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Jonas Hedman

Lund University, jonas.hedman@ics.lu.se

Thomas Kalling

Lund University, thomas.kalling@ics.lu.se

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THE BUSINESS MODEL: A MEANS TO COMPREHEND THE MANAGEMENT AND BUSINESS CONTEXT OF INFORMATION AND COMMUNICATION TECHNOLOGY

Jonas Hedman

Department of Informatics
School of Economics and Management, Lund University
Ole Römers väg 6, SE-223 63 LUND
Phone: +46 46 222 46 03
Email: jonas.hedman@ics.lu.se

Thomas Kalling

Institute of Economic Research
School of Economics and Management, Lund University
P.O. Box 7080, SE-220 07 LUND
Phone: +46 46 222 46 38
Email: thomas.kalling@ics.lu.se

ABSTRACT

This paper presents a conceptual business model, which aims to improve the understanding of the business context of Information and Communication Technologies (ICT). We argue that research into how ICT generates economic value is limitedly valid due to lacking comprehensive knowledge of strategy theory and lacking abilities to integrate strategy perspectives, and the fragmentation of strategy theory. We discuss the main strategy perspectives as well as ICT research within each of these perspectives and conclude that in order to improve the understanding of the ways in which ICT generates value, research must integrate different perspectives. We also review some of the new e-business texts that addresses business models. The business model is broader than any individual strategy perspective (such as Industrial Organisation, the Resource-Based View or the Strategy Process Perspective) and includes market factors, offering, activities, organisation and resource bases as well as longitudinal management processes. In addition, we illustrate how the management and business context of ICT (such as ERP and CRM systems) can be viewed through the business model.

1. INTRODUCTION

In order to understand how Information and Communication Technologies (ICT) create or erode economic value of business and strategy, we argue that it is important to understand the logic and structure of the *business context* of ICT. Within information systems research, there is a range of different approaches and frameworks to explain ICT and business strategy, we assume, because, 1) the field of business strategy as a theoretic field is relatively fragmented and has not been particularly interested in ICT, 2) there is a lack of knowledge about strategy theories (Sambamurthy, 2000), and 3) because of lacking abilities to integrate disparate strategy models and theories within information systems research (cf. Flatten et al., 1992; Applegate et al., 1999). Existing information systems research tends not to be able to measure the bottom-line contribution of ICT investments – the so-called IT Productivity Paradox (e.g. Strassman, 1985; Brynjolfsson, 1993; Barua & Mukhopadhyay, 2000; Sambamurthy, 2000).

We believe this may be due to a shortage of models that explain the impact of ICT on other resources (e.g. knowledge, people, and structure), on different activities and functions, and subsequently on product offerings, and the longitudinal management process. Within the field of strategy there are few holistic models which incorporate the finer aspects of strategy, e.g. resource-bases, competences, activities, organisational structure, culture and politics, products, markets, competitors, environmental factors etc. In fact, strategists still tend to argue about what it is that make companies successful, e.g. whether it is firm-internal resources (Barney, 1991), whether it is successful reconfiguration of the value chain (Porter, 1985) or generic strategy (Porter, 1980). This problem is extended into ICT research.

For the purpose of understanding better the economic context of ICT, it would be valuable to integrate the different theories and frameworks into one model, i.e. a *business model*. It would probably be good for other types of resources as well, e.g. knowledge, brand names, machinery etc, but we believe it is particularly important for ICT resources. They are complex in nature, they are supposedly creating value on the product market, they impose their own logic of the world on activities, structure, and strategy, and they are financially and technically demanding (cf. Davenport, 2000). We also believe that one integrative model should incorporate the management process dimension of ICT. Although there is always a rationalistic idea about how to analyse, decide and implement ICT, many political and cultural obstacles lie in the way between the investment and economic success. Hence this paper describes how such a *business model* could be outlined and which theories it could draw upon.

Another reason for addressing the business model is empirical. Today, it appears as if many business ventures have a limited interest in formulating *strategies* (Brown & Eisenhardt, 1998). Instead, they formulate business models, which are broader in terms of subject areas. This can be observed in the recent surge in the demand for start-up objects to invest in, which requires that the founders present and market their business models in order to raise financial capital. But it appears to bear some truth also in relation to more traditional businesses, such as industrial companies. It could be that business managers in general regard strategy changes as difficult. They can only manage smaller modifications, such as entering a new geographical or demographical market, innovating new products or processes, or extend their knowledge – they are becoming path dependent. Radical strategy changes, such as ‘strategic leaps’, seem to appear more seldom – and in those cases changes are so radical that the entire business model is changed anyway (Upton & McAffe, 2000). In addition, it is always difficult to discuss strategic *management* if one excludes such things as competence management, knowledge management, organisation, politics, and culture etc, because these are the elements that business managers (have to) work with. The concept of business models is frequently used in conjunction with e-business research (e.g. Timmers, 1998; Rappa, 2000; Afuah & Tucci, 2001; Applegate, 2000; Weill & Vitale, 2001). However, few of these discuss the theoretical sub-constructs of their models, but from solely in ‘specific’ empirically identified business models. Theoretical literature on the business model is relatively scarce, even though the concept is becoming increasingly popular, albeit criticised (cf. Porter, 2001)

