# E-Business: Basics and Challenges

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**ABSTRACT**

The paper first gives an overview of the foundations of e-business. This is accomplished by specifying and differentiating e-business. In addition to this, the spectrum of e-business is outlined. Some reasoning is dedicated to the relevance of e-business in terms of performance potential, range of applications, innovation and implementation. The second part of the paper deals with the critical determinants of successful e-business. Challenges to e-business are related to strengthening success factors, establishing barriers to failure, diminishing barriers to success and fighting failure factors. The paper concludes with an outlook on challenges in the implementation process.

## 1. BASICS OF E-BUSINESS

### 1.1 Specification of e-business

E-business represents a major trend in management, comparable to important business trends like supply chain management, leasing, non-cash payment, mail order commerce or the rise of the service economy. In IT-management e-business can be compared to trends like Enterprise Resource Planning or client-server architecture.

E-business primarily stands for internet enabled business. The enabling process is based upon application of internet technologies (Intranets, Extranets) and related standards (HTTP, HTML, XML, CORBA, etc.). It covers several levels (see figure 1). The non-interactive information level serves as a platform for three levels of web-enabled interactions.

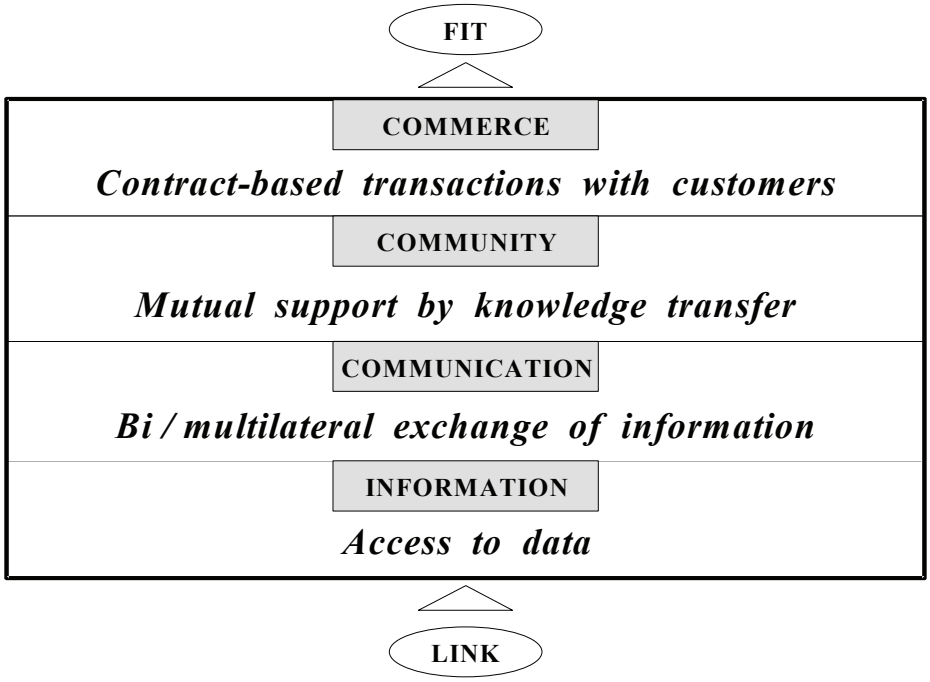


Figure 1: Levels of internet enabled business

*Information*: On a first level, the Internet can be utilized as a powerful source of information for business purposes. Uncomplicated, "democratic", low-cost access to a plethora of data is provided to a huge number of users worldwide, beyond the restrictions caused by proprietary networks. For vendors, business on the Internet requires (at least) a web-site and a listing in some electronic yellow pages enabling traditional one-way-advertising. To find relevant information customers have to do some surfing, which is supported by numerous services (portals, search engines, etc.) that help to improve transparency of the market.

*Communication*: A simple level of interaction is provided by using the internet as a device for communication. This may be accomplished by e-mail based services (e.g. electronic customer interaction centers for customer questions and complaints) and can attain the more sophisticated level of business portals. Communication is facilitated by the linking of internet users which allows to get in touch with potential business partners worldwide.

*Community*: Furthermore the Internet can be applied for knowledge interchange in specific processes like research, design of systems and solutions and development of software. Among “registered” community members - like participants in open-source projects (e.g. Linux) - the multilateral exchange of complex information is time- and cost-efficiently accomplished by an Internet platform meeting the security demands of the community members. The community platform hence fosters groupware support for collaboration on the Web.

*Commerce*: The core business functionality of the Internet is the enabling of transactions, i.e. contracting, sometimes also fulfillment and billing via Internet. To support these business processes, i.e. to coordinate in order to obtain a fit of supply and customer demand, market places, electronic signature or internet-specific payment systems (micropayment, cyber money, etc.) and other infrastructure components have been conceived and implemented.

The range of enabling - in terms of number of activities - diminishes from the information to the transaction level: not all surfers on the internet are customers that buy via clicking order forms. Many buyers switch to the familiar realworld channel for the final transaction from informing and communicating on the web.

