Business Model Analysis: A Multi-Method Approach

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Abstract

A business model is a set of assumptions about how an organization will perform by creating value for all the players on whom it depends, not just its customers. This paper discusses a multi-method approach to consistently analyzing the structure, the behaviour and the dynamics of business models in order to identify possible optimizations. The method utilizes object-oriented analysis for analyzing structural and behavioral aspects and system dynamics to analyze value creation dynamics.

Keywords: Business model, System Dynamics, Object-oriented Analysis and Design, UML, Method Engineering, Business Engineering

1 Introduction

A business model is a set of assumptions about how an organization will perform by creating value for all the players on whom it depends, not just its customers. In essence, a business model is a "theory" that is continually being tested in the marketplace (Magretta, 2003, p. 44).

A good business model remains essential to every organization, whether it is a new venture or an established player (Magretta, 2002, p. 4). A business model describes (Kagermann and Österle, 2006, p. 17),(Müller-Stewens and Lechner, 2005, p. 410):

- The customers, products, sales channels and the revenue structure of an enterprise.
- The position of an enterprise within its value network and the nature of its business relationships.
- The underlying economic logic of an enterprise.

Kagermann and Österle (2006, p. 17) predict that in future business model innovation will be more important for business success than product innovation.

In practice it has proved difficult for firms to systematically design and configure their business model:

- The business model concept is not used consistently—both in research and in business practice (Magretta, 2002, p.4), (Hedman and Kalling, 2003, p.49).
- The quantitative evaluation of business models is difficult, because they are mostly only developed informally and are frequently documented only in prose (Heinrich and Winter, 2004, p. 1).
- The dynamic characteristics of a business model are difficult to predict: value networks are full of interdependencies, such networks often display complex feedback dynamics (Sterman, 2000, p. 22), (Warren, 2002, p. 20).
- There is no single method to analyse both the static aspects (such as the product structure) and dynamic aspects (such as value creation over time) of a business model.

A consistent method to analyse the structure, the behaviour and the dynamics of a business model should allow practitioners to identify possible optimizations to the rules governing the business models behaviour, to assess the impact of innovative changes to the structure of the business model and to identify critical success factors of a new or redesigned business model before the changes are implemented within a particular market.

As a contribution toward developing such a method this paper:

- Examines the business model concept and proposes a comprehensive definition.
- Defines a multi-method approach to business model analysis utilizing both object oriented analysis and system dynamics.

- Illustrates the approach via a case study from a professional service firm.

2 A comprehensive definition of the business model concept

This chapter develops an approach to analyzing the structure, the behaviour and the dynamics of business models:

- The structural perspectives defines the elements relevant to the business model being analyzed, and their relationships to each other.
- The behavioural perspective defines how these elements interact.
- The dynamics perspective show how the value created by the business model develops over time.

Starting point for method development is an analysis of current approaches to business models found in literature.

2.1 Current approaches to business models

To begin with it is important to ask why the concept of business model is a relevant one. The term frequently appears both in business and academic literature, so it obviously has some appeal. But Magretta (2002, p.8) comes to the following conclusion:

> Much like the term strategy, the term business model is used sloppily, being stretched to mean everything and ending up meaning nothing.

Hedman and Kalling (2003, p. 49) even remark:

> However, the concept is often used independently from theory, meaning model components and their interrelations are relatively obscure.

2.1.1 Business models define how value is created

A whole set of definitions found in literature indicate that a business model should define how a business creates value.

An interesting definition to start with is the following by Magretta (2003, p. 44):

> A business model is a set of assumptions about how an organization will perform by creating value for all the players on whom it depends, not just its customers. In essence, a business model is a theory that is continually being tested in the marketplace.

Magretta (2002, p. 4) also notes that a business model should answer the questions:

> Who is the customer? What does the customer value? How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?

Müller-Stewens and Lechner (2005, p. 410) adopt the following viewpoint:

> A business model defines how a firm's particular configuration of the value chain is made concrete through adoption of a "capitalization perspective", thereby answering the question "How do we make money in this business?": The business model bridges the gap to operative management by answering the questions: Which services shall be offered to which customers? How and within which structure shall these services be offered? How do I win, foster and keep appropriate customers? How shall the revenue model be defined concretely?[1]

The constructs for this definition are identified in Figure 1.

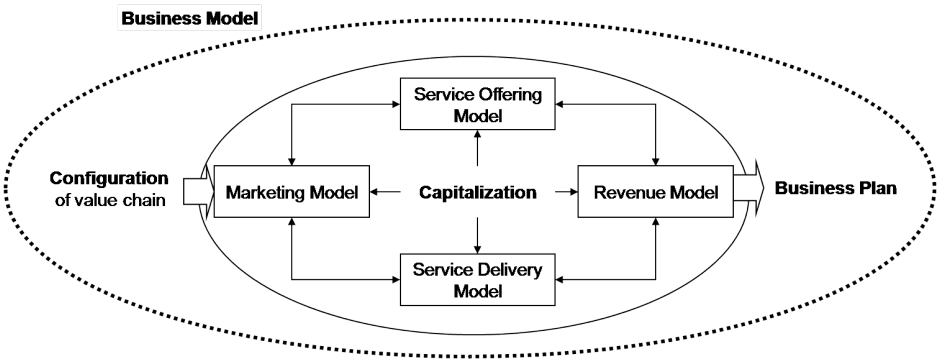

Figure 1: Constructs of a business model in Müller-Stewens definition

A definition quoted frequently[2] is by Timmers (1998)[p.32]:

[1] Translated from the original German by the author of this paper.

[2] Johnson and Scholes (2003)[p. 496], Braun (2003)[p.38], Weil and Vitale (2001)[p.34], Kagermann and Österle (2006)[p.17]

> A business model is an architecture for the product, service and information flows, including a description of the various business actors and their roles, of the potential benefits for the various business actors and of the sources of revenues.

It is also interesting to note that Timmers (1998)[p. 32] explicitly goes on to say that:

> A business model in itself does not yet provide understanding of how it will contribute to realizing the business mission and objectives of any of the companies that are actors within the model. We also need to know about the companies' marketing strategies in order to assess the commercial viability of the business model and to answer questions like how the competitive advantage is being built, what the positioning is, that the marketing mix is, which product marketing strategy is being followed.

Amit and Zott have published a steam of papers using a definition of business model similar to that of Timmers (e.g Zott and Amit (2007)[p. 3]):

> The business model is a structural template of how a focal firm transacts with customers, partners, and vendors; that is, how it chooses to connect with factor and product markets. It refers to the overall gestalt of these possibly interlinked boundary-spanning transactions.

Zott and Amit make the distinctions between business model and product market strategy explicit in Table 1.

2.1.2 Business models link competences the aspirations

Even though all the definitions given above refer to the value created for the business actors involved in the business, none of the definitions given above say much about the "unique capability" that a firm has (or needs) in order to create products of value—the ingredient that has become widely known as the "core competence".

In the resource based view of a firm the terms resources, capabilities and competences are used more or less interchangeably (Barney, 2001)[p. 157]. Barney's definition of core competence is (Barney, 2001)[p. 414]:

> Core competencies are complex sets of resources and capabilities that link different businesses in a diversified firm through managerial and technical know-how, experience and wisdom.

