SYSTEM DYNAMICS BUSINESS MODELS FOR E-LEARNING CONTENT PROVIDERS

1 Motivation and Goals

The maturity of Internet and software technology and the development of sound didactic concepts for E-Learning content and online education have contributed significantly to the emerging use of E-Learning products and services in both corporate and academic training in recent years (Sandrock & Weinhardt, 2004). Internet technology supports an almost global distribution of E-Learning content and provides ubiquitous information and communication means for distant learners and tutors promising immediate or delayed help when needed. Although up-front developments for E-Learning content and technical platforms are very resource-intensive, economies of scale achieved with content reusability and cost reduction for online education make up for these burdens (Sandrock & Vo, 2004).

The use of Internet technology jeopardizes traditional value chains[1] and determines organization and structure of the economic value-creation. It also shapes the traditionally highly integrated education sector where typically single institutes or persons create, develop, present, tutor, and market their content and courses (Enders & Hutzschenreuter, 2003). Far from it, the E-Learning industry is characterized by smaller, specialized organizational units connected with each other, forming new alliances and networks and deconstructing the value chain (Hämäläinen *et al.*, 1996).

Funded with over $200 million by Germany's federal government, more than 100 academic collaborative projects have been supported since 2001 in order to develop, test, and implement innovative forms of teaching and learning. Financial support has typically been given to develop E-Learning content while only few research projects examine overall strategies and economical concepts for media use in higher education (Federal Ministry of Education and Research, 2004b, 2005). Facing tight federal budgets, the latter task has just recently attracted the involuntary attention of both academic research and especially governmental financiers. Initially, government-funded research groups are encouraged to market their research results and to find *business models* for the maintenance and further development of their results (c.f. European Commission, 2004; Federal Ministry of Education and Research, 2004a).

Young and innovative E-Learning companies are thus challenged to build compelling strategies and sound concepts to ensure a sustainable business. Due to novelty of inno-

[1] According to Porter, a value chain can be understood as a "collection of activities that are performed to design, produce, market, deliver, and support" products and services (Porter, 1985).

vative E-Learning products and related services, such E-Learning companies face great uncertainty and complexity to allocate and build their resources and position themselves in the education market.

Due to the lack of direct empirical support, proposed concepts such as *business models* may support the strategic management process through which strategies are chosen and implemented (Barney, 1997). Hence, the development of an E-Learning business model is conceived as a strategic task analyzing and exploiting business opportunities (Amit & Zott, 2001; Hoppe & Breitner, 2004).

This paper addresses the question how a business model can support the entrepreneurial process in the *holistic task* designing an E-Learning business, *focusing* on suppliers, customers, partners, products, processes, organizations and networks in which the company is embedded (Zott & Amit, 2003). Since the considered E-Learning business model concepts will not sufficiently support the strategic management process, a system dynamics simulation model will be introduced. This helps to understand and investigate the complex feedback structure when deciding on strategic issues such as pricing policies or resource-building strategies.

The remainder is organized as follows: The next section gives a short overview on (E-Learning) business model literature, followed by the description and validation of a system dynamics simulation model for a representative E-Learning content provider with stochastic demand. Section 5 describes the results of the simulation, concluded by a discussion of the implication and the next steps.

2 Business Models

Although the expression *business model* is widely used, literature is not consistent in the usages of the term (Timmers, 1998). Several authors with various motivations, backgrounds and prudence offer almost a realm of complementary definitions with different meanings and content. In whatever way the term is used, most would agree that the Internet boom has raised the interest on this expression (Magretta, 2002). Other aspects might include the *New Economy* (Tapscott, 1996) with its strong economical growth in the mid-nineties, the demand-side network effects (Katz & Shapiro, 1994; Shy, 2001) and new co-operation forms on the supply-side (Brandenburger & Nalebu, 1996).

2.1 Current Business Model Concept

Despite the numerous different approaches, major subjects of the discussion are *(1)* definitions/purposes, *(2)* components and *(3)* taxonomies of business models. Timmers, Applegate, and Amit/Zott define business models enumerative as a description or architectural configuration of complex business components, enabling the study of the structure and the relationships among structural elements (Timmers, 1998; Amit & Zott, 2001; Applegate, 2001). Rappa instead emphasizes the importance of the revenue generation and the position in the value chain (Rappa, 1999). Chesbrough/Rosenbloom also acknowledge the role of business models for the strategy-making process (Chesbrough & Rosenbloom, 2002).

