

## Business Model Innovation: From Technology Market to Market Success

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**Abstract**—Profitable commercialization of innovative technologies calls for goal-oriented Business Models. During the last years, Business Models have played a prominent role in the academic discussion but only a few publications looked on Business Model Management out of a technology-management-perspective and their relevance to bring innovative technologies to market.

Therefore Fraunhofer IAO developed a holistic Method to develop technology-induced Business Models. The Fraunhofer House of Business Model Engineering (BME) can be used to create models that ensure innovations are successfully positioned in the market from an early stage in their development. BME includes a “TrendArena” and Smart Scouting as tools to find future trends. A process based function-semantics is used to transform technology via their specific function(s) into potential values for customers. The technology-driven BME process itself is based on multiple different levels. Goals, design options and opportunities for exploitation are identified on the strategy level, while the design of the model takes place on the process phases level. Relevant structural elements are defined in specific configuration and planning contexts. The model creation process is supported by specially developed IT-based methods.

### I. INTRODUCTION

The priorities of the Technology and Innovation Management have been for a long time the creation of optimal conditions for innovation and the development of innovative technologies. Now it can be observed that with Business Models (BM) and Business Model Innovation (BMI), a new innovative type might be established. This innovation type is ascribed that it is capable of producing disruptive innovations from the combination of innovative technologies with corresponding value logics, paving the way for new customer benefit-oriented solutions [11]. Looking at this form of innovation, it quickly becomes clear that neither innovative technologies, nor the change of value creation logics would have been alone in a position to bring about this. Rather, it is the interaction of these two parameters, as described by Christensen in the sentences "The history of innovation is littered with companies who had a disruptive technology within their grasp but failed to commercialize it successfully because they did not couple it with a disruptive Business Model. (...) Truly transformative Businesses are never exclusively about the discovery and commercialization of a great technology. Their success comes from enveloping the new technology in to appropriate, powerful Business Model" [7].

The optimal combination of innovative technologies with matching value logics alone is a necessary but not a sufficient

condition for a Business Model Innovation. For this purpose, the design task has to be set in the context of how a maximum customer benefit can be provided by the newly created solution, which can only be achieved with a corresponding paradigm shift [6].

If disruptive potentials are to be lifted by the orientation towards customer benefit and by combining technologies with targeted value logics, the question arises quickly whether and if so how innovative technologies can be marketed through new Business Models. Such potentials arising by offering new services or customer-oriented solutions, through organizational innovations as well as new innovative Business Models often remain untapped [2]. To tap this potential, new organizational structures and Business Models are a necessity [8]. The realization of value creation and value appropriation by solutions which are based on customer value can be provided only by means of new technologies. This is a challenge for the Management and closely linked with activities around the issue of Business Model Management [4, 12].

One key success factor for profitably commercializing new or existing technologies is a method-based end-to-end process chain from technology intelligence to technology marketing [19]. The Fraunhofer Institute of Industrial Engineering (IAO) has developed the Fraunhofer House of Business Model, a concept to remodel and innovate Business Models. In comparison to former concepts, this concept refers to technologies and builds the bridge between a company and the market success.

### II. TECHNOLOGY IN THE CONTEXT OF BUSINESS MODEL DEVELOPMENT

The term Business Model Management has been so far mostly assigned to the areas of Organization-Management and Business Administrations. During the last years, Business Model Management and Business Model Innovation have been also increasingly addressed in the areas of Technology- and Innovation Management [23]. On the one hand, the subject of Business Models is seen as a new innovation type, which complements the traditional innovation types of process- and product innovation [10]. On the other hand, Authors see in Business Models, a new approach to lift the value potential of innovative ideas and technologies to convert them into corresponding market results [6, 21].

There are three specific characteristics for the consideration of technologies in the context of Business Model Development (see Figure 1) [16].