	Business Model	**Product Market Strategy**
Definition	A structural template of how a focal firm transacts with customers, partners, and suppliers. It captures the pattern of the firm's boundary spanning connections with factor and product markets	Pattern of managerial actions that explains how a firm achieves and maintains competitive advantage through positioning in product markets
Main Questions Addressed	How to connect with factor and product markets? Which parties to bring together to exploit a business opportunity, and how to link them to the focal firm to enable transactions (i.e. what exchange mechanisms to adopt?) What information or goods to exchange among the parties, and what resources and capabilities to deploy to enable these exchanges? How to control the transactions between the parties, and what incentives to adopt for the parties?	What positioning to adopt against rivals? What kind of generic strategy to adopt (i.e. cost leadership and/or differentiation)? When to enter the market? What products to sell? What customers to serve? Which geographic markets to address?
Unit of analysis	Focal firm and its exchange partners	Firm
Focus	Externally oriented: focus on the firm's exchange with others	Internally/externally oriented: focus on a firm's activities and actions in light of competition

Table 1: Business model vs. product market strategy concepts

Eden and Ackermann (2000)[p. 14] explicitly mention competencies in their definition of business model:

> The ability to link competencies to aspirations forms the business model.

This definition is visualized in Figure 2 (Eden and Ackermann, 2000)[p. 13].

2.2 Value creation and performance

Business models define the underlying economic logic that ensures that a company can create value. But what exactly is value? A basic model for measuring the value created in business interactions is offered by Brandenburger and Stuart (1996)[p.7 ff]:

$$value\_added = willingness\_to\_pay - opportunity\_cost \tag{1}$$

This formula is illustrated in Figure 3. In this concept, value is not created by a single player alone—the supplier, the firm under consideration (the focal

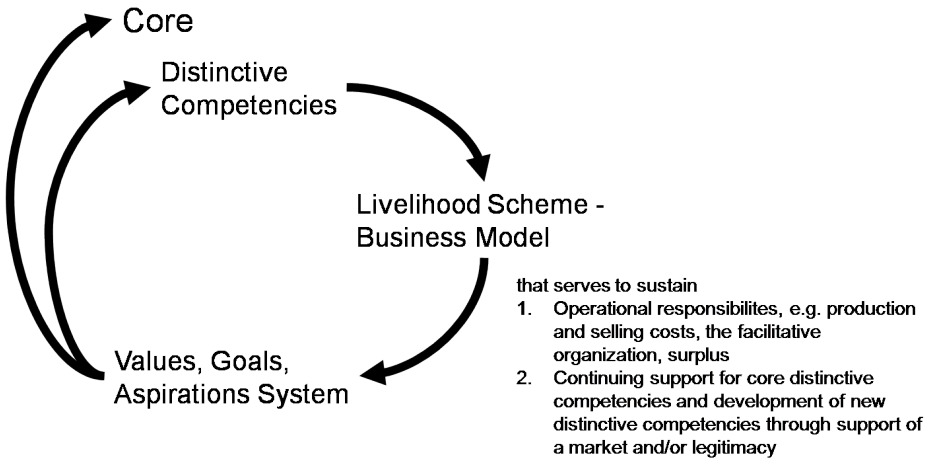

Figure 2: The ability to link competencies to aspirations forms the business model

firm), and the buyer all have a share in value creation. This is due to the fact that the value created is not calculated using the actual price charged for a product and the actual costs that arise in buying resources from the supplier—instead the value is calculated by taking into account the buyer's willingness to pay for a product and the supplier's opportunity cost for the resources in question.

The willingness-to-pay will always be higher (or at most equal to) the price of the product, or else the buyer will not by the product. A similar argument holds for the suppliers opportunity cost.

In practice it is difficult to determine the willingness to pay and the opportunity cost. Often the value created by a company is viewed as the value-added (Müller-Stewens and Lechner, 2005)[p. 370], which essentially is a measure of the gross margin a company generates:

$$value\_added = net\_sales - external\_costs \tag{2}$$

This formula does not consider the operating expenses—so two firms may create equal value, but one may be profitable due to superior organization, while the other makes a loss. It also does not take into account the fact that a firm needs to invest some of the value created back into the firm to ensure that value generation can be continued in the future—therefore it does not show all aspects of a firm's performance.

As discussed in Koller et al. (2005)[p. 54ff], the best indicator for value that considers these operational factors is the free cash flow FCF, the cash that will be generated after reinvesting what is needed to deliver that growth:

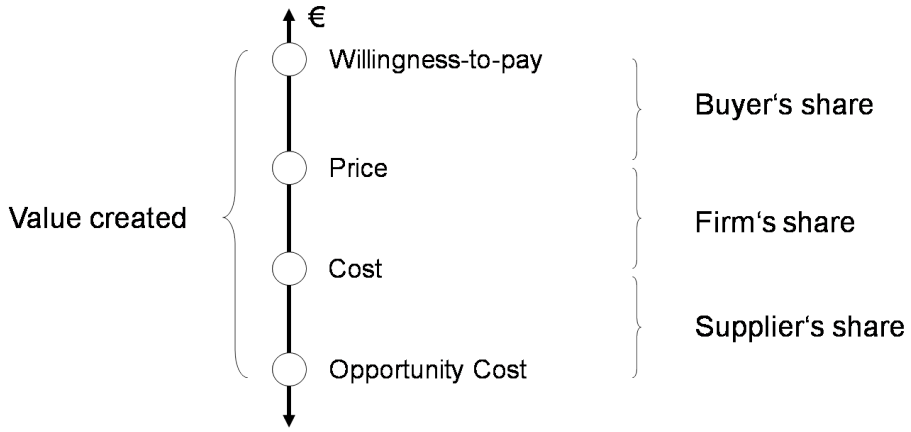

Figure 3: The ability to link competencies to aspirations forms the business model

$$\begin{aligned} FCF = & \, operating\_income \\ & + depreciation \\ & - tax \\ & + non\_operating\_income \\ & - net\_investment\_current\_assets \\ & - net\_investment\_fixed\_assets \end{aligned} \tag{3}$$

In order to calculate the value of a firm, the cash flow is discounted for the future at the rate of the weighted average cost of capital $WACC$. As the firm's cash flow is likely to change in the future, an average projected growth rate $GROWTH$ must also be taken into account. Finally we arrive at the formula defining the intrinsic value of a firm, which is well-established in the finance literature:

$$VALUE = \frac{FCF}{WACC - GROWTH} \tag{4}$$

As it stands, this formula applies to a corporation as a whole and includes non-operating-income which in many cases will not be generated by the firm's business model(s).