This paper intends to propose the conceptual underpinnings of a business model by which managers and researchers can understand the causal relationship between ICT and economic value. Before presenting the business model we will review three strategy perspectives: Industrial Organisation (I/O), the Resource-Based View (RBV), and the Process Perspective. Following this we will present a generic business model, and exemplify how it could be used as an analytical tool to increase the understanding of ICT and economic value.

2. STRATEGY THEORY

Strategy theory concerns the explanations of firm performance in a competitive environment (Porter, 1991). In an attempt to briefly sketch the history of strategic management, Rumelt et al. (1994) state that strategy is about ‘the direction of organisations’. and that it “includes those subjects of primary concern to senior management, or to anyone seeking reasons for success or failure among

organisations” (p. 9). There are many strategy perspectives, but we will as a starting point discuss three dominant overarching perspectives, Industrial Organisation (I/O), the Resource-Based View (RBV), and the Process Perspective. I/O and RBV are both interested in competitive advantage. But their views on what competitive advantage is and on what it is based differ. Although some thinking is clearly conceptually connected within the two perspectives, there are fundamental differences, which will be described in this section. While both RBV and I/O may be seen as content-based approaches to strategic management, the process-based view on strategy focuses on the processes through which strategy contents are created and managed (cf. variance and process theories in Markus and Robey, 1988).

2.1 Industrial Organisation

Porter (1980) brought in the I/O perspective (cf. Bain, 1968) to business strategy, by claiming that *external industrial forces* affect the work of managers. Substitute products, customers and suppliers as well as potential and present competitors affect the possible choices of actions for firms. The possible strategic actions are the so-called ‘generic strategies’, i.e. 1) to differentiate the product so as to enable a premium price, or 2) to produce with low-cost and compete with a low price rather than quality. Porter’s work was further developed in 1985, when he introduced the *value-chain model*, in which focus is put on the activities and functions of the firm. Porter sought to understand the underlying factors of competitive advantage, i.e. the drivers of cost and differentiation advantages, and found that thorough control over activities would enable firms to utilise cost and differentiation potentials. Appropriate grouping of related activities and an active approach towards integration of external and disintegration of internal activities may lead to possibilities to reap scale advantages or to create innovative forums. Porter’s model also emphasises the significant organisational component in strategic management. As will be discussed, the I/O framework has some serious shortcomings in their relative neglect of firm internal factors.

Porter’s analysis of external industrial forces (1980) and the value chain (1985) enable analysis of how ICT can be used for competitive advantage. McFarlan (1984) suggests that ICT can be used to lower the switching cost of suppliers raise the switching cost of buyers, or erect barriers to entry. Porter and Millar (1985) argue that information pervades every element of the value chain activities in organisations. Therefore, ICT can be used to enhance the conduct of value chain activities in managing the industry forces and gaining a competitive advantage, e.g. role of ICT in competitive pricing strategies (Wiseman, 1985; Beath & Ives, 1986), customer relationship management (Ives & Mason, 1990), ERP systems impact on organisational effectiveness (Hedman & Borell, 2001), and business partner relationships (Johnston & Vitale, 1988). Further, ICT can also be deployed in sustaining the generic competitive strategies of cost leadership, differentiation, or niche positioning (Rackoff et al., 1985).

2.2 The Strategy Process Perspective

If strategy and various fields within were concerned with *what* firms did, a redirection took place during the mid-1970’s, towards *how* firms did whatever they did. Strategy was, for a long time, biased towards planning, and long term planning in particular (Rumelt et al., 1994). But with the problems firms and their decision-makers encountered following the oil embargo, the deregulation of industries, internationalisation, and so forth, long range planning lost much of its practical significance. With a focus on the strategy process (rather than the strategy content) followed a growing body of work criticising the ex ante and normative approach of the strategy field (Mintzberg, 1978; 1994, Quinn, 1978). Uncertainty about the future leads to incrementalism, shorter planning horizons, less revolutionary strategic actions, tentative and searching moves. The pattern of action visible ex post makes up the ‘emergent strategy’ (Mintzberg, 1978). The main divergence here is between formulation and implementation: strategies emerge and they are what firms actually do.

