fenn & Raskino, 2008). To gain reliable data,

it is advisable to consider other methods aimed at distinct phases of the life-cycle. And such theoretical frameworks are mostly too complex, to be applied besides daily business.



Figure 1. Structure-Conduct-Performance Paradigm (Faccarello & Kurz, 2016)

The key assumptions of the SCP paradigm are therefore that profitability maximization is the most important measure of success of a company's performance and that industries with their highly differing industry structures have diverging overall profit potential. It is especially interesting to note that the tools for market structure assessment can be used when determining if an industry is interesting from a profit-based view and how a firm is to be positioned therein to maximize future profit. This implies that it is a necessity to find the major origins of profit by utilizing analytical frameworks.

industry structure and therefore determine the attractiveness of an industry or special components or positions in it. Attractiveness is traditionally seen as one-dimensional variable in between a complete monopoly and pure competition. A historically often-used example for pure competition is the airline-industry. It does not take a thorough analysis to determine that the barriers of entry which are here for convenience compressed into technological know-how are very low and other determining factors stand in the shadow of a price battle.

The strategic process is done to gain relevant information about the underlying industry and its structure. It is analysed and disassembled to determine different components and their most strategic positions for innovation. The analysis is foremost a qualitative approach in a very uncertain environment and it is necessary to find a practically simple way for SMEs to comprise theory into a quantitative toolset that is both flexible and applicable to balance the compromise between complexity and usability. It was determined in countless examples that Michael E. Porter's 5 Forces Model from 1979 offers a flexible basis open for development (Porter, 1979). The traditional model is a well-established tool to analyse competitiveness within an industry. Porter determined five key forces that shape market structure over all industries. From industry to industry these forces have differing magnitudes and thus impact on

3. Model Overview

3.1 Traditional Basics for Analysis Process

Before assessing the five forces from multiple points of view it is first necessary to define loosely what our industry constraints or boundaries are. This is done by finding all relevant products that are involved in the industry which are best determined from the viewpoint of the customer and the goals the customer is trying to achieve. This involves different products which solve the same problem. In dynamic times, shaped by innovation and breaking of old market constraints, this involves technology trends which are shaped by how the customer sees the product. To give an example, an often-cited technology trend is sustainable mobility which in one of its forms the bicycle or e-bike a strong alternative to the car. The second key for assessing industry boundaries is the

geographical scope which can be understood the easiest by seeing how different regulations can have such a big impact on the product at hand that a firm might only target one geographic market.

3.2. Introducing an Innovative Approach to Industry Analysis

After defining the necessary industry-constraints it is now possible to determine market actors involved within. This is done traditionally by the 5 Forces Model depicted on the left side in Figure 2. Key problems with the traditional model have been identified and it does not require too much introspection to conclude that they can get amplified in the context of SMEs.

When defining the industry at hand it is easily done too general or broad or very narrowly, which has big impacts on the later model. It is

therefore especially important for leaders in SMEs to train the development of alternative perspectives on their market. Often being experienced in a highly specialized industry leads to the problem of losing sight of the bigger picture, which brings us to the second common mistake. It is focusing on an analysis that is very static rather than seeing the market structure and its components and actors as a dynamical system subject to constant change, that does not wait for annual meetings. For strategic planning the model has to be regularly adapted to the current situation. It is also crucial to keep in mind that economy is subject to both cyclical and structural changes and they are not to be confused. In order for the analysis to work the most important thing to keep in mind is to engage in rigorous analysis and discussion as an iterative process with the end goal of making strategic decisions.



Figure 2. Comparison between the traditional (left) and the altered 5-Forces Model (right)

The strategic challenges innovative SMEs (iSME) in the technology sector face today are dramatically complex and inaccessible for most SMEs. They have been developed as blueprint models for corporate giants with resources for strategic planning that often exceed SMEs revenue. Thus, a scheme to reliably identify and assess these ideas in a rather effortless way would be supportive for near-term decision making. Such a model needs consider of course the most influential direct forces and beyond that sustainability issues, as these become more and more important in international businesses and markets. Sustainability, as defined by the World Council for Economic Development,

includes ethical, ecological, moral, social and for sure economic issues. Especially, iSMEs are threatened by the enormous extend these issues have on the customers buying decision and regulation. The company's daily business is at stake when trending threats bind resources (capital and labor) to obey them and act accordingly. This is even more dramatic considering that any further external constraint may cause such an enterprise to collapse. Despite in the beginning being only stumbling blocks, these odds, put together, tend to be unscalable in the end. This is only one of the stepping stones in a 21st century strategic plan for iSMEs.