Zott and Amit (2007)[p. 6ff] adapt value as defined in 1 to a many-to-many setting based on individual transactions—the total value added is

essentialy defined to be the revenue generated less the cost incurred in supporting the transactions that generate that revenue:

Let $P(T)$ be the price that a customer pays for a product or service acquired in transaction T, or for the right to participate in this transaction. Denote the firm under consideration (the focal firm) with F, and the firms suppliers and partners (other than the customers) with S_i, where i is an index ranging from 1 to N_s, the total number of suppliers and partners in the business model. Let $R(S_i, T)$ be the revenues the focal firm F gets from partner S_i in a particular transaction T. Let $C(S_i, T)$ denote the flow of revenues from F to S_i in transaction T, and let $C(F, T)$ be F's costs of providing its own resources within this transaction (e.g. financial capital, intellectual capital,...). Then the value appropriated by Firm F in transaction T can be expressed as:

$$V(F,T) = P(T) + \sum_{i=1}^{N_s} R(S_i,T) - \sum_{i=1}^{N_s} C(S_i,T) - C(F,T) \tag{5}$$

The total value added (TVA) by firm F is the value created in all types of transactions T_j that the business model enables, where j is an index ranging from 1 to N_T, the total number of transactions the business model supports or enables. Let $F(T)$ be the frequency that transaction T is carried out. Then TVA can be calculated as:

$$TVA = \sum_{i=1}^{N_T} V(F,T_j) \times F(T_j) \tag{6}$$

Inserting equation 5 into equation 6 yields

$$TVA = \sum i = 1_T^N (P(T) + \sum_{i=1}^{N_s} R(S_i,T) - \sum_{i=1}^{N_s} C(S_i,T) - C(F,T)) \times F(T_j) \tag{7}$$

In practice of course firms are not only interested in the TVA defined in Equation 7, but also need to monitor operative success. A possible measure for the performance of a firms business model might therefore be the return on value added ($ROVA$), which compares FCF to TVA [3].

$$ROVA = \frac{FCF}{TVA} \tag{8}$$

In conclusion we can say that a comprehensive, quantitative model of a business model should explicitly state:

[3] An interesting discussion on $ROVA$ is given by Müller-Stewens and Lechner (2005)[p. 369].

- The revenues the firm expects to make in selling its products and services,
- The cost of external resources needed to produce these products and services
- The cost of developing and producing these cost (cost of goods sold),
- The investments needed to keep the business model running.

2.3 A comprehensive definition of business model

Based on the preceding discussion this paper adopts the following definition of business model:

Definition of business model A firm's business model defines how it adds value for all the actors within its value network.

It shows which channels a firm provides to connect the actors in the product and factor markets and which transactions it supports or enables via these channels. It also identifies the resources and capabilities it needs to support these transactions, and the costs incurred in doing so.

It explicitly states the business policies that govern the channels and transactions it supports and the development of resources and capabilities needed to create the products or services it sells, and how these policies are connected to each other. It also states the assumptions that are made about how a firm will perform in its market.

A business model is not concerned with product market strategy or with the business processes and activities that are needed to perform transactions, support channels, or develop products and services.

The constructs of a business model used in this definition are illustrated in Figure 4

3 A method for business model analysis

It is clear from the discussion in section 2 that the business model concept is not a simple one: The firms business partners, customers, products and pricing structure are not independent, but connected to each other in multiple ways, leading to structural complexity. The transactions between these stakeholders, and the channels supporting these transactions frequently involve numerous activities that must be coordinated over many partners, leading to high behavioural complexity. Part of the value created in these transactions

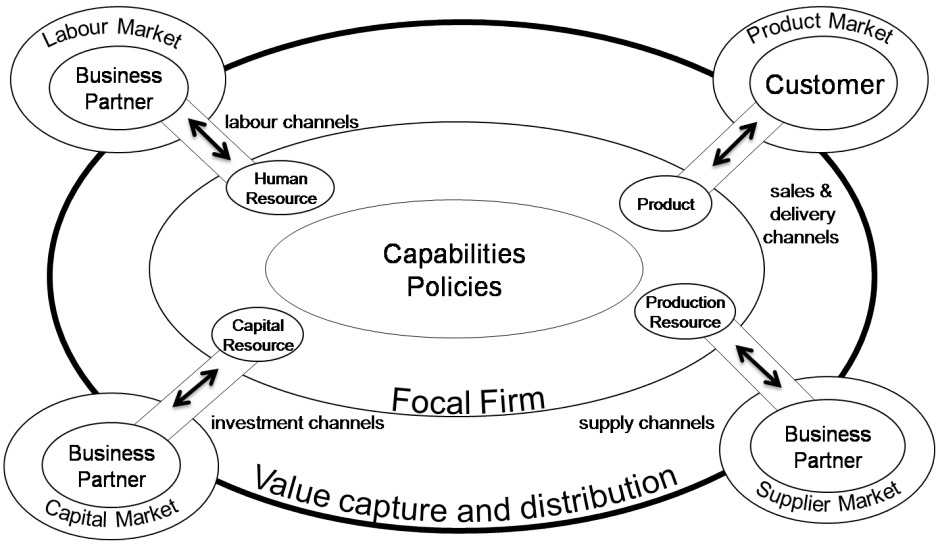

Figure 4: The elements of a business model

must be fed back into the system to support the channels and transactions the firm implements. This feedback leads to dynamic complexity.

System dynamics approaches are well suited to dealing with the dynamic complexity encountered in business systems. But the stock and flow models used in system dynamics don't have the language mechanisms to define complex structural and behavioural relationships.

This paper therefore proposes to model the structural and behavioural aspects of business models using concepts from Object-Oriented Analysis and Design (OOAD): OOAD is an approach to modelling IT-systems as groups of interacting objects, that has been used in software engineering for many years (e.g. Booch (1990)). Each object represents some entity of interest in the system being modeled, and is characterised by its class, its state, and its behaviour. Various models can be created to show the static structure, dynamic behaviour, and run-time deployment of these collaborating objects.

Over the years a number of different notations for representing these models have been defined—the notation commonly adopted today is the Unified Modeling Language (UML)(OMG, 2005). This is also the notation that will be used in this paper.

OOAD concepts have been applied to business engineering activities by various authors who recognize the need for a methodology that can be used to engineer both processes and systems ((Jacobson, 1994),(Eriksson and Penker, 2000),(Marshall, 2000)). Modelling the dynamics of an enterprise is not possible with UML, as these capabilities are not currently supported by the

language specification (OMG, 2005).

The approach followed in defining the business model analysis method is based on method engineering concepts: Originally method engineering was conceived as an engineering discipline to design, construct and adapt methods, techniques and tools for the development of information systems (Brinkkemper, 1996). Meanwhile the method engineering approach has been extended to the engineering of enterprises as a whole, to ensure repeatable, scalable and disciplined 'engineering' (as opposed to individualistic 'creation') and to facilitate division of labour in large business engineering efforts (Winter, 2003, p. 88).

Following Gutzwiller (1994, p.11) the following aspects of the business model analysis method are discussed here:

Stakeholder The stakeholders affected by the results the method produces.

Stakeholder Value The results created in applying the method must produce concrete value for the stakeholders.

Result The results that are produced by the method.

Role The actors partaking in a method assume various roles that perform the activities.

Activity The activities that must be performed to create the result.

Meta-model A model of the result that is produced by the method. This result is frequently itself a model, whence the name *meta-model*.

Technique Techniques that are useful in creating the results. Examples for techniques used in this paper are creating models in UML and using system dynamics.

3.1 Stakeholders and Stakeholder Value

The stakeholders for this method are the shareholders of the firm implementing the business model being analysed, investors interested in funding a business, and the managers responsible for the successful implementation of a business model. Depending on the context this will be the managing director or CEO (in firms implementing a single business model) or business unit managers (in larger corporations deploying multiple business models in different business units).