The increased environmental uncertainty and the criticism towards long term planning were not the sole factors behind the growing interest in strategy processes. Also, the focus on strategy contents such as competitive position, the relation between competitive position and performance (or any other content concepts, e.g. independent variables such as structure, size, degree of diversification etc), was becoming less interesting in relation to research on *how* firms created the favourable positions or whatever characteristics that rendered them a particular performance (Chakravarthy & Doz, 1992). Although process and content strategy research are both concerned with performance, process research focuses on *how* firms reach the positions (Chakravarthy & Doz, 1992). The independent variables of content research become the dependent variables in process research. The independent variables in process research are found in management- and organisation-related fields. Two assumptions make strategy process research unique, according to Chakravarthy & Doz, and that is the acceptance of bounded rationality and the pluralistic view on the organisational unit. The process-based interest has progressed with an even more sophisticated focus on the managerial and decision-making function, and prospered from the research field of cognitive processes of managers (Weick, 1979; Prahalad & Bettis, 1986; Ginsberg, 1994). The process view on strategy has also been brought in to RBV (e.g. Amit & Schoemaker, 1993; Oliver, 1997; and Sanchez & Heene, 1997).

Process approaches are also promoted in ICT research (Robey & Boudreau, 1999). Process approaches are viewed as “valuable aids in understanding issues pertaining to designing and implementing information systems, assessing their impact, and anticipating and managing the process of change associated with them” Kaplan (1991, p. 593). One of the first ICT process models was the Nolan stage model (Gibson & Nolan, 1974, Nolan, 1979). The model has been criticised by several researchers, e.g. Mohr (1982) and Wiseman (1985). More recent developments are the MIT90s framework (Scott-Morton, 1990) and the subsequent strategic alignment movement (Henderson & Venkatraman, 1993). Lately, approaches including both process, RBV and Organisational learning have been applied to explain the cognitive, cultural and political processes by which complex organisations develop and utilise ICT (Ciborra, 1994; Andreu & Ciborra, 1996; Kalling, 1999).

2.3 The Resource-Based View

Whereas I/O states that environmental pressure and the ability to respond to the threats and opportunities are the prime determinants of firm success, RBV states that idiosyncratic and firm-specific sets of immobile resources determine which firm will and reach above-normal performance (Wernerfelt, 1984; Barney, 1991; Dierickx & Cool, 1989; Conner, 1991; Peteraf, 1993). RBV emphasises the characteristics of the underlying, factors behind low-cost or differentiation; i.e. the resources of the company. Resources (e.g. physical, human and organisational resources such as “all assets, capabilities, organisational processes, firm attributes, information, knowledge etc”, Barney, 1991) that are strategic are in themselves competitive advantages (Barney, 1991). This does not imply that RBV is incapable of explaining differences in firm performances on product markets. Successful firms have resources with greater total value than their competitors. Logically, low-performing firms may have competitive advantages, albeit with lower total value than more successful competitors.

The RBV literature descriptions of resource attributes that render a firm competitive advantage are numerous, although we follow the concepts introduced by Barney (1991) including value, rareness, and imperfect imitability and substitutability. A firm’s resources are *valuable* if they lower costs or raise the price of a product. In addition, certain resources have a better fit with certain organisations, and hence expectations – and value – are different depending on who is considering resource investment (Barney, 1986, Dierickx & Cool, 1989). Both resource and firm heterogeneity affect relative resource value. A key resource attribute, within RBV is rareness. Peteraf (1993) claims that superior productive resources often are quasi-fixed because “their supply cannot be expanded rapidly”. Since they are scarce, inferior resources are brought to the market. A valuable and rare resource also needs to be *costly to imitate or to substitute* to *sustain* the competitive advantage of the resource. A valuable and rare resource that could be acquired at an imperfect market price will only remain a source of advantage as long as competitors fail to realise the potential. A resource and its outcome can

be imitated either by building/acquiring the same resource (duplication) or by creating the same intermediate or final outcome by a different resource (substitution). According to Barney (1991), the measurement of imitability is the costs required for a competitor to imitate. These costs depend upon three factors: *Unique historical conditions*, *causal ambiguity* and the *social complexity of resources*.

Whereas the RBV certainly extends the theoretical understanding of the relation between ICT and competitive advantage, RBV too has limitations. Critics of RBV put focus on the potential of tautology (Eisenhardt & Martin, 2000), the lack of empirical studies (Williamson, 1999), the neglecting of the demand-side of resources (Priem & Butler, 2001), the relative lack of process-orientated approaches (Foss, 1997), the shortcomings in explaining hyper-competitive industries (D'Aveni, 1994), the inconsistency of the theoretical discourse (Kalling & Styhre, 1999). A practical issue concerns the object of analysis: what, exactly, is it that should be unique: the resource, its impact on operations or the profit? Mosakowski & McKelvey (1997) and Chatterjee (1998) suggest that the relevant unit of measurement is the so-called *intermediate outcome*. An intermediate outcome, in this case, may be a product feature that increases quality and has the potential to generate increased sales turnover, i.e. something between the resource and the product offering. Chatterjee (1998) also claims that “a unique resource does not create competitive advantage, but a unique and valuable outcome does” (p 80).