All interaction levels in e-business cover both loose and tight forms of interaction. With respect to closer forms of interaction the label "web-based cooperation" is normally applied. From the viewpoint of a company, e-business supports both extra-company interaction with customers (e-commerce) and suppliers (e-procurement) and intra-company interactions, within intra-corporate project teams or transactions on internal markets. In other words, e-commerce as opposed to e-business covers just one facet of electronic business, i.e. selling products via Internet.

The e-business trend is connected to several other current internet-triggered trends. In general, e-business is broader than any of these approaches:

*Multimedia*: Information and communication utilizing the richness of digitized and integrated text, sound tracks and graphics (multimedia) is an indispensable device for any e-business as well as a specific business for quite a number of specialized IT-suppliers, designers and content providers, that produce these multimedia products (web-sites, portals, CDs, e-learning courseware, etc.).

*New Economy*: A label used for high-tech products provided by start-up companies and e-lancers (micro-companies). These dotcoms use the internet extensively as an infrastructure for their

business activities (selling, procuring, designing, ...). In some cases they deliver products to enhance this infrastructure for supporting e-business. E-business is broader, since it is not restricted to the New Economy, but also contains various business activities in the Old Economy (like selling cars via Internet).

*Virtuality*: Normally used to describe the absence of conventional and physical features of products (e.g. digital products as opposed to print products) and companies (electronic companies without local branches or geographically concentrated headquarters) while functionality is sustained (see figure 2). The efficiency of e-business heavily relies upon and profits from virtualization.

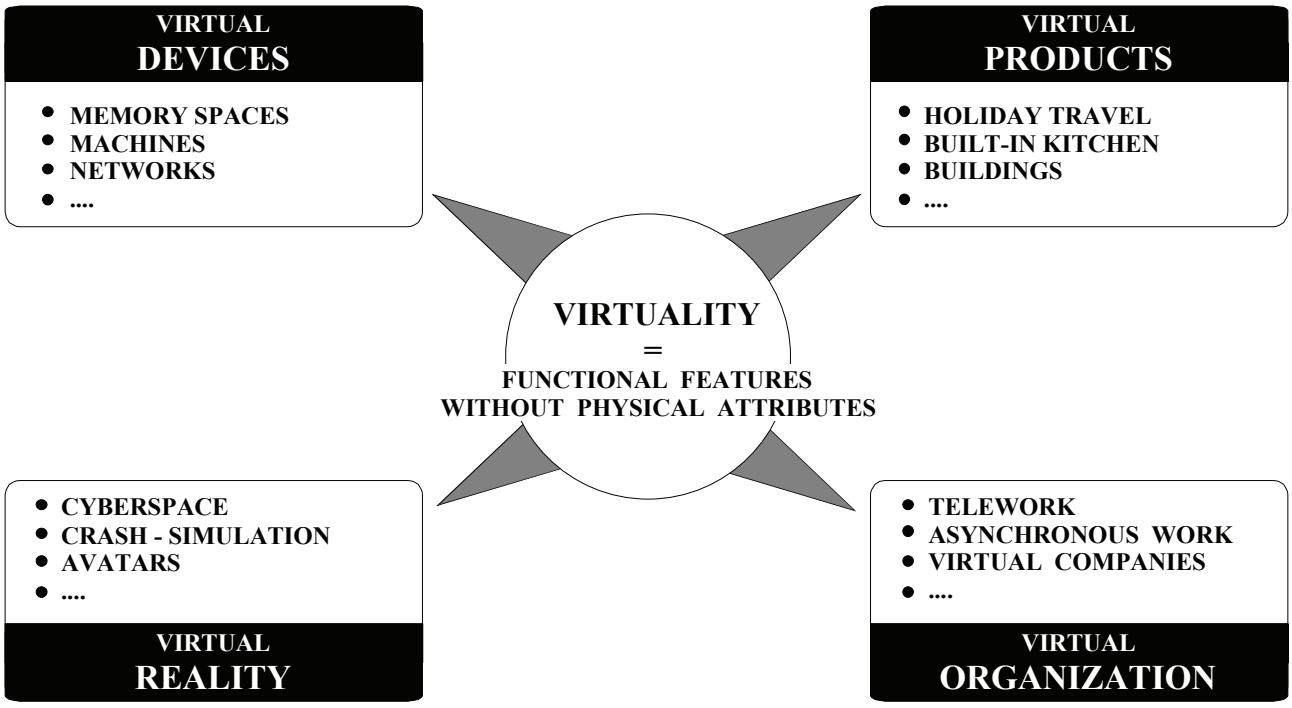


Figure 2: Facets of virtualization

For a detailed clarification of questions like "What is specific about e-business?" and "In which respects is e-business different from traditional business?" the modules of e-business as a management system must be outlined (see figure 3).

*E-strategy* is concerned with specific business models like distributing digital products on the Internet channel. Additionally, e-business affects almost all business processes. This holds for customer integration via community models, customer-to-customer-processes (e.g. on demand-triggering of production processes) and changes in the sequence of activities, like the switch from the print-distribute-paradigm to the distribute-print-paradigm. Very often e-business reinforces complex forms of competitive strategies, especially hybrid strategies like mass customization.