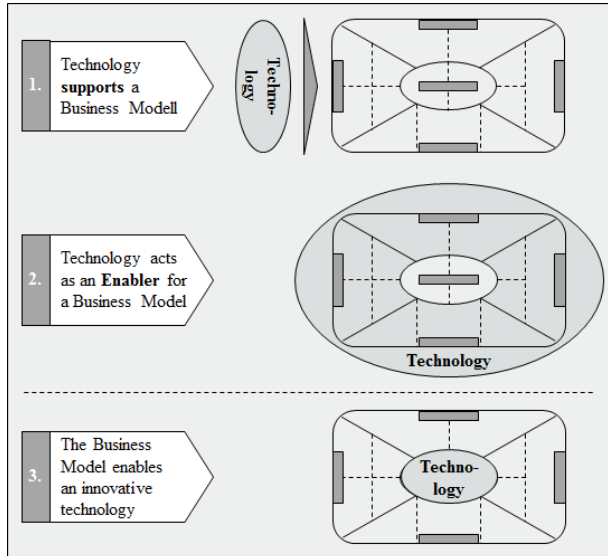


Fig. 1: Role of Technology in the context of Business Models

Thus, a technology can have a supporting function for a specific Business Model and its Business Model Elements. Secondly, technology can act as the basis for a specific business model. Without the respective technology, the Business Model would not be viable. In the third characteristic the technology is the viewing subject and the Business Model acts as the enabler for their commercialization [15].

Based on the third characteristic, the topics Business Model Management and Business Model Innovation are becoming an important element of technology and innovation management [18]. This is also reflected in the existing literature, in which value creation associated with technological innovations via Business Models is referred as one of three core areas recognizable [3].

### III. FRAUNHOFER HOUSE OF BUSINESS MODEL ENGINEERING (BME)

The crucial link between a company and market success is the right Business Model. According to Bieger [3], the Business Model acts as the interface between Business Strategy and Operations. In the context of technology-driven Business Model Innovation, strategies, structures, and processes must be designed and firmly established such that technological developments can be launched on the market in the optimal way at the optimal time.

The Fraunhofer House of Business Model Engineering is a sort of modeling workshop where organizations can come up with sustainable technology-driven Business Models. The process itself is based on several hierarchically structured levels.

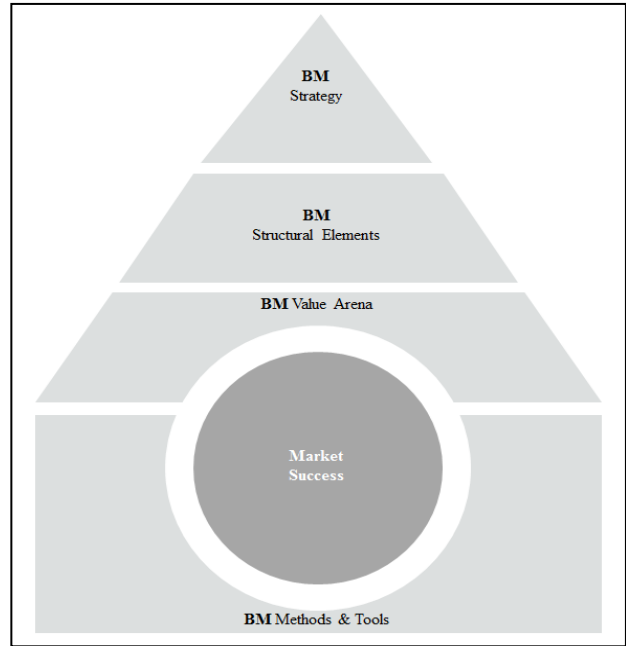


Fig. 2: Fraunhofer House of Business Model Engineering

#### A. BM Strategy

At the BM strategy level, the fundamental concept of the Business Model is established and possible structuring and realization options (e.g. in-house solution, collaborations, licensing, joint ventures, etc.) considered. This level is concerned with the design and implementation of the Business Model. Adjustment to change must be possible at all times so that the company can adapt its strategy flexibly to impending market developments.

#### B. BM Structural Elements

The next level – BM structural elements – is where the organizational course is set. The following structural elements have been identified by the analysis of 29 different Business Model Frameworks which are all linked to Innovation and/or Technology Management. They have been published in the meta analyses of Scheer [17], Onetti [13], Wirtz [22] and Schallmo [16].