Following RBV, Clemons & Row (1988), (1991), Mata et al. (1995), Powell & Dent-Micallef (1997), Andreu & Ciborra (1996), Bharadwaj et al. (1999), Wade (2001) etc have illustrated the power of applying RBV on ICT. Clemons & Row (1988) studied the sustained competitive advantage of McKesson through ICT use. Similarly, in an empirical analysis of the competitive advantage due to ICT use at 30 firms that had been acclaimed for their pioneering role in ICT-based strategic differentiation in their respective industries, Kettinger et al. (1994) found that “the pre-existence of unique structural characteristics are an important determinant of strategic ICT outcomes” (p 46). In frustration over the shortcomings of I/O in explaining the sustainability of advantages, these researchers emphasised the difference between strategic advantage and necessity, and claimed that in order for ICT to generate sustained competitive advantages, they need to be ‘embedded’ with other unique resources or organisational properties (e.g. scale, scope, structure). Interestingly, these RBV researchers never saw ICT as being able to generate advantage on its own, only by facilitating other resources (cf. Powell & Dent-Micallef, 1997).

2.4 Strategy Perspectives

To conclude, the field of strategy is fragmented. The three dominant fields as well as different sub-fields are developing in different directions, meaning there is no such thing as *one* theory of strategy. The strategy concept means whatever phenomenon we subjectively attach to it, such as choice of 1) industry, 2) industry position, 3) customer segment, 4) geographical markets, 5) product range, 6) structure, 7) culture, 8) position in the value chain, 9) resource-bases, 10) knowledge bases, 11) technologies and so forth. We believe, however, that it is possible to integrate the relevant components into one model. This model is too large to be referred to as a strategy model. It includes business activities as well as the resources they deploy, the structure under which they are conducted, as well as the products resulting from these activities, i.e. all business activities between factor and product markets. The business model is described further below.

3. THE BUSINESS MODEL CONCEPT

3.1 Previous Approaches

One comprehensive, yet neglected, text on business strategy is by Porter, 1991. In this article, Porter claims that the low-cost and differentiation advantages that firms enjoy on the product market (i.e. in relation to customers and competitors) ultimately stem from some sort of ‘driver’. Porter's chain of causalities starts with ‘initial conditions’ and ‘managerial choices’. Decisions taken affect so-called

drivers (resources, or properties such as scale and scope), which build up *activities*, which in turn enable *low cost* production and/or product *differentiation*, both of which enable specific strategies and positions in markets/industries and firm success. It is not referred to as being a business model, but it incorporates many features that should be included in such a model. Porter was not very specific about the contents of the different components, but the model summarises most of the ideas presented in his 1980 and 1985 books, yet it adds the causal interrelations between resources and firm success.

Inherent in this model is also the strategic process, as the managerial choices are seen as taking place in a *longitudinal dimension* and is thus a response to criticism from the Process perspective field (e.g. Mintzberg, 1978, Quinn, 1978). The inter-relation between factor markets, the firm and the product market encompasses both RBV and I/O, and highlights the complementary nature of the two viewpoints – a complementarity based on causality. So Porter's integrative causality model is also a response to the criticism from RBV. The model is a metaphor of how factors are transformed to products. RBV focuses on resources, or 'drivers' in Porter's terminology, and use the resource attributes (value, rareness etc) as determinants of 'firm success' in the causality model. Ironically, Porter's criticism of the business model concept (2001), claiming that the definition of 'business models' is 'murky' and that the concept excludes important variables such as the industrial forces, could well be resolved by using his 'causality chain' (1991).

Others have described conceptually similar models (and occasionally refer to them as business models), including Normann's work on the *business idea* (1977; see also 2001). Normann used the business idea concept to describe businesses, much like a theory of the firm, and excluded neither resource bases nor environmental factors. The overall principle of the business idea is fit; it is systemic in nature. Although it contains many different components, Normann (2001) distinguishes between three different parts: 1) the external environment, its needs and what it is valuing – what is crucial to the environment. 2) the offering of the company, 3) internal factors such as organisation structure, resources, organised knowledge and capabilities, equipment, systems, leadership, values. The systemic nature of the business idea requires that there is coherence. The relation to the external environment depends on the offering, which in turn is dependent upon internal factors, such as resources and activities. Again, the resemblance between the business idea (Normann, 1977) and the aggregation of Porter's models (1980, 1985) into the causality chain model (Porter, 1991) is obvious.