*E-resources* cover IT-Infrastructure as well as HR-infrastructure. Appropriate human resources for e-business is not merely a question of e-competencies, i.e. handling the Internet, new media and the complexity of e-business (volatility, hyper-competition, etc.). In addition it requires people acting as entrepreneurs (some of them as netpreneurs) rather than as traditional employees or managers.

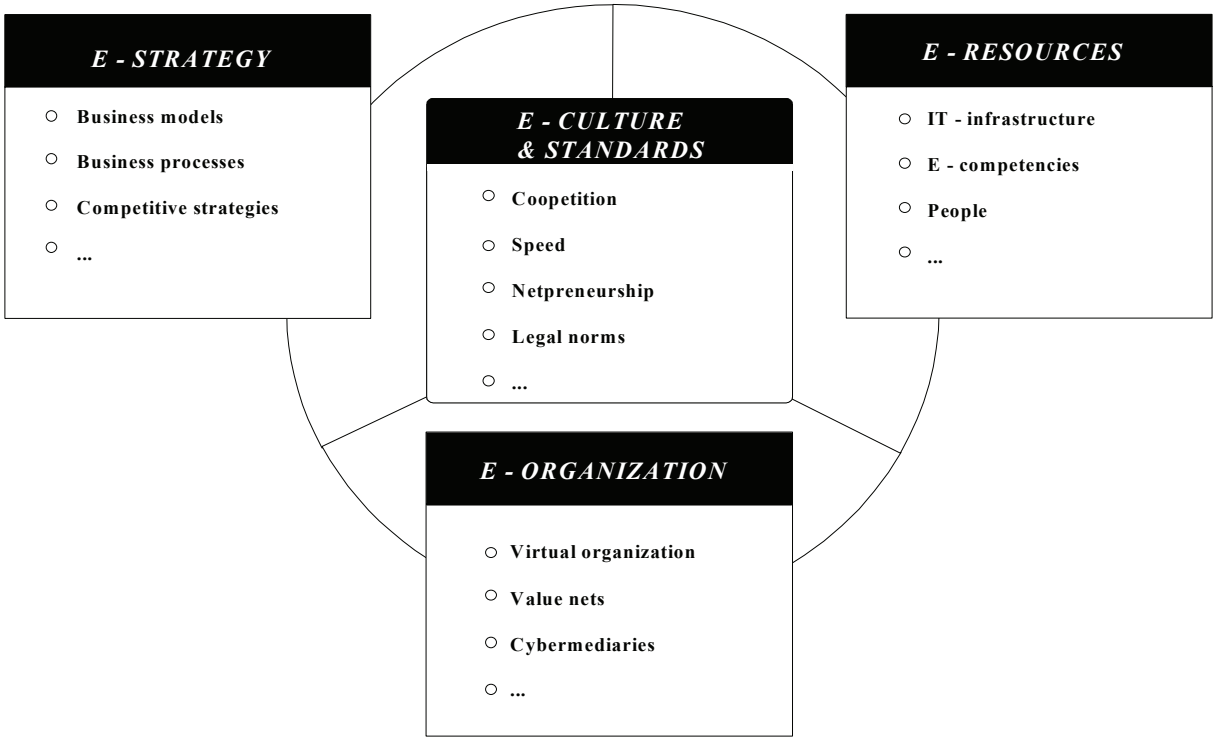


Figure 3: Modules of e-business

*E-organization* is closely connected to virtual organization and virtual companies. E-business relies on all three dimensions of virtuality, i.e. the temporal, spatial and institutional dimension (see figure 4). The way these three dimensions are mixed differentiates two (not mutually exclusive) "archetypes" of virtual organization, i.e. virtual companies as electronic companies versus virtual companies as network organizations.