3.2 Roles

The managers responsible for implementing the business model must be involved in business model analysis to ensure management buy-in and support. Employees responsible for business development are key to business model analysis as they provide the broad knowledge of the business needed for the analysis. Financial controlling experts are needed to analyze the value created by the business model. Domain experts with deep knowledge of particular aspects of the business model (such as experts from sales, marketing and product development) may be necessary to help elaborate the results created. Business analysts with general knowledge of the business co-ordinate the analysis process and maintain the results produced.

3.3 Results

The method produces the following results:

Strategic Questions Clearly formulated strategic questions are needed as a starting point in order to define the model boundaries and scope.

Model of the business model The major result of the method is a comprehensive model of the business model.

Scenarios A set of scenarios analyzing various aspects of the business model. These scenarios are needed to answer the strategic questions.

Recommendations Recommendations on changes that ought to be made to the business model to improve the value created.

The major result is a comprehensive model of a firm's business model. The relevant aspects of a business model are separated into distinct views within this model:

A view is a projection of a model, which is seen from one perspective or vantage point and omits aspects that are not relevant to this perspective (Rumbaugh et al., 2005)[p. 678].

The following views are needed to fully understand a business model and its implications for a firm's performance:

Value Network view This defines the business actors and the channels connecting them.

Product view This defines the detail of the products and the revenue model, showing the concrete products offered.

Business transaction view This defines the business transactions that the business model supports or enables.

Value Dynamics view This defines the value created by the business.

The views not only illustrate different aspects of a business model, they also differ in nature: The business partner and product views have a structural nature, illustrating relevant entities and the relationships between them. The business transaction view is behavioural, showing the transactions individual steps and their sequence. The value dynamics view shows how the value created by the business develops over time.

3.4 Meta-Model

Given the definition of business model proposed in section 2 the core constructs involved in a business model can easily be identified:

Firm Any of the firms involved in a business model.

Market The market the firm operates in (product markets and factor markets, cf. Figure 4)

Product The product a firm offers to its customers.

Transaction Firms interact via transactions.

Channel A channel is a conduit by which a firm offers its products. These products are exchanged via transactions.

Asset A firm needs assets to enable its transactions, maintain channels and create its products. The term is used here as a generalization of the terms resource and capability, following Amit and Schoemaker (1993). The term competence is not used from here on.

Value The value created by the firm, as discussed in section 2.2.

A firm operates in a particular market and interacts with other firms in the value network via channels. Products are exchanged via the channel within transactions. Assets may be needed to implement a channel or produce a particular product.

The relationships between these core constructs are detailed in Figure 3.4.

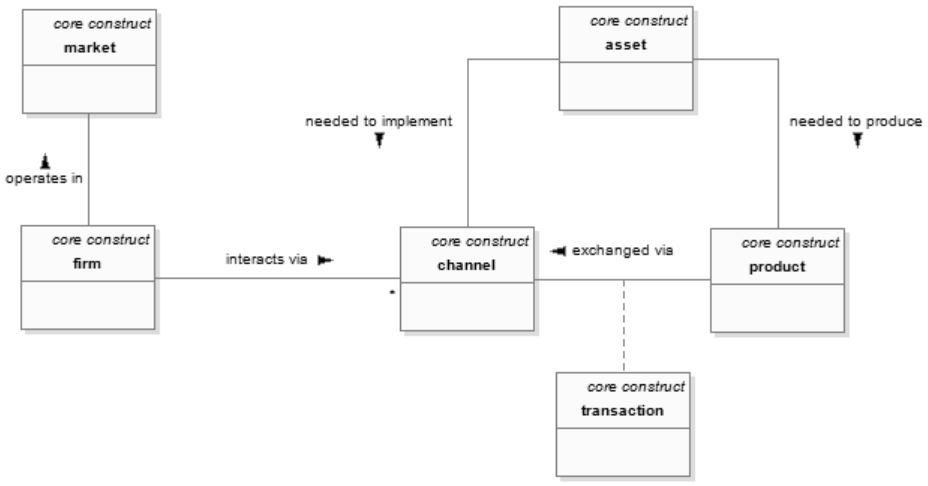

Figure 5: The core relationships of the business model meta-model

3.5 Activities

A business model analysis project performs the following activities:

Initiation In this activity important aspects of the business model are be discussed with the firm's management. Strategic questions concerning the business model are be formulated—the objective of the business model analysis project is to answer these strategic questions by applying the analysis method outlined here.

This phase typically consists of on-site workshops. Workshop results are an informal description of the business model and a list of clearly formulated strategic questions.

Business Model Inception In this activity a first formal model of the business model is be created. Quantitative reference data needed at later stages is specified on the basis of this model.

This activity will typically consist of off-site analysis work performed by the business analysts.

Business Model Elaboration In this activity the initial formal model is elaborated. The specified reference data is extracted from the firm's business intelligence systems. This data is used to calibrate the simulation model, which forms the basis for scenario analysis.

Activities	**Tasks**
Initiation	Informal definition of business model Elaboration of strategic questions
Business Model Inception	First model of business model Specification of quantitative reference data needed
Business Model Elaboration	Elaboration of business model Calibration of simulation model using reference data
Scenario Analysis	Analysis of various scenarios to answer strategic questions Analysis of possible policy changes
Transfer	Recommendations concerning strategic Questions Report Finalization
Transformation	Monitor results

Table 2: Business Model Analysis Activities

This phase will typically consist of on-site workshops to review and elaborate the initial model and off-site work to finalize the model of the business model.

Scenario Analysis In this phase various scenarios are defined on the basis of the strategic questions raised in the initiation phase. The scenarios are analyzed and simulated using the model created in earlier phases. Possible changes to policies are identified and evaluated.

This phase will typically consist of off-site analysis work performed. The scenarios are then presented and discussed at on-site workshops.

Transfer In this phase final recommendations are developed and the report is finalized.

This phase will typically consist of off-site finalization work. The final recommendations and the report are then presented to the stakeholders.

Transformation In this phase the recommendations are implemented in the firm and results are monitored by the firm's management.

The business model analysis activities are summarized in Table 3.5

4 A case study in business model analysis

The goal of the following case study is to illustrate the business model analysis method defined in section 3. To ensure concentration on method (as opposed to concentrating on the details of a particular business model) a company with a simple business model was chosen: The case study reports from a professional service firm—a small, partner-managed IT consultancy delivering process management consulting to IT service providers.

The firm has a flat hierarchy: the partners managing the firm, and the consultants working for them. Thus the growth of the company is limited by the number of consultants a partner can manage (the partner leverage), and the business each partner generates—beyond that the firm can only grow by adding new partners.

The firm has no formal business relationships beyond those to freelance consultants, its customers, and the business relationships ("the business network") each partner maintains. The consulting services provided by the firm are sold as coherent projects on a time and material basis. Business is generated through repeat business from existing customers and through the network of business relationships.

4.1 Strategic questions

After ten years of existence and a brief period of initial growth, the firm has not managed to grow much beyond the partners and a few consultants—the partners are not fully leveraged.