In light of these circumstances the Innovator_Institut (IN²) has developed and established the altered 5 Forces Innovation Model. This model is now focusing on demanding technology trends and innovation strategy to understand and guide today's innovation process in iSME with respect to a designated market.

4. Model Details

4.1 Application to Innovative SMEs

The Innovators 5 Forces Model, as depicted on the right hand side of Figure 2, is featuring on one hand a new force called technology trends, replacing traditional threats of new entrants and, on the other hand, extending the scope of the suppliers towards so-called strategic partnerships for value creation. Considering the scope and product range of iSMEs is highly specialized, there exists only a rare risk of new entrants inhibiting the firm's efforts in the early market-phase. The needs for a company's innovation activities are triggered both internally by seizing technology trends and externally by increased or new upcoming customer demands. These demands can either be triggered by technology trends, such as a pioneering company establishing a new product version with the latest technology or a behindhand company to implement a new breakthrough and update their products with new features.

Just like the traditional model IN²'s model distinguishes between two differing major influencing forces on business success in a certain industry structure: Power and threat. Power refers to customers and suppliers (controllable) influence on the value chain and threats originate from substitutes and new entrants, respectively technology trends.

Forward or backward integration in form of the power of a customer or supplier (partner) can have direct influence on the business and success as these partners are directly related to the company's actions and can be managed. As stated before, they are part of

the value chain.

In contrast there are external threats that generally cannot be actively managed or controlled by the iSME. These refer primarily to externalities such as substitutes, new entrants or technology trends. These factors often determine dynamics of the market and influence the strategy of involved businesses. It is advisable to approach these threats with an even bigger thoroughness and delicacy as they can dictate the outcome of the innovation and are much harder to measure.

IN²'s model should be used to identify involved promoters and inhibitors of innovations in a certain industry. These can be seen as actors of innovation in contrast to regular strategic variables. The goal of the process is to shorten its time-to-market with R&D projects that are either completely new and to be determined or already in an early stage and increase the development speed in these. Major requirement is a direct, practical usage without intensive preparation and training. This is possible as it is supported by a factor-based and structured guideline, helping to clarify key questions in the analysis even without intensive theoretical knowledge.

Rivalry is defined as direct competition inside an industry. Rivalry does often only exist in a smaller amount due to specialization and two company's product portfolios are in most cases barely similar, price is usually the least deciding factor. Nevertheless, direct competition should not be underestimated or defined to loosely. It is easy to underestimate a foreign competitor that expands his portfolio to a global scope. Differentiation via high quality products and a measurable benefit, following Michael E. Porters traditional strategy model, is very strong in small- and medium-sized technology companies but does not have to stay this way (Brandt & Schwoerer, 2031). Therefore, barriers to exit need to be considered as well, which are usually extremely high for iSMEs. The best technique to keep in mind direct competitors is profiling them regularly. It is

important to determine their objectives and goals from their point of view. This includes jumping in the role of the competitors and seeing the market from their eye. This means trying to determine how much information or knowledge the competitors have, what assumptions they take and estimating their resources and capabilities revolving around their key strengths and weaknesses. This needs to be done iteratively to anticipate the future and make predictions that determine strategic moves, which is a key concept in game theory, keeping in mind that the competitor might do the same.

Suppliers, as recognized in the classic approach, inhere a high power and influence on the final product and its quality, thus there exists a need to be actively managed by a company. Price, reliability and delivery time are core aspects for iSMEs and their sourcing decisions often form a target conflict. This seems slightly less important when considering that iSMEs can rely on a high vertical range of manufacturing, special know-how and experience on how to use supplies to create a product with a deep complexity and functionality. Thus, the supplier side in a specialized market is rather to be seen as a stumbling block along others than a severe bottleneck. Instead, the genuine knowledge and competences of a supplier should generally be examined in order to extend one's production capacity and/or resources – this can even lead to collaboration with competitors, so called co-competition. Advantages are shared competences, shortened time for realization and cost benefits (Egge & Müller, 2014). The underlying threat of forward integration may be small but should be examined. In these terms and in accordance to the underlying model, co-competition can elevate a relatively low position of suppliers in the described situation and alter the role of a direct competitor (regarding products / solutions). It is important to keep this in mind while projecting an innovative approach. Especially for iSMEs it is advisable to form strategic alliances for value creation in complex and

costly undertakings to defend their leadership position. Nevertheless, differences between the industries need to be considered as in the present case. The risks and chances of collaboration with suppliers as well as competitors shall be examined. It could be advisable for the firm to set up complementary industries to integrate across or parallel to the value chain. This can easily be exemplified by assessing electric vehicles and a complementary battery firm or charging network.