One stream of literature discusses the decomposition of business models with the aim to reduce the complexity and hence facilitate the planning. Different morphological concepts with up to eight different components are presented which provide sub-models such as a financial model, a marketing model, a distribution model, etc., mainly integrating central economic disciplines (e.g. Alt & Zimmermann, 2001; Weill & Vitale, 2001; Afuah & Tucci, 2003).

Business taxonomies, on the other hand, should help to group different firms in three categories such as revenue source and value chain position (Rappa, 1999) or the degree of innovation and the type of offering (Timmers, 1998).

2.2 Current E-Learning Business Models

Such as the Internet boom has fostered economic research in general, it also has profound impact on the education sector. While researchers have abstained from providing new definitions of particular E-Learning business models, most contributors develop certain taxonomies to reflect the fundamental changes of the education market and to provide communication and moderation means for strategic development.

Seufert, Enders/Hutzschenreuther, and Hoppe/Breitner provide different taxonomies of E-Learning business models (Seufert, 2001a, 2001b; Enders & Hutzschenreuter, 2003; Hoppe & Breitner, 2004). Certain clusters are categorized, for instance, according to different groups of students (primary, academic, or on-the-job training) or according to the products and services offered (content development, teaching).

2.3 Discussion

This short and by no means compressive overview of the (E-Learning) business model literature illustrates the loosely meaning and vague character of the term. Therefore, business models have heavily been criticized for instance by Porter as unclear, superficial, not theoretically grounded and murky at best (Porter, 2001). Also Hedman/Kalling considered business models to be used relatively independently from theory (Hedman & Kalling, 2003).

On the one hand, this discussion shows that business models might be suitable to categorize different types of companies, especially needed in dynamic and innovative market segments. Despite Porter’s condemnation, business models may be used as an abstract representation of a specific firm, contributing to the entrepreneurial strategy-making process as a focusing device and eliciting important aspects when new and innovative ventures are designed in a complex economy.

On the other hand, business models are, in this sense, neither sufficiently operable to assess complex strategy-content and scenarios nor helpful when explaining divergent performances of different firms pursuing the same business model – a clone of an online auctioneer business model e.g. may not guarantee eBay’s success.

As the design of a sustainable business is a holistic, complex, dynamic and challenging task, a proper used system dynamics model provides means of understanding changes in an industry structure and allows the determination of reasonable scenarios as input to decisions and policies (Lyneis, 2000). Hence, system dynamics enables to model the behavior of a business, answers *what-if* questions and gives an analytic approach to planning – just as characterized by Magretta (Magretta, 2002). Undoubtedly, system dynamics has a long tradition with dynamic corporate growth models (Oliva *et al.*, 2003) aiding the management (Lyneis, 1999).[2] A business model may then be regarded as a tool to support the structural analysis of a business, while a simulation model provides appropriate information and analysis for the development of a strategy (c.f. Morecroft, 1984).

3 E-Learning Content Provider Simulation Model

An E-Learning content provider produces, markets and distributes E-Learning content either standardized or individualized (Hoppe & Breitner, 2004). Services such as teaching and students' mentoring are not provided. The focal company provides only individualized or customized courses and hence competes in a dynamic market formed by a group of small and homogeneous competitors (Eid, 2004). The model portrays a single company facing stochastic, potentially unlimited demand and consists of the four sectors *production, marketing & sales, HR* and *finance*. Assumptions for the *sales & market* sector rely on Forrester's market growth model as in Sterman (2000).

3.1 Production

Production of an E-Learning course involves the three steps *content authoring*, *media design* and *course packaging* (i.e. the programming of the course). Individual orders are immediately fulfilled after each process has been successfully completed by a distinct group of specialized employees.

These three processes take a certain time and create a backlog of the work in progress. Production is hence constrained by the courses backlog prior each production step, the number of employees and their experience performing the particular tasks. Since the company only develops individualized courses, each production step is further constrained to be nonnegative (c.f. Sterman, 2000).

