Business Value of Information Technology

Resource-based Analysis of E-commerce Business Value

Research Proposal

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This paper is written for CEMS Doctoral Consortium „ Innovation, ICT and Networks: The research agenda in E-business ”, Opatija, Croatia, Sep. 26-29, 2010.

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1. INTRODUCTION

According to the literature review of Melwille et al. (2004, p. 298.) the five basic research questions of IT business value research are:

1. Is the IT resource associated with improved operational efficiencies or competitive advantage?
2. How does the IT resource generate operational efficiencies and competitive advantage?
3. What is the role of industry characteristics in shaping IT business value?
4. What is the role of the resources and business processes of electronically linked trading partners in impact the value generated and captured by the focal firm?
5. What is the role of country characteristics in shaping IT business value?

My proposed research is going to focus on the first two of these questions, exploring the existence and the process of IT value creation on the Hungarian market. From the wide variety of corporate IT projects I plan to focus on e-commerce[1] investments because of some distinctive characteristics of them:

- Based on the historical reviews of IT business value literature, the current period is the era of outward focusing IT (Bőgel, 2009) or the era of the internet (Applegate et al., 1996).
- The tendencies of IT research literature show (Baskerville – Myers, 2009) that e-commerce research was one of the latest hype around the millennium. Even when we are well over the peak of this wave, at least now we have the opportunity to observe more market players, and have experience and data to examine the depths of the e-commerce value creation.
- It still is an open question whether e-commerce is a source of competitive advantage or a strategic necessity – or none of them. There are also controversial opinions about the beneficiaries of e-commerce: do the SME-s benefit from long tail effects or the bigger companies from network effects and intangible asset accumulation (Corbitt – Al-Quirim, 2004).
- Finally, e-commerce applications are ideal for large sample data collection, because the most of the e-commerce capabilities of the firms can be observed openly through their websites (in B2C context at least), and related public databases are also available.

Section 2 offers a theoretic introduction to the IT business value literature, focusing on the resource-based approach and e-commerce. The proposed research model and the adequate methodology are described in Section 3.

[1] E-commerce is defined here as "the use of the global Internet for purchase and sale of goods and services, including service and support after the sale" (Treese - Stewart, 1998, p. 5.)

2. THEORETIC BACKGROUND

2.1 IT Business Value Literature and the Resource-Based View

A synthetized definition of IT business value research could be "any conceptual, theoretical, analytic, or empirical study that examines the organizational performance impacts of IT" (Melwille, 2004, p. 287.). This includes subjects from the IT productivity paradox till the IT based competitive advantage, approaches from the financial theories to the strategic literature. (See Table 1., and also Nemeslaki – Aranyossy, 2005)

Table 1. Core questions and theories of IT business value literature
(selected E-commerce value literature in italic)

Question Nr.	Explorative-descriptive	Normative
1	**1./a question:** Does IT create business value? **Sub-questions**: - Does IT affect productivity? - Does IT create sustainable competitive advantage? **Related theories:** Economics > *Bernstein et al., 2006* > *Bakos, 1998* - production functions - stock market event study methodology > *Dehning et al., 2004* > *Subramani – Walden, 2001* Strategy	**1./b question:** How can we measure the value created by IT investments? **Sub-questions:** - What effects have to be considered in th e valuation? - Which valuation methodology should we use? **Related theories:** Economics - agency and transaction costs > *Malone – Laubacher, 1998* > *Lee – Clark, 1996* Finance - discounted cash-flow - real options > *Kauffman- Walden, 2001* Accounting
2	**2./a question:** How does IT create business value? **Sub-questions:** - What are the key sources of value creation? - What are the necessary and criteria of value creation? **Related theories:** Resource-based view > *Hulland – Wade, 2007* > *Marono-Cerdan – Soto-Acosta, 2007* > *Zhuang- Lederer, 200, 2006* > *Zhu, 2004* > *Zhu - Kraemer, 2002* > *Amit – Zott, 2000* Technology acceptance > *Gefen et al., 2003* > *Koufaris, 2002*	**2./b question**: What can we to support IT value creation? **Related theories**: Management / Project management Risk management IT project escalation and de-escalation

The Resource-based view (RBV; see: Barney, 1991; Grant, 1991 or Peteraf, 1993) tries to explore the link between the firm-level resources (assets and capabilities) and

sustainable competitive advantage. The IT related RBV research focuses on the identification, classification and characterization of the strategic IT (or IT-related) resources and their relationships (see: Mata et al., 1995; Mellville et al., 2004 or Wade – Hulland, 2004). The first question – identification of IT resources – already presents some difficulties: researchers conceptualize IT resources on fairly different abstraction levels. (See Figure 1 an attempt to systematize the different research results.) Furthermore, a multi-dimensional measuring model should also be worked out for resources and capabilities. (Santhanam, 2003)