- *Strategic Leadership and Management* lays down the basic business orientation parameters (planning, organization, and control). A decision is made based on stakeholder analyses regarding what benefits should be promised to customers and how customer expectations can be best fulfilled.
- The *Technologies and Resources* element involves clarifying which skills, technologies, and resources are required for the Business Model. Unique technologies that create a clear competitive advantage must be identified and modeled. This includes the question as to which skills are already on hand and which have to be acquired in order to realize the benefits promised to customers.

- The analysis of *Customers and Markets* pinpoints potential markets and elaborates the competitive circumstances prevailing in them. It is demonstrated here how market potential and the benefits promised to customers match up. The requirements include compiling customer-relevant user profiles.
- The *Value Creation and Network* structural element entails modeling the optimum value creation processes for the Business Model – in consultation with network partners if appropriate. Critical factors here are how the generation of customer benefits is embedded in value creation processes and which technologies are needed for different network partners.
- The objective of the *Financing and Revenue* element is to determine which financing and revenue strategies to implement and which solutions are available for that purpose. Another matter to be clarified is where exactly revenue will come from in the future and which processes make the biggest contribution to value creation.
- The *Company Performance* is the performance of a company to satisfy the customer demands. Each company performance consists of the package PSIFx: P stands for product, S for service, I for interaction and Fx for the emotional factor x. This package depends on the saturation level of the market.

The structural elements of the Fraunhofer House of Business Model Engineering are arranged one after the next in a circle such that the different units can be revisited several times during modeling.

C. Value Arena

A significant characteristic of profitable technologies and products is their clearly recognizable customer benefit [14]. This does not stem from the technology in isolation [6], but from a utility package in which several components interact: products, services, interaction, and emotional factors [1].

The product itself must first of all meet customers’ technical expectations as regards functionality, e.g. perform a recognizable basic utility. Supplementary services such as maintenance, training, and company-specific optimization are extras that customers have come to expect in many cases. An added value that grows of its own accord is successful interaction with customers (interactive applications and exclusive offers, for example, but also customer-customer interaction and customer-company interaction etc.). Assuming ever greater significance are social and emotional factors. The elements, Fraunhofer refers to as the X-factor, are emotional, often subconscious qualities. The desire for social esteem and recognition, security, and trust are important needs that have to be fulfilled. Depending on the market, some utility components are more important than others. For example, functional utility tends to be the driving force in high-demand growth markets, whereas the X-factor often predominates in more saturated markets.

What is decisive for market success is achieving the right balance of utility components. In the Fraunhofer House of Business Model Engineering (BME), the weighting and balancing of components is carried out in the corresponding “value arena”. The objective is to offer customers the greatest possible technical and social utility in every area, thereby attaining maximum value added.

TABLE I. SUCCESS STORY: APPLE STRATEGY

Apple is one of the most successful companies in the world and powerfully illustrates how to successfully implement the different components in the value arena:	
Product	<ul style="list-style-type: none"> <li>• The technology in Apple products has been consistently satisfying customers’ functional expectations since the first Apple Macintosh in the 1980s</li> </ul>
Service	<ul style="list-style-type: none"> <li>• Apple products are compatible with each other and with many other devices in their product category. Special user groups such as teachers, schoolchildren, and college students receive (product-specific) special offers.</li> </ul>
Interaction	<ul style="list-style-type: none"> <li>• The iTunes platform is designed to facilitate a huge amount of interaction. Relevant products and offers are proposed to users based on their behavior.</li> </ul>
X-factor	<ul style="list-style-type: none"> <li>• The Apple brand represents a modern, trendy lifestyle and is widely considered a must-have with high prestige value</li> </ul>

D. Methods & Tools

Fraunhofer’s Business Modelling Portal brings together software-assisted methods and tools that enable organizations to analyze new technologies from different perspectives and arrive at a realistic appraisal of potential and opportunities. The methods accompany the entire development process from the original idea to the successful marketing of the technology and are adapted to the specific requirements of the Fraunhofer House of Business Model Engineering.