The research on entrepreneurship, often resting intellectually on the fundamentals of Schumpeter (1934, 1950), have produced many models that are free from the RBV – I/O dichotomy and inherently longitudinal and process-orientated in nature. These approaches normally focus on the evolution and life-cycle of entire business operations in a holistic fashion. McGrath & MacMillan (2000) include "the way an organisation organises its inputs, converts these into valuable outputs, and gets customers to pay for them" in the business model concept. Schumpeter himself claimed that entrepreneurship included the combining of previously disconnected 'production factors' (Landström, 2000) and put focus on the competitive behaviour of firms in markets that are in states of disequilibrium.

Close resemblance to business models are found in Alter's (1999) theory of Information Systems. The focal point of the theory is the distinction between the information systems and the 'work system(s)' it serves. Alter (1999) defines a work system as "a system in which human participants and /or machines perform a business process using information, technology and other resources to produce products and/or services for internal and external customers" and the elements of a work system is: business process, participants, information technology, products, and customers.

Components of the business model could be found in the emerging e-business research, an area where the concept of business models has been used more extensively. Amit & Zott (2001) concluded that in order to understand the factors behind value-creation in e-business (efficiency, complementarity, lock-in and novelty), a range of different theories had to be used and integrated into a *business model*. They used value chain analysis (Porter, 1985), Schumpeterian innovation (Schumpeter, 1934), RBV (Barney, 1991), strategic networks theory (Burt, 1992) and transaction cost economics (Williamson, 1975) to be able to capture the factors of e-business value creation and construct the business model,

which includes the content (exchanged goods and information and the resources required to facilitate the exchange), structure (the transaction stakeholders and how they are linked), and governance of transactions (the control of the flows of goods, information and resources and the legal association form). All three components are important to understand business models, yet what is included in each may be dependent upon the nature of the business, i.e. it is not generic. Rappa (2000) identified nine generic e-business models and Afuah & Tucci (2001) presented a comprehensive description of the components of a business model: customer value, scope, price, revenue sources, connected activities, implementation, capabilities, and sustainability. These models try to explain today's fast moving environment in a more appropriate way than previous models based on strategy or ICT. Weill & Vitale (2001) state that a business model describes roles and relationships among consumers, customers, allies and suppliers as well as the major flows of product, information and money. Upon selecting a business model, firms must consider strategy, organisational structure, business process, value chain, and core competencies. At least 33 different business models have been presented within the field of e-business research (Cherian, 2001), e.g. Timmers, 1998; Rappa, 2000; Afuah & Tucci, 2001; Applegate, 2000 Rappa, 2000; Weill & Vitale, 2001).

3.2 An Alternative Business Model

Based on the existing literature review above, we would propose a business model that includes the following causally related components, starting at the product market level: 1) Customers, 2) Competitors 3) Offering, 4) Activities and Organisation, 5) Resources and 6) Factor and Production Input suppliers. The components are all cross-sectional and can be studied at a given point in time. To make this model complete, we also include a longitudinal process component (cf. Porter, 1991), which covers the dynamic of the business model and highlights the cognitive, cultural, learning, and political constraints on purely rational changes of the model. It could be illustrated as in figure 1.

The model integrates firm-internal aspects that transform factors to resources, through activities, in a structure, to products and offerings, to market. The logic is that in order to be able to serve the product market, businesses need activities, as well as input from the factor market (capital and labour) and the supply of raw material etc. The same resource-base and activities and organisation can produce different products and hence have a scope of different offerings (e.g. cars in two or more colours), but at some point during diversification, new activities are needed (e.g. cars in two or more versions) and potentially also new resources (e.g. diversification to include lorries), thus forcing the development of business models. With this view, a firm can have many different business models. However, the more profound the differences between products, the higher the probability that the businesses are organised independently from each other (cars and lorries make out distinct business units in most vehicle-based corporations).

There are causal relations between the different components. In order to serve a particular customer segment and compete with the products within that segment, the offering must have a favourable quality/price position. In order to achieve this, firms need to offer customer-perceived quality of physical product features and service, which in turn requires effective activities (e.g. large scale, competence) and organisational structure (efficient communication and division of labour and authority). This requires human, organisational and physical resources that have to be acquired on factor markets and from suppliers of production inputs. Although not depicted in the model, external actors are potential partners or competitors in all aspects of the business: in the bundling of products (e.g. computers and software), in activities (e.g. outsourcing ICT, buying services from advertising agencies) and in the configuration of resources (e.g. banks and insurance companies share customer data bases). Change can appear both in exogenous or endogenous processes. A poor offering (e.g. too high price/quality) may initiate change programmes that result in reformed activities and reconfigured resource base, but it can also work the other way. Firms take stock of their resource base and may find new ways to combine resources, and new ways to dispose of activities as a result of resource modifications. This can result in new products and improved product market positions. So change can take either direction, and the depth of change will vary. Logically it seems that resource bases are

more difficult to change than products and activities. What is important though is the realisation that whatever the modification, it will affect other components of the model.