In the past the following pattern has been observed: Each partner builds a stable client relationship and secures enough business from this relationship to hire some extra consultants.

After some years the customer relationship breaks, the consultants are lost. It takes some time to build a new client relationship of equal strength and hire new consultants.

Based on these observations, the following strategic question was asked:

What drives growth more—stable customer relationships, the number of new customer relationships generated via the network of business relationships, or the size of consulting projects sold?

4.2 Model of the business model

4.2.1 Value network view

The following actors are part of the full service provider business network. They are illustrated in 6.

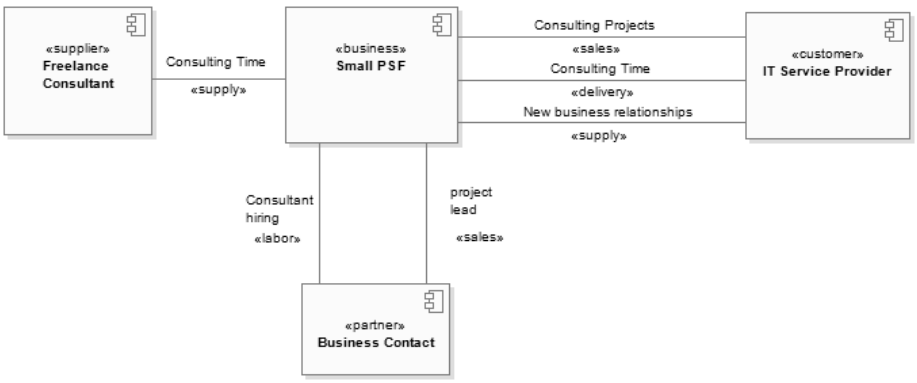

Figure 6: The firms business partners

Business Relationship The firm's partners maintain a network of business relationships. These are important as they are a source of leads for generating new business.

Freelance consultants The firm depends on freelance consultants for the staffing of its projects during peak times. These are mostly recruited from the network of business relationships via the recruitment channel.

IT service providers The firm's customers are IT service providers. The firm sells consulting projects via its sales channel and supplies consulting time via its supply channel. Customers and customer projects are also important for making and maintaining new business relationships via the partner channel.

4.2.2 Product view

The firm sells consulting projects as a service to its customers. The projects are delivered on a time and material basis (man-days). Partners and employed consultants draw wages, freelance consultants charge a daily rate which is a fixed percentage of the daily rates charged to the customer.

Projects are sold to IT service provider managers on the basis of leads—these leads can either be generated through the managers themselves (repeat business) or through business relationships maintained by the partners.

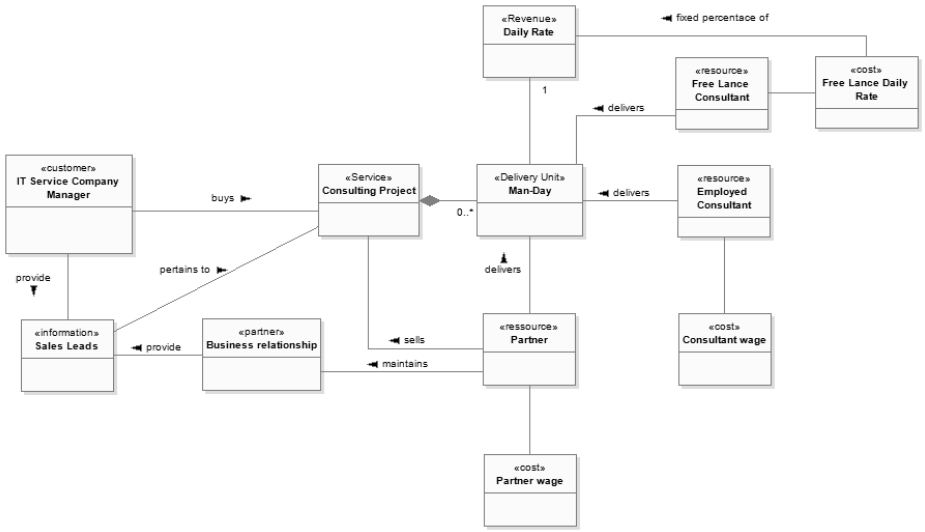

Figure 7: The firms product view

4.2.3 Business transaction view

The main transactions the firm engages in are:

- Sell projects
- Deliver projects
- Hire and fire (freelance) consultants
- Maintain business relationships

For brevity's sake only the "Maintain business relationships" transaction is detailed here:

The maintain business relationship transaction lies at the core of the firms marketing and sales process: All sales are made either to current customers (repeat business) or to leads generated from the network of business relationships. New contacts made in current projects are systematically turned into business relationships which are actively maintained.

A typical transaction runs as follows, illustrated in Figure 8:

1. New contacts are mostly made during client projects—experience has proved these provide the best opportunity to building enduring relationships.
2. The network of business relationships is actively maintained (visits, phone calls, emails, newsletters).

2.1. Business contacts provide sales leads to existing or new customers.

3. The sales leads are used to make sales pitches and write proposals which generate orders.

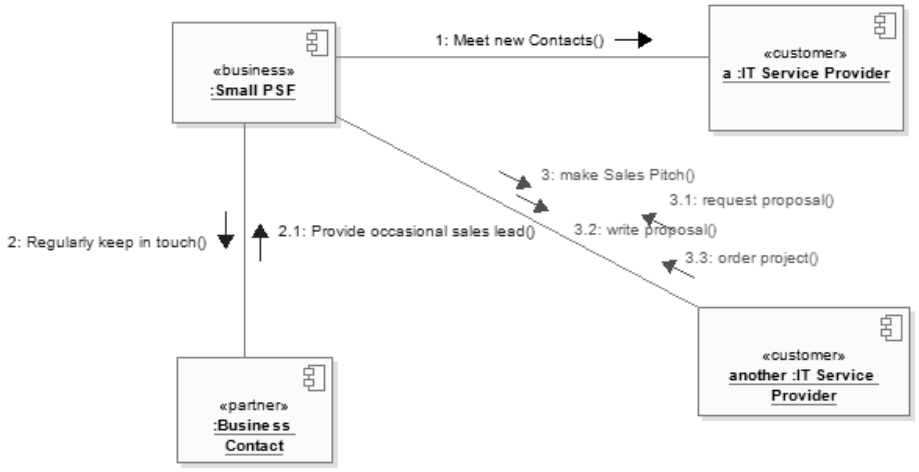

Figure 8: The 'Maintain business relationships' transaction

4.2.4 Value dynamics view

The value dynamics view of the PSF business model examines how the elements of the structural model (such as customer, consultant, projects sold) are changed by the business transactions (such as selling projects, hiring and firing consultants) in the behavioural model.

The structural and behavioural model therefore forms an important basis for developing and validating the dynamic model.

An overview of the value dynamics is given in Figure 9 and briefly discussed here[4]:

Partners The heart of the business model is formed by the firm's partners, who are responsible for enacting all of the firms policies regarding the business model. The number of partners the firm has is fixed in the model—this reflects the fact that the firm currently has no policy for changing its partnership structure.