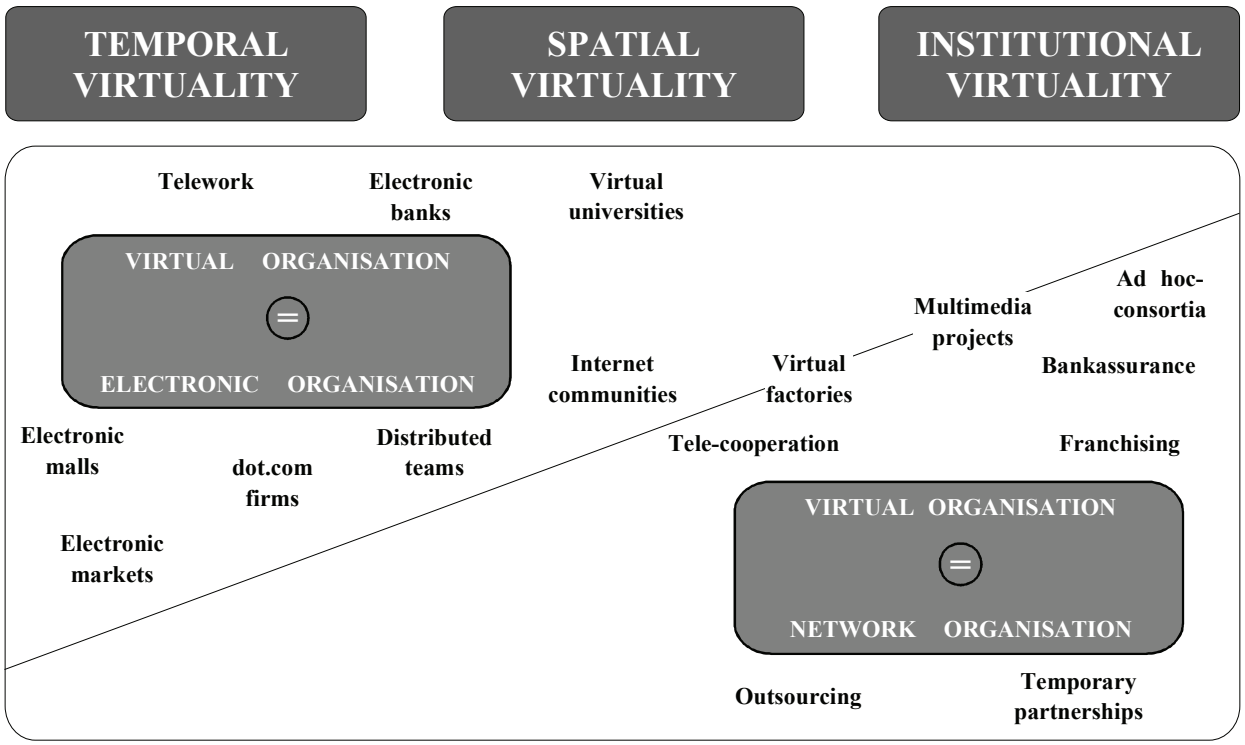


Figure 4: Scope of virtual companies

E-business is often performed by asynchronous work of experts (companies, departments, e-lancers) distributed all over the globe and coordinated by loose contracts for specific projects. The framework for these value creating e-processes is the value net. It contains the involvement not only of suppliers and customers, but also of competitors and complementors (like consulting, billing and logistics companies). The network relations within the value net cover cooperation and competition, like e.g. alliances, digital markets, and new contracts (new labor relations to freelancers and subcontractors that bypass labor unions, etc.). For coordination purposes special kinds of intermediaries are involved on all levels of web-enabled business (see figure 1). These so called cybermediaries (search engines, portals, infomediaries, value added resellers (VAR), trusted third parties, etc.) replace and/or complement traditional intermediaries, like distributors, wholesalers or retailers.

*E-culture and standards* represent both soft and hard standards as a mandatory infrastructure for cost- and time-efficient e-business. The philosophy of the Internet economy relies on a spirit of entrepreneurship with a dominance of self actualization (in relation to security), on ubiquitous forms of fuzzy relationships (called "coopetition") beyond the traditional cooperation or competition-paradigm as well as on the acceptance of e-business complexity (speed of innovation, short product life cycles, etc. and the underlying paradigm of emergence instead of control). Probably the most controversial item of e-business culture is trust, both among partners and in the technological infrastructure. Last but not least, "hard" standards, i.e. legal norms for Internet-security (digital signature, laws concerning hackers and cyberterrorism, etc.) represent an important part of the infrastructure.

### 1.2 Scope of e-business

There is no standard, let alone a best way of doing e-business. Instead the entire world of e-business consists of a variety of rather different types of doing internet-based business. A morphology of e-business differentiates between the following variants of e-business:

*Business models*: Internet-enabled business covers 1: n-mass commerce (like procuring high volume commodities or selling standard services like car rental or airplane tickets) and 1:1-class marketing (like tailored services, customized equipment or telematics solutions). Using the advantages of bundling is typical of e-business, especially with respect to free & fee-bundles as well as offering the benefits of communities along with products. Furthermore, models of mutual exchange between supplier and customer are quite common, with customers contributing feedback or intermediary services or participating in solutions development processes. Additionally, e-business enables high and sophisticated levels of familiar business models, like Application Service Providing or Just in Time-delivery . The scope of revenue models is enlarged by the fact that several options of different performance units are offered, like pay per use or pay by time.

*Digitization of products*: The core of e-business is digital products. With digital products almost all business processes can be run via Internet: In other words, communicating, fulfillment, contracting, billing, and joint development is simply done by clicking. All other variants of e-business are characterized by a lower degree of digitization. A middle degree of digitization is typical of physical products (like vehicles or appliances) that exist only as digital (virtual) products until fulfillment. This degree of digitization is based on the principle of postponement: Manufacturing is triggered as late as possible, i.e. when the customer transmits his ultimate ("frozen") requirements. Intelligent products (like facilities or vehicles with a considerable value content of electronics)

allow up-dating or up-grading of software components via Internet. The lowest degree of digitization relates to goods and services that cannot be electronically handled to enable contracting. This may be due to modeling problems ("no appropriate description of an adventure trip to the north pole") or to the specifity of the goods and services in question (tailored construction, consulting, solutions, etc.).

*Arenas*: With respect to interacting business partners involved, e-business contains several arenas. The basic distinction is between the business-to-consumer arena (B2C, the core of e-commerce) and the business-to-business arena (B2B). B2B contains both e-procurement (doing e-business with suppliers) and e-commerce (doing business with customers that are not consumers). These variants differ with respect to business processes (like turnover per transaction), objectives of participants (cost efficiency being the dominant objective in B2B) and level of software- and hardware equipment of partners (higher level with B2B, like speed of data transmission or ERP-integration).