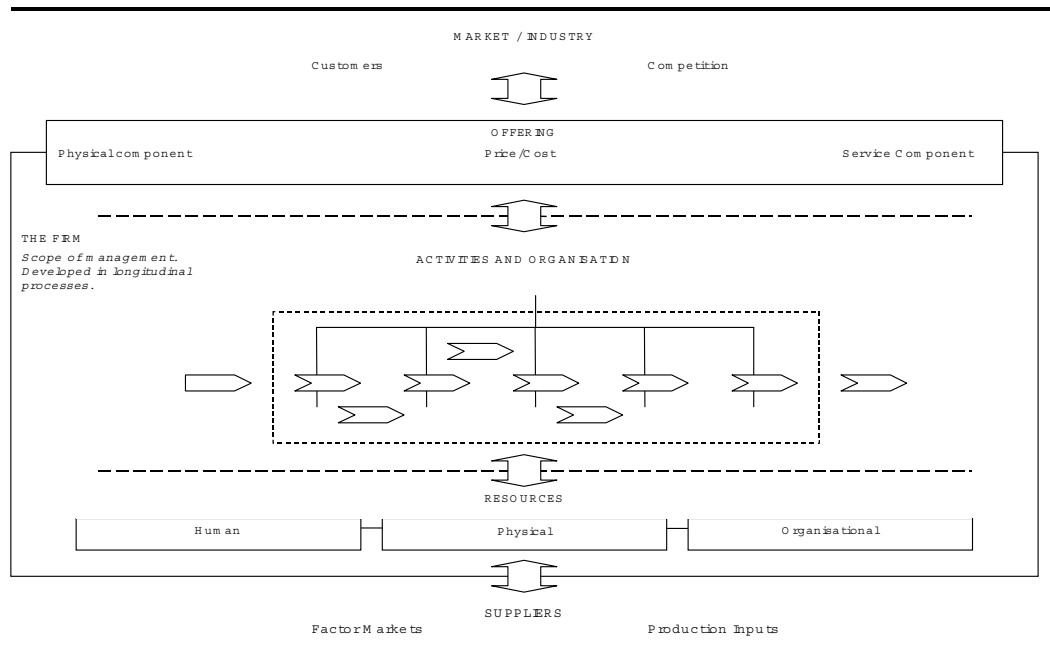


Figure 1. The Components of a Business Model

One important aspect is that the business model has to be managed and developed. This is how the Process perspective is included. The model can be studied in a cross-sectional dimension (the causal dimension, vertical in the outline of the model) but it also evolves over time (the longitudinal dimension, horizontal in the outline of the model) as managers and people from the inside, and as customers and competitors on the outside, continues to evolve. These processes include the bridging of cognitive, cultural, political obstacles, and are issues that managers deal with on a regular basis, for all components of the model (scope of management is depicted in figure 1). This model incorporates RBV and I/O and Process perspectives and solves potentially many RBV questions about what is the unit of analysis in terms of value and uniqueness. Is it the resource, the intermediate activities or the product that should be analysed? One way to approach this issue – if one is interested at all – is to use the business model. Certain parts of it may be more valuable and unique than others, be it a product feature or a particular type of knowledge, and that is what matters.

4. DISCUSSION: ICT AND THE BUSINESS MODEL

Assessing three particular properties can validate a model such as the business model proposed here: the integration of the model, its practical and theoretical relevance, and explanatory power (Glaser, 1978). Integration refers to the logical coherence of the model, and shall not be further discussed. However, we shall briefly discuss the relevance of the model by exemplifying how different ICT systems interrelate with the business model components. We also discuss the explanatory power of the model by comparing to existing models, most of which have been discussed above.

4.1 Examples

CRM (Customer Relationship Management), for instance, is an ICT resource consisting of data and the knowledge to process customer data that sales and customer service use to improve customer relations and sales. The economic logic of a CRM system as seen through the business model is the following:

- Like all ICT, the system itself is a resource. CRM relates and is related to and draws on other resources, such as financial resources (it costs to invest in and maintain it), physical resources (you need hardware and network as well), human cognition (you need knowledge to manage the system and to interpret the data from the system), and organisational resources (cooperation is required between individuals and between organisational units). The system will also integrate with other ICT resources, e.g. ERP systems, as input and output sources for data, e.g. customer order might first be entered into the CRM in some cases and in other cases the CRM will collect data from an ERP system.
- In the next step, i.e. activities, the CRM system directly affects sales and customer service activities, since the system design reflects the vendors view on how to conduct CRM. The system will provide the information processing capabilities for sales and customer service. The quality of the information provided by means of the aggregation of data in the system should improve the daily as well as the long-term decisions on customer strategies.
- The improved knowledge about customers will affect the product offering (the next step in the model) as well. Costs for the offering will be reduced, which means that the company will improve its profitability. The customer-perceived quality of the offering might be improved as well, due to better communication and possibly more accurate and timed offers. Competitors that are not able to match the offering will be at a disadvantage. This in turn improves price and/or sales volume, which increase profitability.