Contacts Each partner maintains a list of contacts, who provide leads that may ultimately lead to new projects and customers—maintaining contacts costs partner's time, which is then not available for project work

[4]The full model is available from the author

and consultant management. If the partners invest to little time in their contacts the number of contacts diminish, reducing the number of leads generated.

Projects Partners are also responsible for following up on leads,writing proposals and winning new projects. Projects may be won from new customers or from current customers (repeat business). In the firms experience winning a new customer is much harder than winning repeat business from a current customer, a fact that is reflected in the model via two distinct sales pipeline, one for new customers and one for repeat business. The firm just has one product ("consulting projects")—projects are characterized by total project effort and the average team size deployed.

Consultants Consultants are needed to delivery projects and are hired and fired by the partners. The hiring and firing policies implemented in the model are very simple—consultants are hired (or fired) as soon as the number of consultants needed for project delivery exceeds (or falls under) the number of consultants available.

Customers Customer maintenance essentialy is done via contact maintenance (all customers are contacts, but not all contacts are customers). Customers have a finite lifetime in order to reflect that the consulting products offered by the firm may become obsolete.

Value This model takes a simple approach to accounting the value generated—the revenues generated are reduced by partners and consultants wages and summed over the firms lifetime. The resulting value is essentially the amount of capital available to the firm to invest into new services. It is important to note here that the firm currently has no planed policy for investing the value it creates back into the firm (e.g. for creating and marketing new products). This is reflected in the model: There is now connector leading from the value module to the other modules.

To answer the strategic question posed in chapter 4.1 we will concentrate on the following aspects of the dynamic model in this chapter:

- Sell and deliver project transactions dynamics.
- Hire and fire consultants dynamics.
- Customer acquisition dynamics.
- Value generated dynamics.

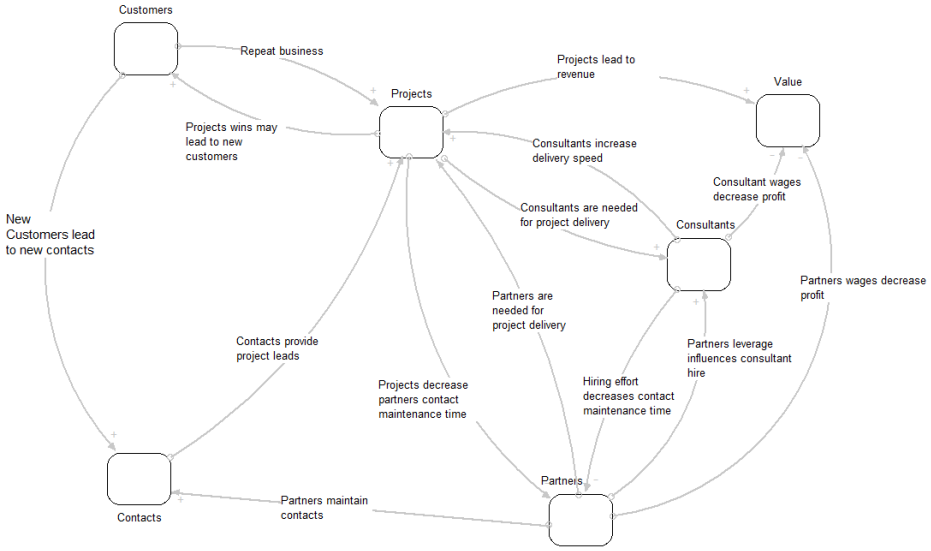

Figure 9: Value dynamics view

Sell and deliver projects transactions dynamics This part of the model discerns between the leads generated from business relationships as opposed to leads generated from current customers (repeat business). This is necessary as the transaction and success rates are different — typically repeat business is generated at the end of the current assignment. The success rates of these proposals are higher than those of proposals created for new customers. This part of the model is illustrated in figure 10

Hire and fire consultants dynamics This part of the model has been kept simple — a fixed hiring and firing duration is assumed, and the reservoir of consultants is potentially infinite (no 'war for talents'). This is acceptable in order to answer the strategic questions posed. This part of the model is illustrated in figure 11

Consultants are fired as soon as the number of consultants actually needed due to the projects sold falls below the number of consultants actually available. The actual firing policy is far more complex and not considered here.

Customer acquisition dynamics A new customer is generated every time a project is acquired via the business relationship channel ('network proposal success'). Customers have a finite lifetime—policies for prolonging the lifetime of a customer are not considered in this model as they are not relevant to the strategic questions being posed. This part of the model is illustrated in figure 12.

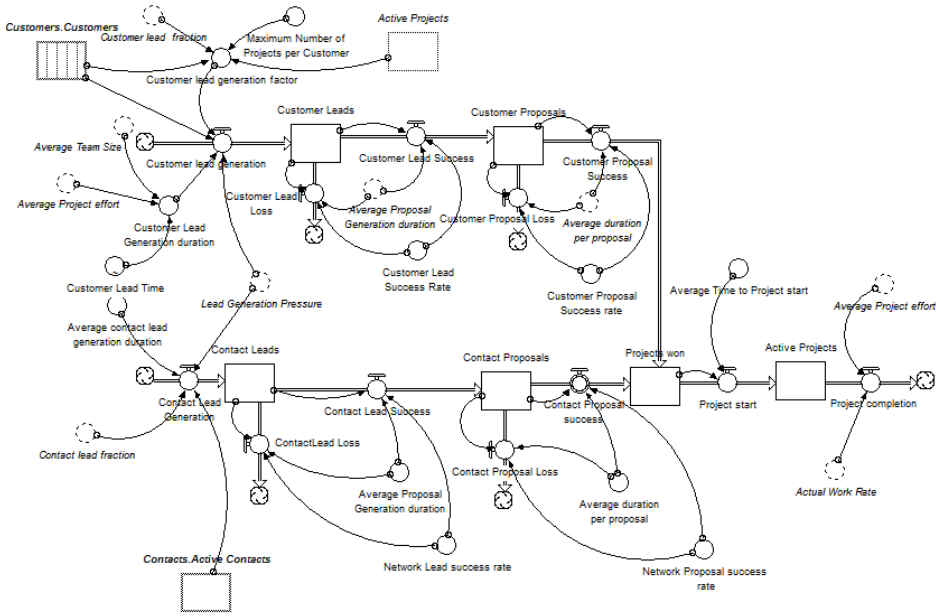

Figure 10: Dynamics of the sell and deliver projects transaction

Value generation dynamics This model takes a simple approach to counting the total value added by the business model—the revenues generated are reduced by partners and consultants wages (which are transaction costs in Equation 7) and summed over the firms lifetime. $ROVA = 1$ because service innovation and development costs are not considered in this model. This part of the model is illustrated in figure 13.

4.3 Scenarios

Given the simulation model (cf. 4.2.4) we can now test various scenarios to answer the strategic questions (cf. 4.1):

Reliance on current customers. How does the value created by the firm perform when the firm relies on current customers only and does not actively seek new projects?

Growth What size of project does the firm need to be selling in order to grow? Does this depend more on the size of projects sold (the total effort), or on the typical size of the team deployed at the clients site?