In addition, a variety of other arenas exists. This holds for consumer-to-consumer-interactions enabled by intermediaries, like Napster, affiliate programs or auction sale companies (e.g. ebay). Sometimes internet based interaction between public administration and citizens ("A2C") or between intra-company service centers (like HRM) and employees in the company or on labor markets ("B2E", e-recruiting) are also considered arenas of e-business. In these cases e-business does not reach the commercial level though, i.e. only communication and coordination is accomplished via Internet but there are no "money in exchange for goods or services"-transactions taking place.

*Context*: E-business can be either embedded in a New Economy context, an Old-Economy context or a hybrid context. This distinction (also) refers to business partners: When New Economy-dotcoms do transactions, both hard and soft infrastructure factors warrant a transaction with rather low transaction costs (for identifying partners and contracting). When Old Economy-partners are involved into e-business, the efficieny of transactions is comparatively low since normally some infrastructure modules are missing or not professionally implemented. In the Old Economy, hybrid contexts may be established by increasing the flexibility of big corporations via transforming them into federations (networks) of entrepreneurial business units.

### 1.3 Relevance of e-business

Although e-business can be categorized as a major trend in terms of awareness and investment, it does not in general stand for a mega- or giga-trend. For some (few) business areas for instance, e-business is nothing more than a "peanut". The overall evaluation of relevance depends on various relevance indicators:

*Performance potential*: Quite naturally, relevance is determined by the benefits of e-business. Efficiency ("Doing things right") on the one hand, is primarily reflected in the percentage of existing business relocated from traditional channels to the Internet. This substitution is caused by shorter process cycle times or lower costs. The assumed figures are quite impressive: for example overall delivery time of a passenger car can be reduced from 40 to less than 10 days (up to a reduction to one third of former cycle time) or a reduction of inventory costs up to 90 % or 4-5% cost savings per vehicle by e-procurement. Efficiency models sometimes erroneously neglect some costs of e-business, like cost of equipment, training, Enterprise Application Integration, web-site

maintenance, internet access, as well as costs of security to prevent and/ or repair hostile attacks (viruses, e-mail-bombing, etc.).

*Effectiveness* ("Doing the right things") on the other hand is primarily measured by additional business generated by the internet. This potential may derive from higher quality (e.g. of multimedially enriched information), more reliability (e.g. telesupport), more customizing (e.g. recipient location-based delivery of information) and shorter response times (i.e. better up-to-date-content of information and software).

In general, efficiency benefits exceed effectiveness benefits. Likewise, B2B-performance is considered to be significantly higher than B2C-performance. The maximum efficiency in B2B is accomplished with mass business, i.e. with low value commodities.

*Range of concerned industries*: For the information industries (news, media, software, ...) e-business is extremely relevant because almost all business processes are "clickable". Order fulfillment e.g. can rely on the Internet, since no physical products causing logistics problems are involved. For some physical products from the manufacturing industries only some processes (communication, contracting, ...) may be directly supported by Internet. Since production and logistics are not integrated into the web, relevance is significantly smaller for these industries. The outputs of many manufacturing industries are so specific (like solutions, systems or simply innovative products) that they are not clickable. The same applies to many services. For these industries web-based business is restricted to the communication and community level (see figure 1).

*Innovativeness*: Many practitioners and researchers refer to e-business as a business-revolution implying that e-business stands for a genuine innovation. But is e-business really relevant because the e-business-era is completely different from the way business was done in the pre-Internet-era? As a matter of fact, only very few features of e-business mark a significant and therefore innovative change with respect to current practices of doing business. Customer focus, speed management, virtualization, empowerment of customers and suppliers by high performance management information systems, supply chain management, outsourcing and value nets are no USPs of e-business, but trends that already existed prior to the internet era. They are merely enhanced by the Internet, like with auction sales and so called "powerbuying". Some of the few, really innovative aspects of e-business relate to transparency of global markets, the implementation of a new channel for distribution and procurement and some new business models.

*Congruence of facts and visions*: When dealing with the benefits of e-business it is fairly difficult to find some sound evidence. The objective assessment of relevance is impeded because of a widespread confusion of actual performance (state of the art), perceived performance (biased personal opinions), predicted performance, possible scenarios and fuzzy visions of future performance. Like with many other trends, the "hype" in e-business is created by

- treating expectations as facts (e.g. percentage of new cars sold via Internet 10% - by 2005!, in 2000 just 1%)
- claiming wishful thinking as unbiased predictions

- using indicators of generic Internet-acceptance (number of users or web-sites of companies, traffic on homepages, stickiness, etc.) as indicators of commercial transactions on the Internet (and not just of communication via web).

Only if the discrepancy between science and science fiction in e-business can be reduced, relevance of e-business, especially for down-to-earth managers, is granted.

## 2. CHALLENGES AROUND E-BUSINESS

### 2.1 Modeling e-business performance

Challenges related to e-business have very different connotations:

- High-speed skyrocketing boom.
- Slow and retarded diffusion.
- Roller coaster-ups and downs
- Dramatic recession and decline.