According to learning curve effects, the employees' experience varies exponentially with the cumulative production (Lieberman, 1987). By keeping the labor force unaltered, this is equivalent to an efficiency gain in production, i.e. production time decreases with increasing output (Womer, 1984).

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[2] Olivia/Sterman/Giese also give a short overview on familiar system dynamics market and corporate growth models (Oliva *et al.*, 2003), also see e.g. Paich & Sterman, 1993; Sterman, 2000; Bianchi & Bivona, 2002.

The characteristic of E-Learning content reusability (ADL, 2004) creates another positive feedback loop in the production system. Content reusability is achieved through modularity. Modularity in this context refers to the concept that E-Learning courses are built out from small building-blocks (modules). Once produced, modules can be used in multiple different courses in the same context. Hence, reused modules only need to be integrated. Thereby, the content authoring and media design process for the reused part of an E-Learning course is unnecessary. The re-usage share of all courses rises with the number of courses produced. However, after a certain period, modules are outdated and cannot be reused anymore.

Courses transit the three production steps sequentially but due to content modularity, media design and content packaging may start when the authoring process starts. Authoring begins if and only if the order backlog is greater than zero.

3.2 Marketing & Sales

The amount of courses ordered depends on the number of sales representatives, the expected and accepted delivery delay, as well as the relative reputation of the company, the average deal size, the number of customer leads, and the closing rate.

Feedback of expected and accepted delivery delay cause asymmetrically delivery-sensitive customers to order their courses from competitors, if expected delivery delay exceeds the accepted one. However, if expected delivery delay is less than the accepted, the company will not benefit from an order-increase. Orders for new E-Learning courses arrive randomly and cannot be influenced deterministically by the behavior or the resources of the firm. Therefore, the closing rate is modeled as a random walk, similar to the concept of the geometric Brownian motion.

$$Closing\ Rate(t) = Expected\ Closing\ Rate + \sigma\,\Delta z$$
$$and \quad z = \varepsilon \cdot \sqrt{t},$$
$$\varepsilon \sim N(0,1)$$

Unit dmnl.

The random behavior is given by a truncated normal distribution to ensure positive values for the conversion rate. Also, the accepted delivery time varies according to a random walk concept given by a truncated normal distribution.

According to the market characterization, firms rather pick quantities than prices (Cournot-Model (Tirole, 2002)). Sold courses increase the production backlog. Sales representatives also deliver the courses and support their rollout which reduces the number of concurrent sales leads.

Similar to the content reusability, completed courses can be resold to new customers without any additional production efforts. The share of resold courses increases with the course inventory. Again, after a distinct period of time, courses are outdated and must be taken out of the inventory.

3.3 Human Resources

New employees will be hired if the expected delivery time exceeds the customers' accepted delivery time. The hiring and training process takes time. During their training period, employees cannot beneficially contribute to the production or sales process. The hiring and training process is modeled as a third-order delay. If the accepted delivery time is greater than the expected delivery time, hiring activities stop. Voluntary quits or retirements are not considered.

If the company's workload falls under a fixed proportion, the company will reduce the labor force within a certain period of time. This process is also modeled as a third-order delay. Hiring, training, and dismissal durations are assumed to be constant.

3.4 Finance

The finance module tracks the performance of the E-Learning content provider. Cash flow is considered to be the most suitable measure of a company's success and is directly calculated as inflow minus outflow. The inflow equals the product of the price and courses shipped. Customers pay immediately after delivery without any price reduction. Outflow covers wages and all other labor costs, rents, taxes, etc. An overview of the company is shown in Figure 1.

3.5 Model Feedback Structure

E-Learning content providers enjoy positive feedback loops in reusing and reselling their content respectively courses. Furthermore, the experience curve as a standard self-reinforcing mechanism and companies' reputation are considered. One of the key balancing loops in the model defines the relationship between delivery delays and sales. Incoming orders increase the backlog and hence the delivery delays – as a result, future customer orders drop, which in turn decreases the order backlog and improves delivery delays. In order to infer the dynamic behavior of the model, a simulation will provide further insights.

The full model consists of little less than 200 equations. For the initial simulation, parameter and initial conditions are estimated. In total, the model contains less then 30 constants and two table functions for the effects of content modularization and course reselling. Table 1 depicts the most relevant parameter.[3] The model is simulated for seven years. Each year is split in its twelve months, giving 85 values for each run. This simulation is repeated 80 times, varying according to the random walk of the conversion rate. It is assumed that initially five courses have been sold prior to the company's foundation – already generating a positive backlog for the content authors.