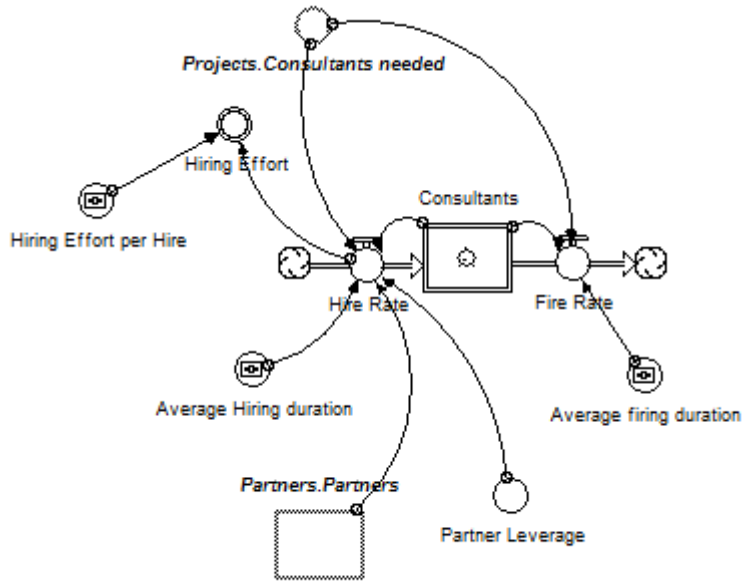

Figure 11: Dynamics of the hire and fire consultants transaction

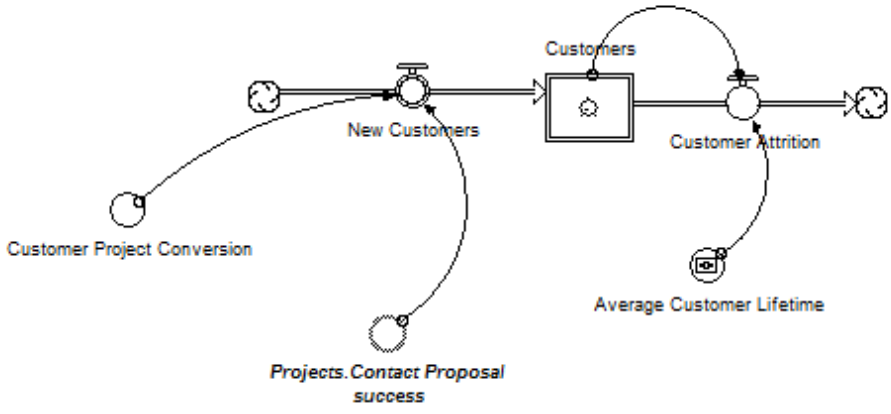

Figure 12: Dynamics of the customer acquisition transaction

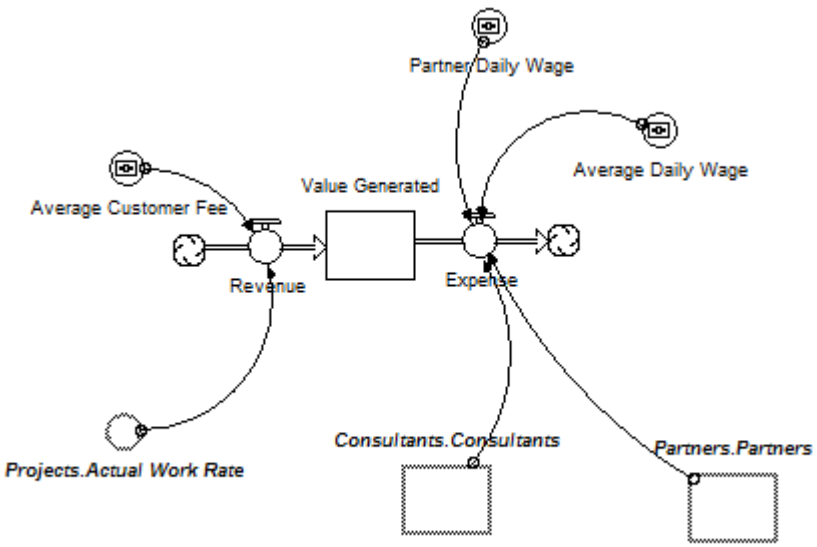

Figure 13: Dynamics of value generation

4.3.1 Reliance on current customers

In this scenario a simulation was conducted with the following initial parameters:

- Average project effort was set to 300 man-days.
- Average team size was set to 1 person teams.
- Number of partners was set to 1.
- Average customer lifetime was set to 30.000 days — as the simulation only ranges over 3.000 days, this effectively means customers have an infinite lifetime.

In this situation the business model is stable, but little growth is achieved, as displayed in the graphs in figure 14.

The value generated in this scenario is displayed in figure 15.

4.3.2 Growth

To analyze growth scenarios a first simulation was conducted with the following initial parameters:

- Average project effort was set to 300 man-days.

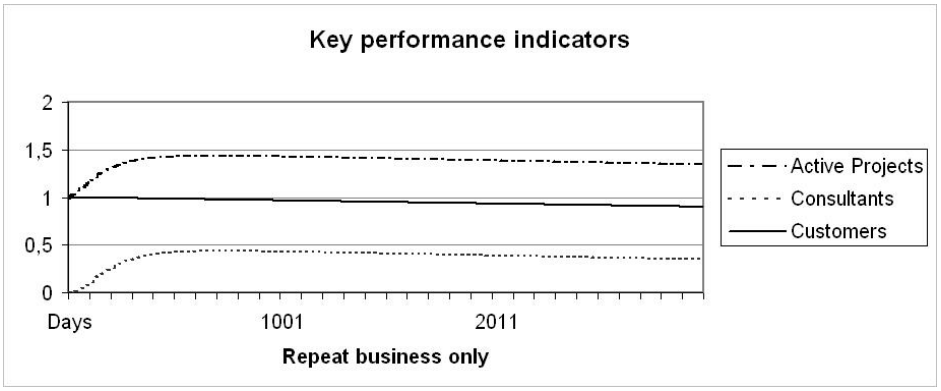

Figure 14: Key performance indicators for the 'repeat business only' scenario

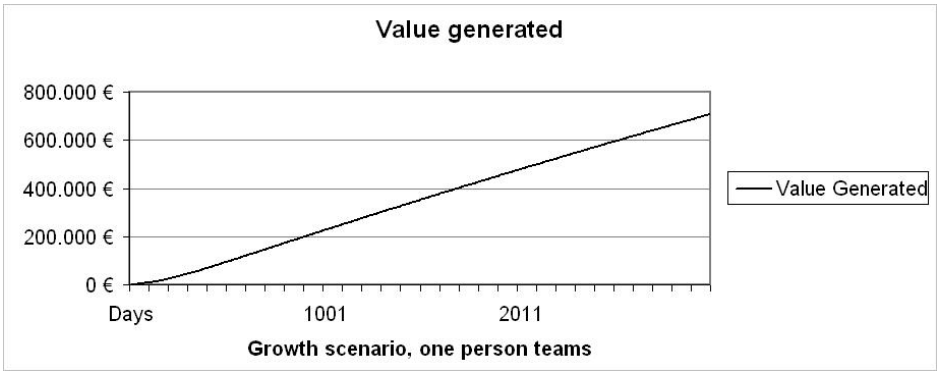

Figure 15: Value generated in the 'repeat business only' scenario

- Average team size was set to 1 person teams.
- Number of partners was set to 5.
- Average customer lifetime was set to 1.000 days.