Fig. 3: Fraunhofer Business Modelling Portal

*TrendArena®*

The TrendArena is an innovative tool to identify, describe and evaluate future trends systematically. For the trend identification the TrendArena® uses access to suitable data bases and information services. Furthermore, data bases are analyzed individually with a textmining software. With the TrendArena® the Fraunhofer institution developed a web-based collaborative tool to collect and describe trends, megatrends and innovations. The evaluation and visualization of these trends lead to a base for strategic planning. The strategic trend management consists of four steps:

1. Feed: Collection and classification of relevant trends and innovations.
2. Validation: Estimation of the actuality and possible application.
3. Description and evaluation: Detailed description and evaluation using specific criteria.
4. Visualization: Internal networking, exchange of knowledge and support with the planning.

How is it possible to find new trends and where? To find generic trends the TrendArena® uses Fraunhofer trend catalogs, trend studies and the commercial trend research. To find specific trends, internal and external experts should be involved as well as the research/smart scouting.

*Smart Scouting*

Smart Scouting is a software-based analytical tool to make fast and relevant statements about technologies, markets and competitors. With this software tool it is possible to identify new technologies and markets and to monitor competitors using extensive data stocks. The advantage of the Smart Scouting tool is the identification of even unknown markets and technologies making fast statements via graphic representation. The selective search of new trends is performed by semantic analysis. Therefor the Text Mining Software LUXID® which works like a search engine considering the meaning of the words is used. The sources for the analysis include data bases (e.g. WTI, Elsevier, ThomsonReuters and others), patents, articles, technology portals and the internet.

IV. A PROCESS MODELL TO DEVELOP TECHNOLOGY-INDUCED BUSINESS MODELS

Companies, products, and technologies are always only as good as they are perceived in the market. This is where solutions, expectations, and needs meet. Only those who recognize and make use of actual demand can succeed. These basic requirements have to be met in the process model described below.

A. *Initiation by function-semantics*

As already mentioned in Chapter III, the Solution, where the new technology is incorporated must first of all meet customers' technical expectations as regards functionality,

e.g. perform a recognizable basic utility. Therefore the principal functions of the technology have to be clearly elaborated and suitable application-scenarios have to be deployed [5]. To develop a suitable Business Model the elaboration of the functions and possible application scenarios builds the starting point. Therefore a function-semantic approach is used to excerpt possible functions and applications [19].

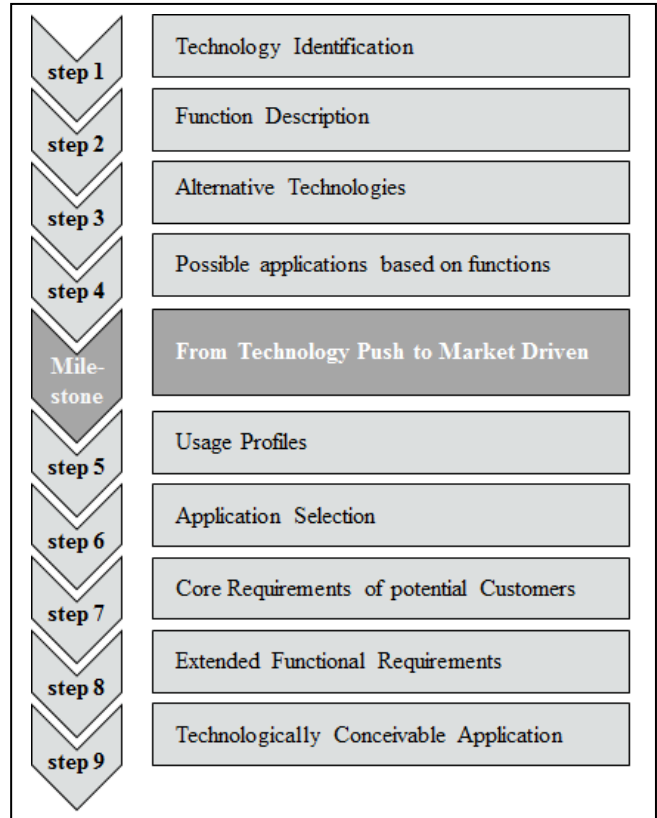


Fig. 4: Function-Semantic Approach [19]