[3] Some parameters are straight forward to set. Since the model is initialized in a balanced equilibrium (Sterman, 2000), for instance, the eight initial levels of new and laid-off employees are set to zero (2 values for each group of *authors, designers, IT-specialists,* and *sales representatives*).

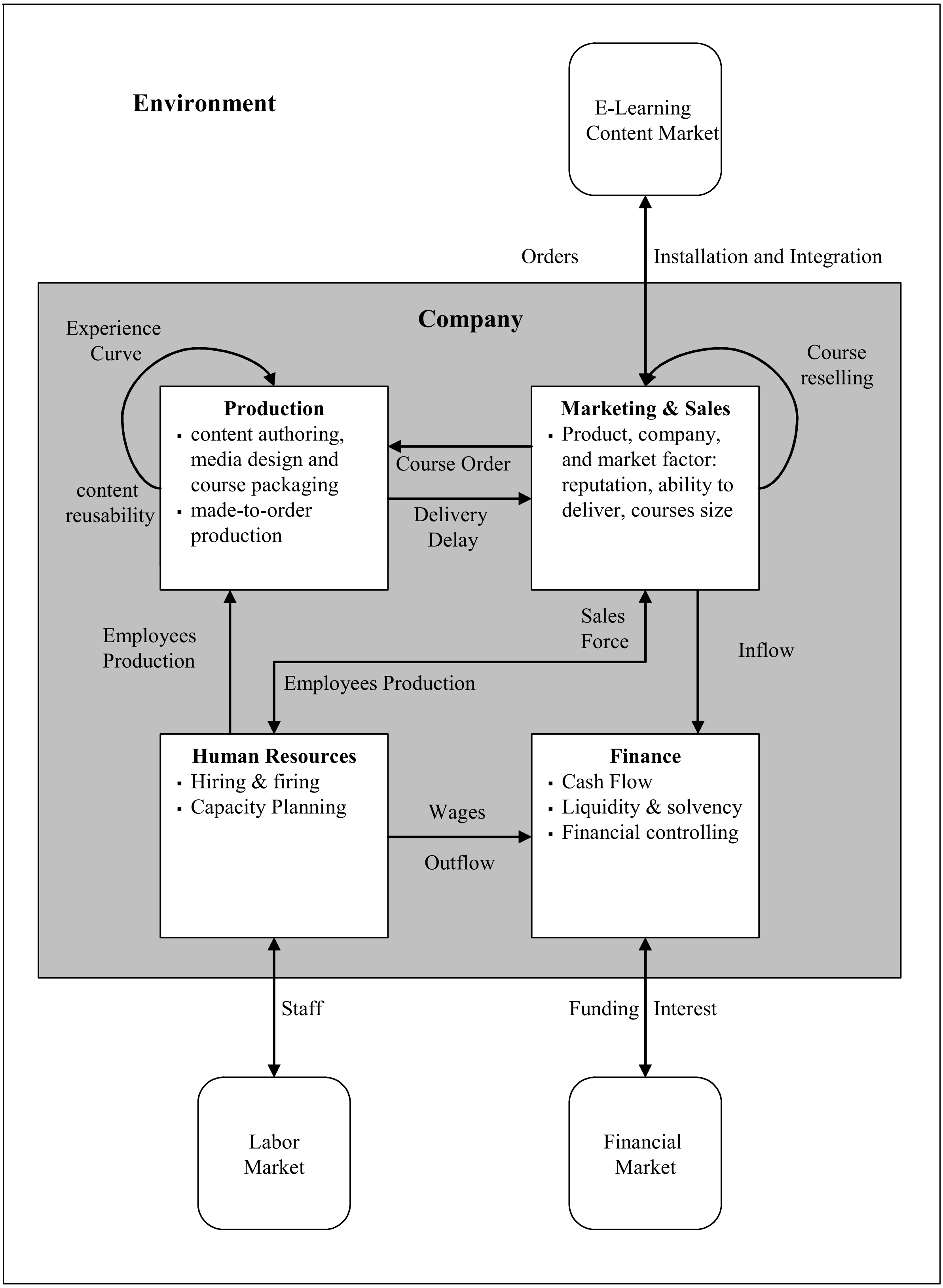

Figure 1 Company Model

Initial Parameter and Constants	Value
Price *p* for an E-Learning course	80,000 per course
Accepted delivery delay	6 months
Product life span	3 years
Annual cost per employee	70,000
Hiring (Search) time	2 months
Training time	2 months
Layoff time	6 months
Number of sales representatives	3 employees
Authoring backlog	5 courses
Number of customer contacts	10 per sales and year
Number of authors	2.5 employees
Number of designers	0.75 employees
Number of IT-specialists	0.25 employees
Authoring production capacity	6 courses per year
Media design production capacity	9 courses per year
Packaging production capacity	12 courses per year

Table 1 Initial settings of the simulation model

In the first year, the company ships only little more than two courses yielding an inflow of 175,000 on average faced by an outflow about 450,000. During the simulated period, cash flow rises up to 210,000 – mostly due to experience curve and content reusability effects. This simulation set will be used as the reference in the following assessment of different pricing policies. Figure 2 shows the simulated development of the company's cash flow. Table 2 gives an overview of other relevant values.