In this scenario the PSF achieves a maximum size of five consultants after three years, and then remains stable (figure 16). The value generated in the first year is negative though, break even is not achieved until the third year.

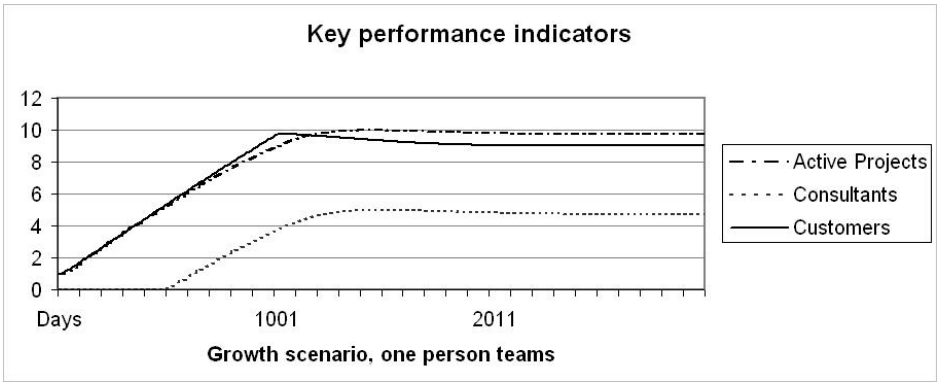

Figure 16: Key performance indicators for the 'one-person-team' growth scenario

The value generated in the 'one-person-team' growth scenario is displayed in figure 17.

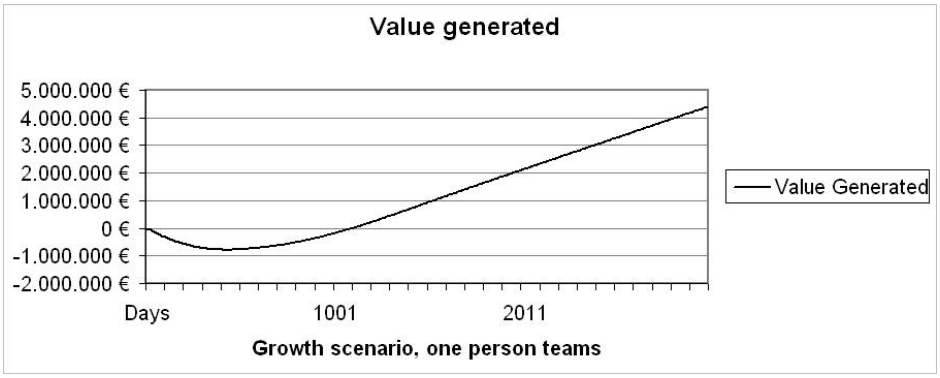

Figure 17: Value generated in the 'one-person-team' growth-scenario

A second simulation was run with the following initial parameters:

- Average project effort was set to 100 man-days.

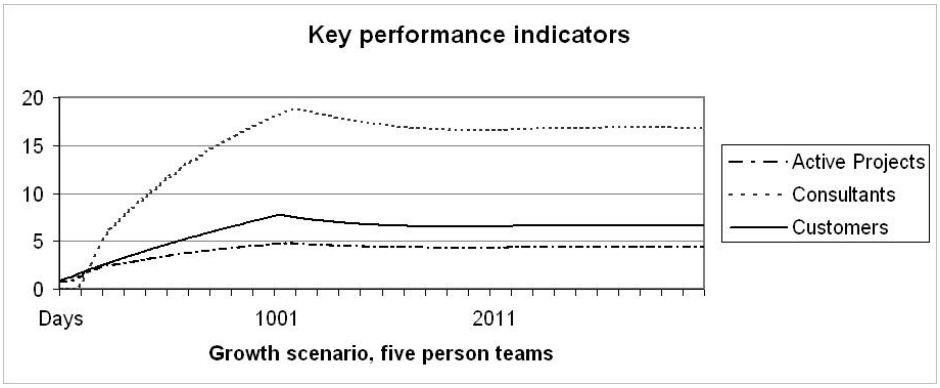

Figure 18: Key performance indicators for the 'five-person-team' growth scenario

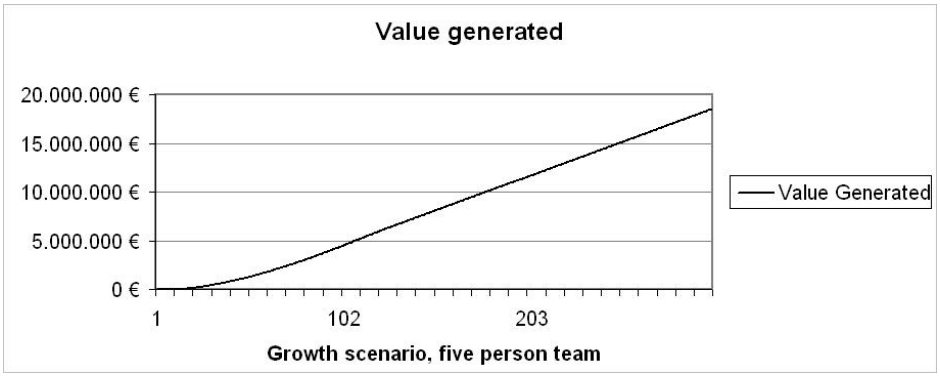

Figure 19: Value generated in the 'five-person-team' growth-scenario

- Average team size was set to 5 person teams.
- Number of partners was set to 5.
- Average customer lifetime was set to 1.000 days.

In this situation growth comes more easily, achieving a peak at 18 consultants after three years and stabilizing at 16 consultants (Figure 18). The value generated was negative for the first 150 days, but then grew steadily (figure 19).

The simulation was then repeated with an average project effort of 300 — this had little effect, indicating that team size is more important than the size of the project effort.

The value generated in the 'five-person-team' growth scenario is displayed in figure 19.

4.4 Recommendations for the PSF business model

Based on this analysis of the PSF business model the following recommendations can be made:

- The partners should concentrate more on selling larger teams (in terms of team size deployed in customer projects) than on selling larger projects (in terms of absolute project effort). The product structure needs to be further differentiated to achieve this.
- Reliance on repeat revenue only is dangerous — it is important to generate revenue through new customers if growth is to be achieved. Current customers should not be neglected, as they are more reliable in difficult market conditions.

5 Conclusions

Starting from a review of literature this paper gives a comprehensive definition of the business model concept. This definition shows that business models have rich structure, behaviour and dynamics.

In order to analyze all aspects of a business model a multi-method approach is proposed. The approach uses UML for modelling the structure and behaviour of business models and system dynamics for modelling the dynamics of the business model and for simulation.

The case study described in chapter 4 shows how the method can be applied to real situations.

A number of open questions remain to be investigated:

- A complete and consistent definition of the views that are necessary to model a business model is needed. In particular the value perspective needs to be investigated further.
- The interdependence of these views should be examined—in particular the possibility of using the structural and behavioural views to inform and validate the dynamic view.
- Integration of the business model meta-model into appropriate strategy and process meta-models.

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