In the first step technologies as well as possible alternatives are identified. In the second step, the functions of the considered technologies are described. To compare and prioritize, technology profiles are derived out of those descriptions. Based on the descriptions of the functionalities and the technology profiles, possible (function-based) applications can be identified and described. At this point the perspective of consideration will alternate from technology push to market driven. This means that the focus of attention moves from technology to market. The following steps therefore are influenced by the market point of view. Next, application and usage profiles are structured, prioritized and selected. Now the customer comes into play. After the selection of the potential application the core requirements of potential customers will be developed for the application system. What does the customer wants? Where does he require technological support and how can this be organized? By answering these questions, the extended functional

requirements can be displayed on the possible technologies. In the last step a technologically conceivable application is described, which serves as basis for the design of the Business Model.

*B. Ideation with the help of Trends*

Objectives of the “ideation phase” are on the one hand the generation of Business Model Ideas for the derived application system and on the other hand, the evaluation of the Business Model Ideas regarding their future potential. This is discussed in the context of current and future customer, market and competitive requirements. Therefore currently observable technological, customer-oriented and market-oriented trends as well as their estimated future development are used as the analytical basis. Besides the investigation of future potentials, the work with trends allows the confrontation with the customer, because trends always represent a combination of sociology and economics, which enables an integrated consideration of people and markets [9].

To analyze and identify relevant trends the Fraunhofer TrendArena® is used (see Chapter III). The evaluation and visualization of trends leads to potential Business Model Ideas which have to be evaluated afterwards. For this purpose the so-called “TrendFit” is determined. The “TrendFit” describes whether a Business Model will contribute in future to success (high TrendFit), or has hardly any significance (less TrendFit). To determine the “TrendFits” each identified trend is evaluated in terms of its influence on the Business Model Idea with a scale of “-2” (strong negative influence) to “2” (strong positive influence).

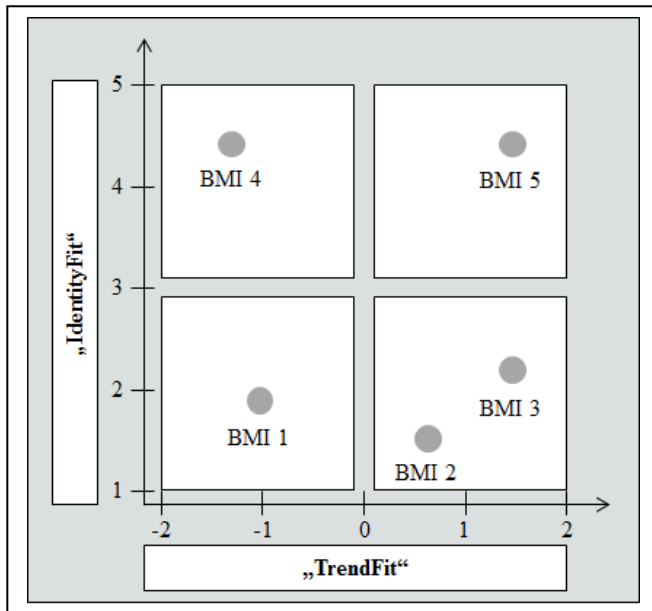


Fig 5: Evaluation of Business Model Ideas (BMI)

In addition to analyzing trends, company-specific requirements have to be addressed to provide a proper fit of

the Business Model Idea. The so called “strategic identity” is described on the unique features of the organization, representing a competitive advantage (USP). The following questions have therefore to be answered in an intense multi-day workshop to identify the relevant USP’s: How to get a competitive edge of my competitors? What products and services satisfy the needs of my customer best? What are my strengths and what can I do to be better than the competitors?