Prior to the policy assessment, confidence in the structure and behavior of the model must be developed (Forrester & Senge, 1980; Sterman, 2000).

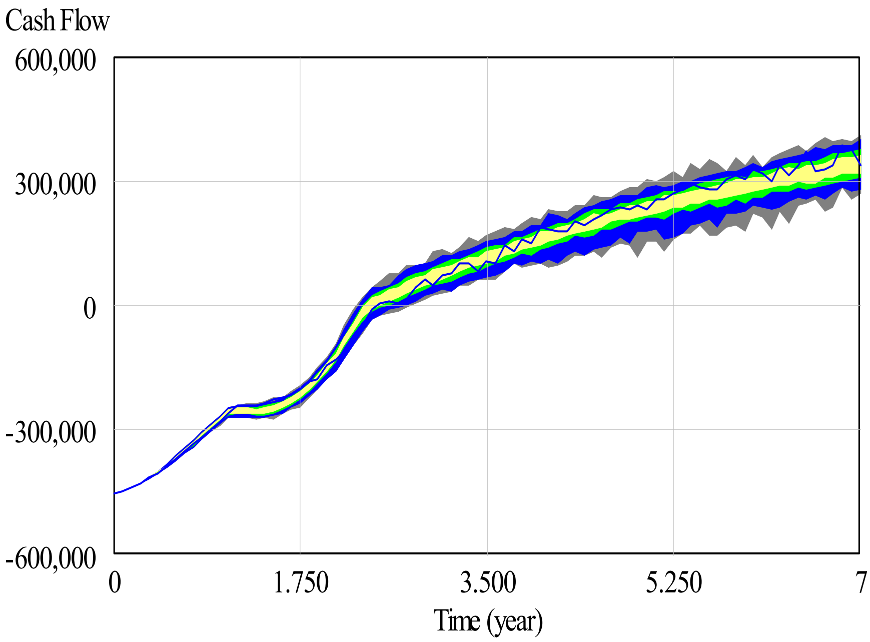

Figure 2 **Cash Flows basis scenario with *n=80* runs**
expected closing rate: $\mu^{Closing}=0.5,\ \sigma^{Closing}=0.15$
accepted delivery delay: $\mu^{Accepted\ Delivery}=0.5,\ \sigma^{Delivery\ Delay}=0.05$

Parameter	Value t=0	Means T=7	Variance
Employees	8	9,80	0,0520
Courses shipped in t	0	12,87	0,1697
Courses resold within t periods	0	2,99	0,0091
Inflow in t	0	1,029,569	1,086,116,080
Outflow in t	0	686,154	254,989,535
Cash Flow in t	0	343,415	848,891,674
Funding requirements	0	-659,318(at t=2.47y)	74,386,010
Course inventory in t	0	26.80	0.7460

Table 2 **Company development after 7 years**

4 Validation

The structure of the model is inferred from intensive literature research including the above mentioned business models, other academic approaches and available company reports. The production module for instance is built on well-documented technical specifications, guidelines, and reference processes developed for creating and deploying E-Learning content which includes the aspects of content modularization and reusability (IEEE, 2002; ADL, 2004). Furthermore, structures of familiar models or (sub-) models are considered and incorporated or modified when applicable. All parameters have real world meanings ensuring the dimensional consistency of each equation of the model.