Apparently, the life cycle of e-business is not shaped according to a pure and sustaining expansion-pattern, but more likely according to a rise and fall-pattern. Consequently, performance in e-business ranges from hits (MP3, Linux, DivX;), ...) to flops (Music on Demand, CyberCash, WAP, ...) with many question marks in between, like the business of selling books via Internet (amazon, bol, etc.) or e-banking, which have not reached their break even point yet. In e-business performance ranges from *excellence* (bonanza profitability) to *existence* (just reaching break even point) to *exit* (having to leave the market): the predicted survival rate of only 10% of internet start-ups is reflected in virtual graveyards of many deceased dotcoms.

Lessons from the New and the Old Economies make clear that performance management cannot be restricted to "fair weather"-opportunity management (impressive success stories from best practices). Performance management must also include "bad weather"-risk management, i.e. learning from failure stories by proactive and reactive handling of various risks.

To identify the critical determinants of success and failure, a sophisticated performance model of e-business is needed (see figure 5).

### 2.2 Strengthen success factors

A first challenge around e-business is to strengthen success factors in order to exploit the potential of e-business. Here a distinction between *efficiency* potential and *effectiveness* potential is helpful. For sustainable competitive performance both potentials must be exploited. If e-business is run as a discounting business (lower cost than traditional business), a major part of the entire potential remains idle. Additionally, only hybrid competitive strategies (cost leadership = efficiency and differentiation = effectiveness) can establish a competitive position to be successfully defended. Players in e-business that focus only on selected efficiency factors or on effectiveness-factors will

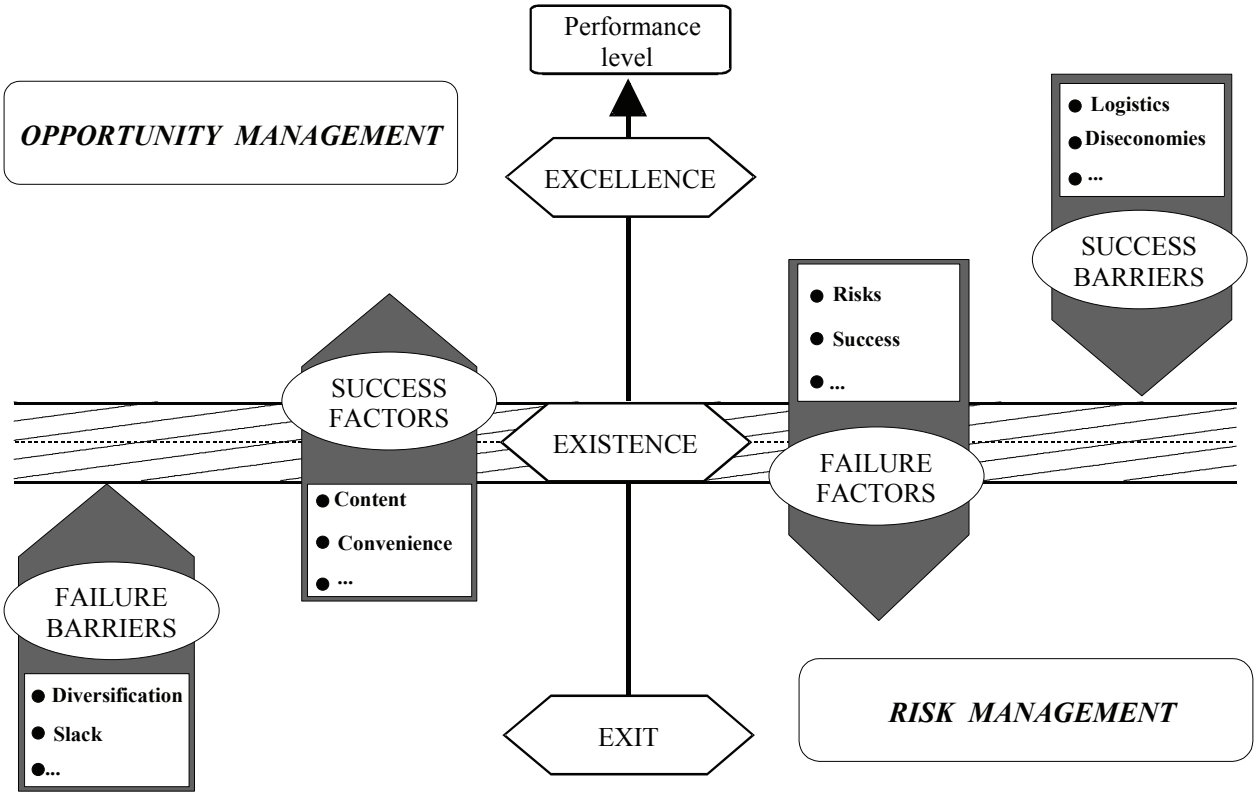


Figure 5: Model of e-business performance

be confronted with barriers to success since just one factor will not be sufficient as a sustainable differentiator in the long run. All missing success factors must be established or imported via complementary partners.

A first step is *identifying* critical success factors. Very often a list of several "co..."-success-factors is used., comprising cost, commerce, content, community, convenience, connectivity and some others.