Based on the USP’s the so called “IdentityFit” can be derived. For this purpose, questions for each USP, on how far the Business Model profits by the USP or on how important the Business Model is for the USP, will be formulated. These questions will be answered in the study of Business Model Ideas with a scale of “1” (not at all) to “5” (very strong).

Subsequently the Business Model Ideas are evaluated in a portfolio based on their determined “Trend-” and “IdentityFits”. Based on the portfolio, the most promising Business Model Idea with a high TrendFit (values from 1 to 2) and a high IdentityFit (values from 4 to 5) will be selected.

*C. Integration via the BM-Blueprint*

Before the final assesment, which of the Business Model Idea will be implemented, they have to be detailed with the BM-Blueprint, in which the individual BM-structural elements of the ideas are embodied. (see Chapter III).

V. CASE STUDY: MEDIA GROUP

A medium sized media and newspaper group in Germany used the described Fraunhofer Toolset to

- identify the main trends influencing their business in the future,
- identify possible “second use scenarios” for their existing technical infrastructure and
- to identify and discuss potential new Business Models

For this purpose, the following six phases of the process were carried out with the media & newspaper group.

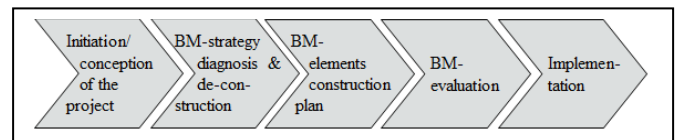


Fig. 6: Six phases

First, the specific objectives have been set. In the second phase “BM - strategy”, the current situation of the company was diagnosed by deconstructing the existing Business Model. Next, a construction plan for the future has been designed with the BM - structural elements, which served for scenario development. In the fourth phase the new Business Model has been reconstructed and the strategy has been set from these developed scenarios. After evaluation the new strategy and Business Model will be implemented in the media &



newspaper group in the last phase, which is carried out at the moment.

One Vision out of the most important Trends which could be analyzed was that Tablets, as highly personalized mobile device with an enormous emotional quality for the individual user, will be “THE PLATFORM” for private media consumption in the future. To make this vision become reality there will be the need for personalized media contents which will be derived out of multiple sources like contents of big, well established newspapers and journals as well as from aggregators like Facebook, Flipboard, Google News, Apple News or from individual Journalists publishing by their own. The idea to match the customer value (individualized media content without any hassle) was to act as a Meta-Aggregator and to offer a service where the user gets individualized media contents for a monthly fee, based on an initial configuration of contents and recommendations based on his user data, configuration settings and consumption behavior.

With regard to the “second-use scenarios” the results out of the Smart Scouting showed, that it could be a possibility to enter in the market of functional printed products which can be printed on a “Roll to Roll” basis. Further discussions about the feasibility of that vision and the suitable Business Model are still in progress.

The presented case is the description of a running project here at Fraunhofer IAO. Lessons learned at this stage of the project, where the first implementations are done are:

- The function-semantic approach is applicable for new as well as for existing technologies developed or used in the company.
- Trends are an inspiring and valuable source for idea generation.
- Trends help to get a better understanding about the future customer needs.
- The combination of “TrendFit“ and “IdentityFit“ to evaluate Business Model Ideas works well.
- The described process to develop new Business Models is transparent enough and not too complicated to work in a close working mode with the customer.
- The basic works which have to be done to identify the relevant trends for idea generation and –evaluation are complex and very time extensive. These expenses can only be justified if a continuous trend management will be established afterwards.

## VI. CONCLUSION

As future markets develop more dynamically than stagnating ones, it follows that they will be the site of the bulk of economic growth over the coming decades. Companies that want to be successful in these markets must be quick to recognize the potential of new technologies and develop the right strategy to exploit them. Only companies that get this right will be able to meet the constantly growing demands of

markets and users while at the same time securing an important advantage over competitors.

The Fraunhofer House of Business Model Engineering, which has proven itself in practical applications, and the related methods of the Technology Development Portal offer companies continuous support throughout this process – from evaluating their own technology development capability all the way to successfully launching a new technology onto a new market.

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