Some parameters, such as production capacities per employee can be assessed by available empirical data (e.g. Dillon & Gabbard, 1998; Hülsmann, 2000; Rumble, 2004). Furthermore, the model structure and parameters have been validated with five interviews with four chief executives and one head of marketing of five German small and medium-sized E-Learning content providers. All companies target the German market for individualized E-Learning content – only one company has a significant share of standard products. Four of five companies are older than three years and employ between 10 and 20 regular employees and additional freelancers for peak loads. One company is younger and employs less than 10 people. However, all interview participants carry at least a 5-year experience in the E-Learning and distant education sector. The face-to-face structured interviews were taped and lasted roughly one hour each. Participants had been informed on the outset and objective of the interview and were arbitrarily chosen from the exhibitor list of a well-known industry fair that is asserted to be the leading E-learning event in Europe. Vennix's framework guided and supported the interview design and conductance (Vennix, 1996).

A preliminary model has been employed as a starting point for the interview design (Vennix, 1996). This preliminary model was built on literature research and on the model-builder's industry and academic experience only. Neither simulation runs nor parts of the model have been shown in advance to the interviewees. Interview questions were predetermined in advance; responses were either open-ended or predetermined. For instance, as an example for an open-ended question, candidates were asked to describe the production or the marketing processes of their company. Closed, fixed field questions were used for instance to rank the relevance of different marketing channels. Causal relationships were considered as verbal statements followed by an open question to elicit causal argumentation (Vennix, 1996) – causal loop diagrams have not been drawn. However, the questionnaire also included several raw drawing which had to be completed and filled out by the participants to reveal the shape of the two table functions. Furthermore, expected price elasticity and customers' delay time-sensitivity have been evaluated with these graphical means.

Results of the interview generally support the structure of the model and elicit relevant parameters. Most likely due to the homogenous company panel, the analysis of the interviews showed similar findings. Two major issues were identified. The interviewees were first concerned with a proposed feedback loop between relative workload and prices. The loop would have allowed price reduction behavior in the marketing process if the production workforce was not fully occupied over a longer period. This feedback was rejected unanimously mainly because of the fear of price eroding competition and has been removed from the model. A second concern was raised regarding the content reselling and modularity which had been numerically overstated largely in the preliminary version of the model; one company representative even stated that his firm has never reused content yet. However, most companies have established reusing and modularization processes; only two companies have experienced the effect of content reselling. Current academic literature seems to be more enthusiastic on this subject. The model has been modified appropriately.

Behavior reproduction tests or Turing tests have not been carried out – relevant empirical data for small companies is sparsely available, Turing tests might be considered in a second interview round. Extreme behavior tests (e.g. production inflow, time, delivery delay sensitivity, hiring times etc.) and intensive numerical sensitivity analysis also support the robustness of the model. Some results of the sensitivity analysis are depicted in Table 3.

	ΔParameter	**-5%**		**+5%**		**-50%**		**+50%**	
Parameter	**Initial Value**	**ΔCF**	**ΔRSD**	**ΔCF**	**ΔRSD**	**ΔCF**	**ΔRSD**	**ΔCF**	**ΔRSD**
Price per course	80000	-14,99%	11,86%	14,99%	-8,70%	-149,90%	-215,17%	149,90%	-39,19%
Annual cost per employee	70000	9,99%	-9,10%	-9,99%	11,20%	99,90%	-48,38%	-99,90%	a
Accepted delivery delay	6 m.	-11,28%	10,80%	10,73%	-8,24%	-154,04%	-270,02%	90,41%	-39,98%
Product life span	3 y.	-1,16%	1,23%	1,10%	-1,13%	-15,42%	19,80%	8,75%	-8,29%
Training time	2 m.	0,63%	-0,29%	-0,59%	0,26%	8,35%	-2,91%	-4,64%	3,96%
Authoring backlog	5 courses	-0,04%	0,43%	0,03%	-0,47%	-0,96%	3,37%	-0,09%	-5,20%
Customer contacts	10 / (sales rep. • y.)	-8,50%	5,12%	8,52%	-4,57%	-85,22%	252,89%	85,22%	-27,65%