ERP (Enterprise Resource Planning) systems as another example, they too affect activities, offering, and resources in a specific way:

- They integrate the activities within a business model or between business models by integrating the information flows (e.g. procurement, order entry, production planning, human resource planning, accounting, controlling). They contain a common data repository (e.g. customer data, supply data accounting data, and bill of materials), which if properly made, will enable a faster and more correct communication of data and information. ERP systems are also real time system, which enables quicker and improved decision-making both on a strategic and daily/operative basis. Furthermore, ERP systems integrate these activities in both horizontal and vertical dimension, sometimes to the extent that a new organisational structure is imposed to reflect the proprietary solution of the ERP system. The reorganisation itself creates value by synergy and by improving quality and efficiency of work - hopefully.
- In terms of the offering, an ERP system enables firms to cut costs and increase quality through improved information processing and in reorganisation, and to improve the sales turnover by means of improved throughput processes and by better decisions. The same is true for SCM (Supply Chain Management) systems, which integrate all activities from procurement, inbound logistics, internal logistics in sequential production steps, outbound logistics and distribution.
- Finally, the resource aspect of ERP system. Davenport (1995, p. 32) described the implementation of ERP as “perhaps the world’s largest experiment in business change” and for most organizations “the largest change project in cost and time that they have undertaken in their history”. The investment and implementation of ERP systems is a challenge for most managers and a risky project that will affect all other resources, see for instance Markus and Tanis (2000).

The economic value of systems such as CRM, ERP and SCM grows exponentially if they are networked externally to suppliers, customers and alliance partners. Collaborative product development, online quotation making, order information available through the value chain are services that will improve the value of individual systems resources since they link up firms externally. Extending that line of thought, e-Business resources, which enable trading over the Internet, can also be viewed through the model. Depending on the product or service offered, it can enable reach of new customers, it can create complementary services to existing products/services, it can automate parts of the selling process, and, if the scale of trading is sufficient, data on customer

behaviour might be analysed and materialised in new strategic and operative decisions. e-Business firms can build almost entirely new business models (e.g. Amazon), if they innovate individual products and services (e.g. software upgrade over the internet, music, news, ticket sales, home banking) that require resources and activities other than what is required for the existing, 'bricks and mortar' business model.

All ICT can be viewed through the business model lens: they are resources, they affect, directly and indirectly, one or more activities, which in turn if well implemented, will improve the offering in terms of cost or quality, which will lead to higher profitability, higher economic value. This is true not just for contemporary ICT resources such as those described above, but also for more classical applications: financial systems automate accounting which reduces costs and improves decision-making and improves the offering. Payroll systems automate activities in the HR department and improve the information on salary notes to employees. Decision-support systems and data mining enforce analytical activities both by generating novel slices of data and by automating search processes. Better decisions and swifter decisions, as well as less time consumption, will improve the offering in relation to the industry, *ceteris paribus*. For managers, the challenge is to manage not only the system but also the fit with resources, activities, organisation and the product on the market in longitudinal processes. Developing the business model over time is likely to encounter the bridging of cognitive limitations (bounded rationality), to norms and values and to politics.

Let us look at a simple example:

- **Resource level:** A company acquires a CRM system and an ERP system. They cost 1 EURM each in software, hardware upgrades and training. At the same time, old systems are sold, rendering 100 EURK. Thus, the net one-off investment is 1.9 EURM. Thus, ICT affects resources such as money, existing ICT resources and people (carriers of both knowledge and culture).
- **Activity level:** The CRM system is embedded in Sales operations, and as staff learns to use it, its data contents and how to improve their work tasks, activities are improved. For instance, customer analysis is sped up, meaning less staff is needed. In addition, communications with customers might be improved, due to a better overview of purchasers, goods receiving etc. The ERP system, on the other hand, is successfully implemented and because processes are reengineered and the organisation is restructured, the order-entry sub-process is made in 2 minutes instead of 10, and production planning is improved to the extent that stock can be reduced and that deliveries become more accurate. Both systems require extensive maintenance, and training is continuous, averaging a cost of 200 EURK per year. Still, improvements have been made, but they have not been materialised through reduced costs or increased sales turnover.
- **Offering level:** The improvements in activities following the two investments should also improve actual result by increasing price per unit or volume sold or by reducing cost per unit. A unique offering (price/quality in relation to competing offerings) is the ultimate effect of good resource utilisation. Resources do not always materialise in this way, though, since organisations may refrain from making staff redundant (hoping, possibly, that the overall volume shall grow) or they might be afraid of actually reduce buffers of goods and stock, and since there might be difficulties in communicating to customers that the business has improved, the actual improvements may not affect the offering. If they do, let us say the cost reduction equals 400 EURK on an annual basis, and that the increased revenue equals 100 EURK per year. That means that net annual flow of cash in is 500, meaning the time period required to pay the initial investment of 1.9 EURM is four years. If it is sustained further, it will generate annually 500 EURK, to be discounted to net present value. Simple investment logic, which could be coupled with a sunk cost approach if the initial investment needs to be neglected for, say, political purposes.