*Cost* stands for cost-efficiency by low transaction costs, experience effects by high volume as well as time efficiency by reducing logistical processes (inventory, transport) to a minimum. *Commerce* stresses profitability of the business, as opposed to mere enhancement of customer satisfaction by a number of free services or open-source cooperation without revenue. Profitability requires a reengineering of all - and not just some - business processes (including internet payment systems).

*Content* and *community* are primarily related to effectiveness in terms of high quality products and services (like up to date, personalized newspapers, tracking services, mobile services, etc.) and knowledge exchange (advice, tips, background information, mutual support, etc.).

*Convenience* (like "just 5 clicks to buy a new car") and *connectivity* deliver both efficiency (speed) and effectiveness (access to many partners). Moreover, some "co"-success factors support both efficiency and effectiveness: communities as parts of e-Customer Relationship Management programs improve customer retention, thus avoiding high costs of acquiring new customers (rule of thumb: acquisition causes five to six times as much transaction costs as retention).

The "co"-success-factors are specific intervening variables that transmit the potential of the e-business modules (see figure 3) into performance (see figure 5): the virtues of virtual organization for example, i.e. low transaction costs plus best-of-configuration, serve as levers for efficiency and effectiveness.

### 2.3 Establish barriers to failure

Telling from experience, the likelihood that an e-business fails to reach the break even point is rather high. To avoid market exit, some more or less traditional generic risk management activities must warrant robustness and survival, even when markets are adverse. A short list of important failure barriers comprises:

*Competency based diversification*: A strategy focused on one product or service (e.g. designing web-sites for one specific customer) is not robust as for changing demands, competitor behaviors and customer choice with regard to preferred channels. Contrary to this, a generic competency (like employing Virtual Reality technology, customer-centric consulting, "understanding customers' business", etc.) serves as a base for diversification, allowing access to new customers and/ or new products, in other words a broad range of applications.

*Slack resources*: Financial slack for hard times can be generated by not entirely reinvesting IPO-revenues into growth activities. Another source of slack are venture capitalists that provide money for an e-business with a long break even time. Old Economy corporations create slack via cross subsidizing from existing cash cow businesses (e.g. traditional channels).

*Risk sharing*: Appropriate contracting provides an entrepreneurial involvement of partners, i.e. to handle risks by putting them on several shoulders. This is accomplished by risk sharing pricing or "pay on output"-contracts among partners in value nets.

### 2.4 Diminish barriers to success

What keeps e-business from becoming an excellently profitable business and keeps the performance on the mere existence-level? The major cause are deficits in infrastructure that have a restricting and retarding impact, in other words act as barriers to success:

Gaps in *technological infrastructure* are typical examples of barriers to success: Take missing voice detection-software which could contribute significantly to convenience of e-business or lacking UMTS-transmission-nets that restrict instantaneous utilization of already available cell phones, M-commerce standards and software. *Logistics*, i.e. physical processes are the bottlenecks of a high-speed e-business. They prevent a significant competitive advantage of e-business compared to traditional business. Lacking widely accepted *standards*, problems caused by *culture clashes* in brick and click-alliances as well as non-existing complementary *organizational structures* (decentralized network structures, new intermediaries, etc.) also have a negative impact. *Diseconomies* of the Internet (like information overflow causing reluctance towards Internet use) have a restricting effect as well.

Progress in surmounting barriers to success has been made in the field of Enterprise Application Integration (EAI), i.e. integrating ERP and Internet. This is a prerequisite for an overall

optimization of business processes as opposed to optimizing the internal process and the markets interfaces separately.

### 2.5 Fight failure factors

What can endanger the existence of e-business in general or of specific businesses in particular? First, e-business faces generic existential risks like any business does. This holds for the *underestimation of powerful enemies* - like (sleeping) giants in the Old Economy that are just about to strike back -, leading to neglect of competitive advantages as well as behavioral risks, generated by a lack of interpersonal trust among partners who only met on the Internet, but never face-to-face.

In addition to these generic risks e-business has to deal with at least two specific failure factors:

- Legal factors, like unsolved property right problems ("killing" for example the Napster business model).
- Security factors, primarily the dangers from cyber-fraud, cyber-terrorism and warfare on the Internet.

Some specific failure factors originate in the (short) history of e-business, especially lessons to be learned from failed dotcoms:

- The "curse" of early success which may have a dangerous effect on entrepreneurial motivation.
- A fatal flaw in the navigation system for e-businesse: Unfortunately, the notion of "performance" in e-business (see figure 5) is ambiguous: Performance can either be measured on customer markets (by profitability) or on capital markets (by shareholder value). This ambiguous multi rating situation leads to a dangerous lack of orientation, a potential failure factor for both the New Economy in general and specific companies in particular.

## 3. OUTLOOK: IMPLEMENTATION OF E-BUSINESS

Any state of the art-report can merely explain present or future states. This kind of inquiry does not explain why changes and transitions occur and how changes can be managed. Likewise, performance models (see figure 5) explain specific levels of performance, but not why performance is gradually or discontinuously improving or declining over time. To foster these explanations, a dynamic performance model is needed. It is a performance-focused process model of implementing e-business. The process of implementation of e-business follows a life cycle-pattern (see figure 6). A major challenge to the dynamic modeling of e-business relevance is the fact that in the community of e-business practitioners and academics rather different mental paradigms of such life cycle patterns exist.