Customers shall be considered as another highly influential/powerful force in a specialized niche market. A respective company's success is rarely based on mass products and a broad sales market. It is rather highly customized small series or individual products addressed at a defined small customer group. Price, usability and design of the product or machine limit its interdisciplinary usage as they are developed for a certain case/task. Depending on the competitive situation an oligopoly on the supply side arises serving a couple of customers in the same or different industries. The individual revenue generated with a customer may make for up to 50 % of the total turnover. Product scalability and the access to new markets and customer groups remains as one the most challenging tasks that iSMEs face.

Technology Trends is a new perspective in the model replacing New Entrants of the classical approach. In a specialized market environment, it can be generalized that there is a low threat of new entrants and an insignificant risk of me-too products, hence a company's specialized knowledge can hardly be copied or is far too specialized and thus risky to mimic. These companies are usually independent and have a deep vertical range of manufacture and high experience. They can be classified as mid- to high-tech companies supplying multinationals (MNC) and other big businesses.

This force may have the most complex definition. Its impact on the success rate and

development time of an innovation / innovative product is not to be underestimated. Technology Trends shall be considered ambivalent as a threat and a chance to set a framework for a company's future actions. New technology trends involve digitalization of product and production, incorporating data analytics and mechatronic sensors and actuators rather than traditional mechanical parts and microcontrollers. This can range from small additions to a complete permeation of the product by computational devices and often leads to a complete overhaul of how these companies do business in all its facets. Acknowledging that sensibility for these topics has not reached major corporate giants should especially alarming for iSMEs and push them to stay on top of technology trends.

According to VDMA, a leading German Mechanical Engineering Industry Association, approximately 3 % of the total revenue in 2016 of the mechanical engineering industry, which amounts to 5.8 b. EUR, have been spent on R&D activities. In other industries this share can rise to 20 % or higher (Krebs, 2016) While the intensity of R&D affects the direct short-term revenue of a company it can secure workplaces in the long run which is often underestimated.

Substitutes are classically defined as threats that compete for the same or similar customer needs. As substitutes offer a similar advantage for the user it is highly important to create a unique set of attributes in developmental stages. Considering the classical approach there needs to be an incentive for the customer to buy which goes beyond economical facts and increasingly values sustainability. This remains true for the adapted model, whereas this threat needs to be individually assessed for distinct types of specialized projects / products. Traditionally the risk of substitution is considered rather low attributing to a loyal customer base and high switching costs. In times of rapid technology trends substitution should not be underestimated.

Following the force assessment, it is advisable to segment industry structure into strategic groups. These strategic groups should have a fundamentally comparable business model but should differ in targeted customer groups. This process is called clustering and tries to separate data points by following the definition of variables for the most reasonable attributes according to customer needs. This process helps determining if the forces, their drivers or their effects differ inside an industry and give light to different levels of profitability in these industry segments. It can also be used to identify fields inside the industry that are unoccupied and thus are subject to low competition and leave room for impactful innovation. Players in these subgroups can be analyzed according to their profitability which can be used in turn to identify unrecognized customer needs. It needs to be emphasized that the easiest way to assess dynamics of the market is to assess how its structure has evolved in the past, especially in times of innovation or how similar markets have evolved, when targeted by the technology trends that just begin seeping into the firm's market.

4.2 Tool

The Innovator's 5 Forces Model IT-tool is equipped with an updatable database, provided by IN² and iSMEs themselves. The user is guided by a graphical interface step by step through the subjective assessment of his project goals. After allocation of the relevant industry sector, factors for evaluation are given, depending on relevant and structured influencing factors, depicted in Figure 3.

The user is guided through all five forces and uses an input mask to enter his assessment of the current topic. For this there is a scale of 1 - 5 (where 1 does not apply at all and 5 seems very appropriate). Likewise, it remains open to the user to assess the topic at all or to rely on empirical data.