Table 3 **Sensitivity analysis of initial parameter,** *n=80*
(CF: Cash Flow, RSD: relative standard deviation)
[a] *as CF converges in T=7 to 0, RSD becomes very large*

The analysis above exhibits the numerical sensitivity of certain initial parameters. Price, accepted delivery delay and customer contacts show a disproportionately strong effect on the cash flow. This strong price effect appears to be rather intuitive: The cash flow equals the difference of cash inflow and cash outflow. A price change for instance of +5% proportionally increases the inflow keeping the outflow constant since demand is not price sensitive in this base run. Hence, the cash flow will increase disproportionally large when prices increase. This applies vice versa to employment costs. Also a similar effect accounts for the relation between the cash flow and the customer contacts: Due to time delays in firing and because of the accepted overcapacity level, inflow drops faster than the outflow and hence stronger burdens the cash flow development.

Other parameters show a weaker effect on the cash flow development. As elicited in the interviews, the effect of delay time is asymmetrical; customer disvalue exceeded delivery time stronger than the outperforming of the accepted delay. The relative standard deviation (RSD) indicates the robustness of the sensitivity analysis' results.

5 Simulation of Pricing Policies

The developed and validated system dynamics model may be used to design and evaluate different policies. Pricing decisions and policies have direct impact on the firm's performance effecting both revenue and cost. Recent research indicates that the price-setting process may be sufficiently complex to merit attention (Dutta *et al.*, 2003) – for a literature review linking pricing decision and operational effects on a firm see e.g. (Fleischmann *et al.*, 2004).

Current practice in software pricing offers various different pricing models including usage-, user-, time- or server/CPU-based licensing; as a digital good, most of the software pricing models may be applicable to E-Learning content. The pricing of goods and services is an important element of a company's marketing strategy and associated with costs, customer behavior and competition. It may include dynamic, segmented, value-based, differential pricing schemes or versioning and bundling mechanism (Shapiro & Varian, 1998). However, for simplicity, the simulation includes two plain scenarios which should help to understand the performance effects of different pricing schemes:

- ***Scenario A:*** in the basis scenario, as described above, the company charges as a price-taker a fixed price p. Payments are due immediately at the time of delivery.
- ***Scenario B1:*** in scenario B1, the company changes payment conditions. Similar to a license model, customers pay for four years a quarter of the price ($0.25 \bullet p$) each year, starting with the first payment at the time of delivery.
- ***Scenario B2:*** since scenario B1 includes a price reduction according to net present value measure, the company faces an order increase. Price elasticity is assumed to be unity and the discount rate r set to 10%, the relative order increase equals around 14%.[4]

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[4] Let assume the following condition holds: $\sum_1^4 \frac{p}{4}(1+r)^{-t} = c \cdot p$ with the given variables. If price elasticity of demand equals unity and the demand function is linear, demand rises with c^{-1}. For the given parameters, c^{-1} *equals 1,147*. The order increase is modeled as a linear increase in the conversion rate.

Figure 3 shows the three simulation runs of the scenarios A, B1, and B2. Table 4 summarizes further results of the three different scenarios for a set of 80 simulation runs as described above.