The performance of e-business is not only a matter of technical feasibility, but also a matter of behavior. Most important is acceptance by customers, employees, legal authorities, third parties, etc. Quite a number of members of the e-business community assume an idealistic pattern in terms of an undisturbed and accelerated diffusion based on an enthusiastic acceptance of this business innovation (hype pattern, pull mechanism). This optimism can be explained by tactics of self-fulfilling prophecies, wishful thinking, and fallacies, e.g. applying the formula "internet user = internet customer", neglecting drop out-rates by users of the internet reluctant to do business on the Internet.

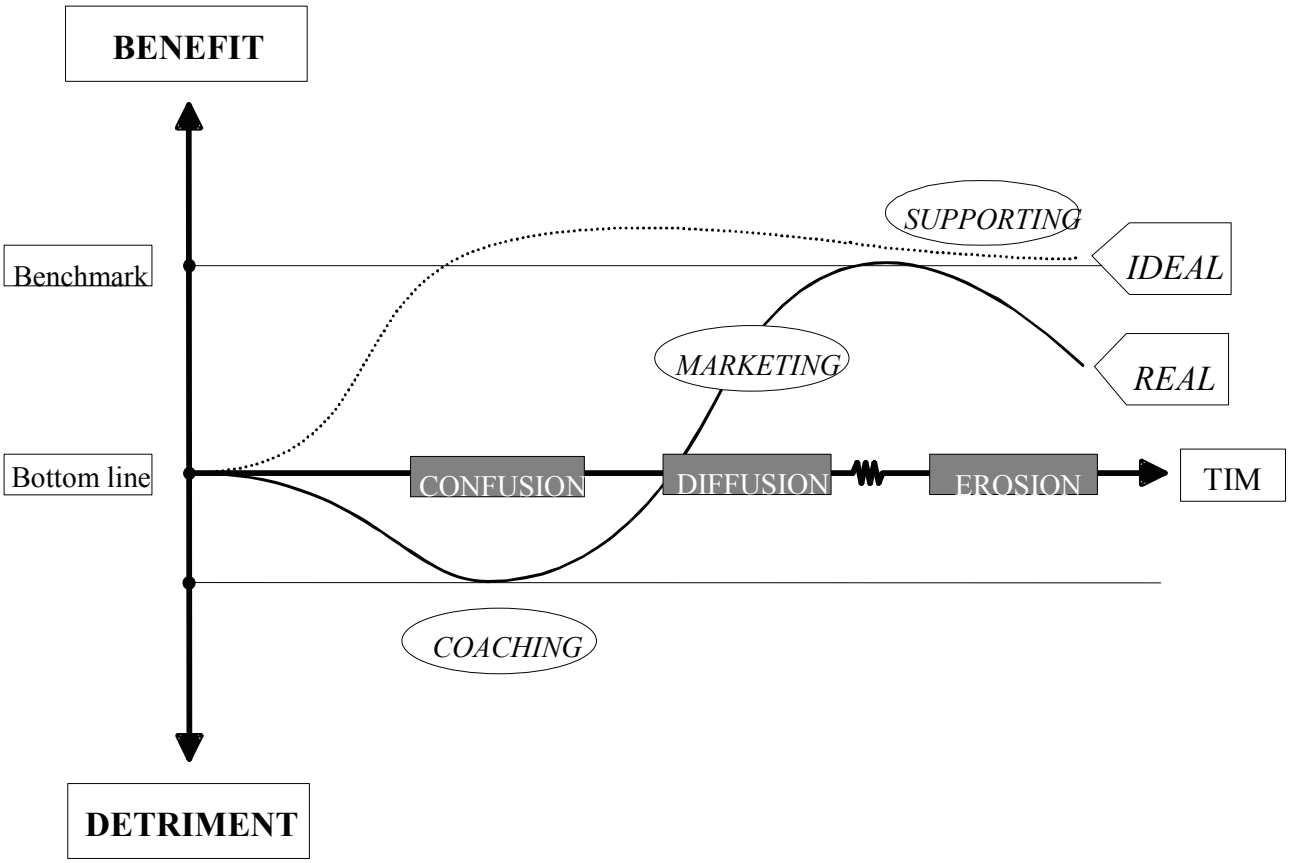


Figure 6: Performance patterns of e-business implementation

A more realistic view differentiates between *diffusion* on the one hand and two challenging stages of implementation, i.e. confusion and erosion, on the other hand. *Confusion* is due to technical problems, rivalry of several standards, need to unlearn habits, doubts, perceived security problems, lack of pioneer spirit, missing standards, just to mention a few. *Erosion* occurs, whenever old habits prevail (like using not the Internet, but the phone as a familiar communication device) or more efficient technologies emerge (like M-Commerce).

In dynamic performance analysis there is a major demand for *step-by-step-models* of e-business implementation. They inform about typical sequences in successful implementation, i.e. what should come first and what is less urgent. This category of models helps to clarify questions concerning the sequences of participating in open, proprietary or cooperative market places in B2B or the best sequence of reengineering business processes, like communication, contracting, logistics and billing.

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