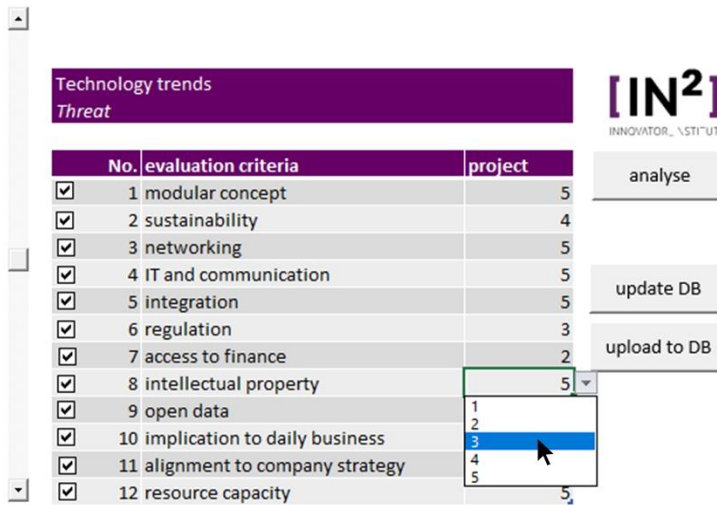


Figure 3. Screenshot of the Innovators 5-Forces evaluation tool

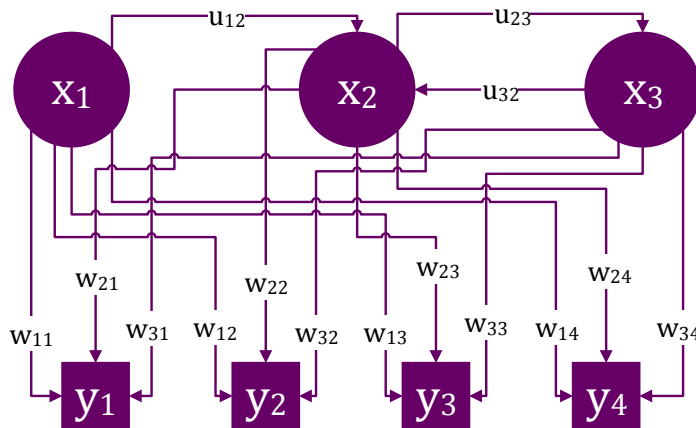


Figure 4. Scheme of dependencies between inputs, weightings and outputs

By inputting the assessments (x_i), factors are calculated and weighted by the individual topics and influencing factors as a non-linear function of the current and future importance (calculated via factor analysis). However, the factors are not only multiplied linearly by the input values, but a recursive algorithm hidden algorithm that is in constant development calculates the respective dependencies. Also, dependencies between the individual influencing factors are calculated (u_{ij}). As a function of the weightings (u_{ij} , w_{ij}), different estimates of current and future market opportunities (y_j)

result, as shown in Figure 4.

The user receives a detailed quantitative assessment of the market chances of his project idea, depending on the individual influencing forces, which is depicted in Figure 5. Values above the average (> 2.5) mean an increased market influence and thus the opportunity to strategically exploit the factor in the development of the project idea. By a further cross-weighting of the individual forces against each other, an overall result of the industry situation is indicated.

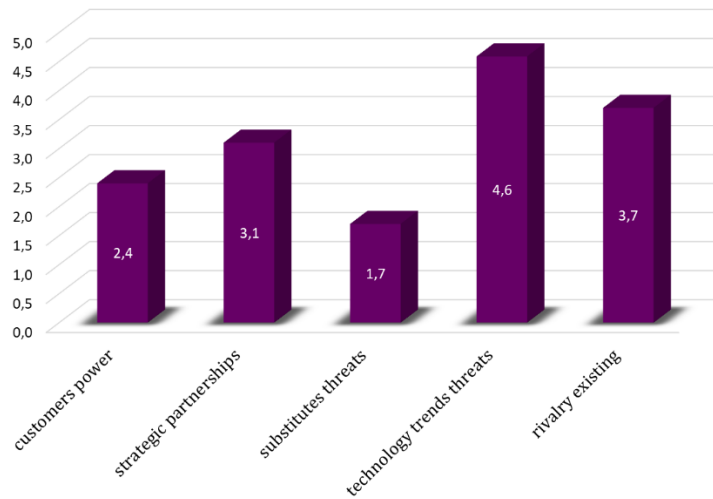


Figure 5. Relative values of market potential for all considered forces

The system also uses the input data and assessments to better estimate future market trends using iterative correlation, building on a data base from past and current projects. For simplified scheme see Figure 6. This requires an estimation of the real market situation to be returned into the database as a feedback-loop. This is done through relevant market reports and surveys of iSMEs. By means of market analyses and the observation of emerging technology trends, statements of current and future market opportunities can be given.