An important aspect of the model is the intermediary level, activity and organisation, i.e. what the firm actually does with its newly acquired resources. Failure to use the ICT resource to improve activities, failure to organise in a suitable way, and/or failure to materialise on improvements made in activities, will render an intact or possibly worse offering than before the ICT investment was made. Potentially,

this also clarifies some of the practical problems with RBV and what it is that should be unique in relation to resources. A common system (off the shelf) can be uniquely well applied and thus create uniquely low costs or unique customer-perceived quality – and hence generate a competitive advantage. A unique system (built in-house possibly) can be applied in an ineffective way and thus not enable improved offerings, even if it improves activities. Apart from the cross-sectional causalities between resource, activities and offerings, the model we suggest also takes into consideration the fact that the inclusion of new ICT changes the entire business model – if implemented and employed effectively. If not, the only change brought about was the actual installation of an idle, costly resource. The process of identifying and investing, as well as implementing and employing and ICT is longitudinal and intended to transmigrate the existing business model (at t_0) into a better one (at t_1), hence the longitudinal management dimension of our model. Whether it is successful or not depends on the ability to manage cognitive as well as cultural and political constraints, which are extremely important variables that are often neglected. If users and managers and consultants cannot be successful in identifying, developing and using ICT to improve activities in a way that is visible in the profit statement and the individual offering, nothing significant will happen with the business model.

All in all, the model proposed should be seen as a generic tool to understand the business context of all types of resources, ICT included. The actual value of an ICT system is dependent upon how well it is applied and used in relation to the business in question. Economically, its value is determined partly by the costs associated with investing and maintaining it, and partly by the payback that the system brings in terms of cost reductions or profit improvements. The payback stream, in turn, is dependent upon the uniqueness of the system and the effectiveness of the process of managing the deployment of the system in activities, in organisation, in the offering and in possible diversification of the offering.

4.2 The Business Model in Comparison

The business model is characterised by an integration of various theoretical perspectives such as I/O, RBV, Strategy Process, and ICT research, and addresses the interdependency between the components of the business context of ICT. There are other studies addressing the same issue both within ICT and strategy research. The advantage with the model described here is the broader integration, the level of details on causalities between the components (see section 3), and the integration of longitudinal management processes and constraints on change. The model is applicable on ICT in general.

Research into ICT has been based on a deterministic view of ICT. A consequence is that the object under investigation is studied based on variance theories (Markus & Robey, 1988). Thus important aspects of how ICT affects organisations may be missed, e.g. business models changes over time. Research on ICT (e.g. Scott-Morton, 1991, Alter, 1999) is not explicitly addressing how ICT is contributing to economic value. This is only done implicitly since there is a belief that ICT will improve organisations. Most studies of ICT and competitive advantage have applied an I/O view of strategy or simply practical checklists. Studies based on an RBV perspective and the process view of strategy are focusing on sustainable competitive advantage, but are often biased towards development or usage. It is also unclear what in the business model that should be unique. This is resolved with the model presented here. Other studies that have an explicit focus on ICT and economic value (productivity) have been based on single theoretical frameworks (cf. Brynjolfsson, 1993). The business model addresses these issues by taking an integrative perspective on ICT and business.

5. CONCLUSION

Research into what makes ICT valuable to business and organisation, like strategy research in general, tends to focus on a selection of specific aspects of business, rather than an integration of them. In addition, much ICT research uses obsolete strategy models fragmentally and as a consequence finds it difficult to explain certain phenomena in relation to ICT and value, for instance sustainability of competitive advantage and the strategy processes by which ICT are developed and embodied with other resources and with activities and the product offering.

With this paper, we provide a business model that gives structure to the broader business context of ICT. ICT is at best a potential resource, i.e. something with a potential value, acquired on a market or developed internally. Theoretically, the bottom line is that the economic value is determined by a firm's ability to trade and absorb ICT resources, to align (and embed) them with other resources, to diffuse them in activities and manage the activities in a way that creates an offering at uniquely low cost or which has unique qualities in relation to the industry they compete in. We argue that any empirically defined ICT application can be viewed through the business model, but that a contingency view must be applied: the economic value and the relations within the business model vary between different ICT applications, and between different businesses. Yet as a generic model it captures the relevant aspects to consider for any ICT decision-maker or student of ICT and business.

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