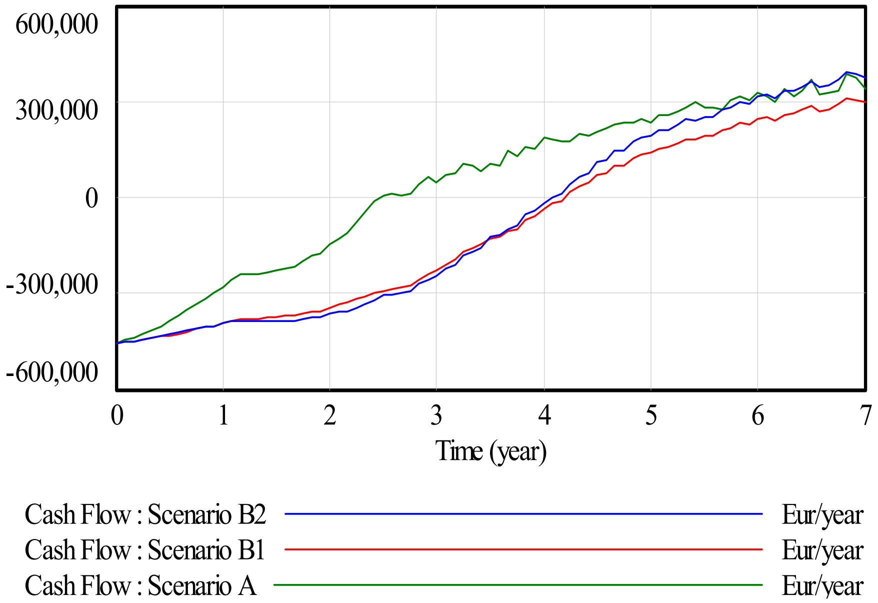

Figure 3 Pricing scenarios A, B1 and B2

	Scenario A		**Scenario B1**		**Scenario B2**	
	Means T=7	Variance	Means T=7	Variance	Means T=7	Variance
Employees in t	9.80	0.05	9.80	0.05	10.65	0.06
Courses shipped in t periods	56.77	3.59	56.77	3.59	64.33	4.73
Outflow in t	686,154	254,989,535	686,154	254,989,535	745,310	270,233,461
Inflow in t	1,029,569	1,086,116,080	978,721	870,417,758	1,118,709	1,136,716,666
Cash flow in t	343,415	848,891,674	292,567	478,453,794	373,399	610,997,623
Funding requirements	-659,318	74,386,010	1,250,619	384,772,890	1,287,055	606,616,848
Break even point	2.47	0.01	4.17	0.00	4.07	0.01

Table 4 Analysis of different pricing scenarios

The results obtained from the three simulation sets exhibit generally speaking an expected behavior of different pricing schemes. In scenario A, the company achieves profitability (defined as cash break even) roughly after 2 ½ years, almost 1 ¾ years earlier than the company following policy B1 or B2. This is obviously caused by the immediate cash inflow when an E-Learning course is shipped. Since demand is independent of changes in the payment schedule, the company ships in scenario A and B1 the same amount of courses during the first seven years and also has the same number of employees, which causes the same cash outflow. However, inflow patterns change significantly. Although after seven years the cash inflows are basically in the same range for both scenarios A and B1 (difference of 50,000), the required funding in scenario B1 exceeds the cash demand of scenario A for more than 590,000 or 90%.

In scenario B2, demand for E-Learning courses depends on the price, leading to an increase in both cash inflow and outflow. This is reflected in a 9% increase of the labor force and in a 13% increase of the total amount of courses shipped. The net cash flow in scenario B2 exceeds both scenario A and B1 while the maximum amount of cash needed for financing the company almost doubled compared to scenario A. In scenario B2, the company gains more experience with the course production and enjoys a larger course inventory. Furthermore, this supports content reusability and course reselling.

The results obtained throughout the modeling process and the simulation runs show the typical complex feedback structure of pricing policies: The first pricing model may be characterized as a conservative growth strategy with a modest financing demand and a moderate resource building process. Correspondingly, scenario B2 marks a rather aggressive and more challenging growth strategy. The customer base increases and the accelerations in the experience curve as well as the higher inventory in this scenario can fuel rapid growth but must be compared with the higher demand for capital.

6 Conclusion and further research

The search for the *right* E-Learning Business model is a strategic issue for E-Learning-companies' management. But like any new concept, it is not short of confusion and ambiguity. This article gave a short review of the controversial discussion of the value of E-Learning business models. System dynamics concepts were used to build, to validate and to evaluate a formalized simulation model. Such business models are valuable in the policy design and analysis process of the E-Learning start-up companies. The presented model has been initialized and validated by empirical data gathered from literature research and five structured expert interviews.

The simulation for different pricing and licensing scenarios reveal the complex feedback structures in the price setting process and its impacts on the performance of the company. Further research efforts should be made towards expanding the model – enhancement may be the incorporations of recurring customers or marketing-alliances with learning management software or service providers. Also, the dynamics of the E-Learning industry should be explored and effects of content intermediation be integrated. Behavior reproduction tests may develop the confidence in the model.

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