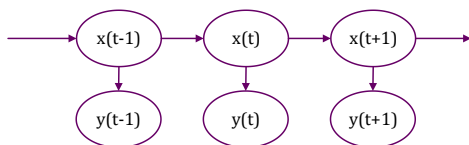


Figure 6. Simplified scheme of iterative optimizations of future trends via historic and current data

It is a positive side effect of the tool that it aligns with the PDCA agenda underlying international quality management systems (ISO 9001 ff). Managing and accessing a company’s suppliers is an important part of it. A proper risk assessment on a regular basis has been incorporated in the latest revisions due to the fact that a complex and volatile

market brings up a high variety of unknown threats to businesses. The only way to deal with these highly dynamic environments is considering those risks and their possible impact on a business and its quality. The tool can be used in accordance with the regular risk assessment.

5. Research Design

The origin of the present paper lies in single consultancy projects about the market introduction of new, innovative products and processes. It was noticed that especially SME have little knowledge about basic market theory and thus miss chances of a successful rollout of new products. In order to specify new and/or innovative products, innovation projects that are subsidised by respective governmental innovation programmes were selected as research object.

Considering this, a bottom-up approach was chosen in order to prove the assumption, that especially SME below 100 employees act rather intuitive in their strategic decision about technology related topics. Beginning with only three companies there is a current sample size of 21 that will be enlarged by a broad survey of at least 150 companies during 2019.

The samples will be pre-assessed regarding the SME-scheme by the EU and narrowed to German based, independent technology companies with up to 200 employees. Additionally, these companies must have had an respective innovation project in the last three years. These companies should be active in different industries, for example polymer processing, engineering or process technology. The primary sector will be excluded from the research.

Panels were conducted in the beginning and will be held in order to gather information about the topic with a distinct time in between. By now, the studies have to be reconsidered choosing a sound meantime to observe changes. Most appropriate for gathering the relevant data and information about the strategic acting a mixed-methods questionnaire was designed. An entire returning of the questionnaires of the current sample will be statistically considered when enlarging the sample size.

Generally, we expect a qualitative, iterative research giving insights into the SMEs' strategic decision making process.

6. Validation and Conclusion

For validation, past and current reference projects are compared with their predicted and realized market potentials. In addition to industry reports and market analyses, industry partners are also asked about their subjective impressions. Despite of being in the early stages of development and optimization, the project shows a reliable and realistic assessment of future potential for iSMEs. Due to integrated small database, it is designed that the tool predicts a more conservative

assessment of the market. As an ongoing activity, an even bigger dataset is being collected. The aim should be to further enrich and optimize the database and thus the data volume and quality.

In conclusion it can be stated that strategic innovation continues to be a challenging topic for iSMEs. Demanding topics like IoT or Industry 4.0 can wipe out whole industries. Therefore, it is crucial for iSMEs to assess their strategy on a regular basis. We continue to help and provide guidance in these ambitions to our highest capabilities. The original 5-Forces model has been developed by Michael E. Porter to deliver an abstract approach to a very diverse landscape of different organizations and their industries. It assesses the historical problem of characterizing complex social situations in company strategy or industry analysis. For a variety of business leaders and universities, Porter's model has proven to be a standard qualitative framework in both theory and application for analyzing historical data of a company's surrounding but to static for today's dynamic economy..

There has been an absence of rigorous mathematical models because of high uncertainty, dynamics and the absence of concrete measures and definitions. The transfer of modern economic theory, not just in form of qualitative models but quantitative data driven frameworks continues to be an interesting challenge. We hope to facilitate improvement by developing new and useful concepts from spearhead research. This research includes cooperation with leading scientist in the fields of game theory, machine learning, traditional statistics and multi-agent system theory.

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