Figure 1 Different conceptualizations of the IT resources

<table>
<tr><th>Mata et al., 1995</th><th colspan="2">Ross et al., 1996</th><th>Lopes - Galletta, 1997</th><th>Powell - Dent-Micallef, 1997</th><th>Bharadwaj, 2000</th><th colspan="2">Wade - Hulland, 2004</th></tr>
<tr><td rowspan="3"></td><td rowspan="5">IT processes</td><td></td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="8">Outside-In resources</td><td rowspan="2"></td></tr>
<tr><td>Strategically aligned planning</td></tr>
<tr><td>Cost-effective operations and support</td><td>Cost effective IS operations</td></tr>
<tr><td></td><td>Fast delivery</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Proprietary technology</td><td rowspan="8">IT assets</td><td>Technology</td><td>Property-based resources</td><td>Technology resources</td><td>IT Infrastructure Resources</td><td>IS infrastructure</td></tr>
<tr><td>Technical IT skills</td><td rowspan="3">Human IT resources</td><td rowspan="5">Knowledge-based resources</td><td rowspan="3">Human IT resources</td><td rowspan="3">Human IT Resources</td><td>IS technical skills</td></tr>
<tr><td></td><td>IS development</td></tr>
<tr><td>Managerial IT skills</td><td rowspan="3">Spanning Resources</td><td>IS planning and change management</td></tr>
<tr><td></td><td rowspan="3">Relationship resources</td><td rowspan="3">Business resources</td><td></td><td>IS-business partnerships</td></tr>
<tr><td></td><td rowspan="2">Inside-Out Resources</td><td>External relationship management</td></tr>
<tr><td></td><td>IT-enabled Intangibles</td><td>Market responsiveness</td></tr>
</table>

The next step would be to find the distinctive features of the strategic IT resources. Mata et al. (1995) suggest (in line with the original RBV literature) that value, heterogeneity of distribution and immobility are the distinctive characteristics; while Piccoli – Ives (2005) identified various barriers to erosion of competitive advantage, like resource or project characteristics, resource complementarities or preemptive actions. Wade and Hulland (2004) suggest that value, rarity and appropriability are the ex ante limits to competition, while imitability, substitutability and mobility are the key characteristics ex post.

It is also interesting, that very few of the above described IT resources' competitive effect has empirical support. None of the technical resources have (Bhatt – Grover, 2005), which is not too surprising regarding the level of commoditization of information technology hardware and software (Carr, 2003). Aral and Weill (2007) found that organizational IT

capabilities strengthens the performance effects of IT assets. Also, Varian (2003) argues that using IT could be rare and immobile enough to be the source of sustainable competitive advantage, and Powell and Dent-Micallef (1997) found the same in their empirical investigation. Meanwhile Mata et al. (1995) or Ray et al. (2001) found that only managerial IT skills could have this kind of competitive effect. Also some complementary business resources could work as a source of sustainability, like IT business expertise and relationship infrastructure (Bhatt – Grover, 2005). These theoretic and empirical RBV findings serve as a basis for the e-commerce business value research summarized in the next chapter.

2.2 E-Commerce Value Creation

We can organize e-commerce business value literature based on the first two basis questions of Mellwille et al. (2004) about the existence and process of value creation (as Table 1 shows).

Let us start with the first. Are the e-commerce (-related) resources associated with improved operational efficiencies or with competitive advantage? On the market level Bakos (1998) found that corporate e-commerce value creation can be achieved via (1) increased personalization of products, (2) aggregation and disaggregation of information-based products and (3) lower search costs. On the other hand economic theory says that one of the most compelling advantage (also in financial terms) of e-commerce would be to decrease the transaction and agency costs for both retailers and customers (Malone – Laubacher, 1998). A game theory modeling of the retail market (Bernstein et al., 2006) concluded that click-and-mortar could become the dominant business model, even a strategic necessity which creates value mostly for the customers. At the same time a McKinsey study (Krishnamurthy, 2007) drew a different conclusion: that the effective sales model would be of the bricks-and-clicks'. Event studies (focusing on the share price affects of e-commerce initiative announcements) indicate that the market sets a higher value on B2C initiatives in comparison to B2C projects, and that e-commerce investments related to tangible products are more valuable than the ones concerning digital products (Subramani – Walden, 2001). Dehning et al. (2004) repeated these researches and showed that while the positive price effect of e-commerce announcements diminished after 2000, the B2C initiatives and the e-commerce investments of traditional companies were still recognized by the stock market as value creation (Table 2).

Table 2 The effect of e-commerce announcements on share prices

cumulative abnormal returns during the next 3 day after the e-commerec announcement	Subramani - Walden (2001)	Dehning et al. (2004)	
	1998	1998	2000
B2B initiatives	3,10%	1,74%	-4,3%
B2C initiatives	5,30%	9,02%	3,4%
E-tailers	4,40%	4,46%	-1,0%
Conventional firms	3,90%	10,32%	7,4%

The second research question about how the e-commerce resources are going to create business value is dominated by the resource based-view. Amit (2000) found four sources of e-commerce success: novelty, lock-in, complementarities, and efficiency. Zhu and Kraemer (2002) conceptualized the e-commerce resource in the information-transaction-interaction-integration dimensions and found a significant positive effect on operative performance measurers like inventory turnover. Later Zhu (2004) used the same model in the retail industry and revealed the complementarities between e-commerce capabilities and IT infrastructure, their joint effect on cost reduction and productivity. (This complementarity of IS resources could also be one explanation of the well known IT productivity paradox.) In Europe, Marono-Cerdan and Soto-Acosta (2007) found similar complementarities between the corporate e-commerce capabilities: the information and interaction functions strongly support the positive financial effect of the transaction function of the website. Zhuang and Lederer (2006) use similar resource categories like information-transaction-interaction but integrated with some technical and usability capabilities, human and business resources, where all but the human resources have significant positive effect on firms' financial performance. While Hulland – Wade (2007) use fairly different concepts of e-commerce resources in the retail industry, they found that technological and marketing resources do not have a direct positive effect on the firm performance, only through their model's intermediary variable, which is online channel commitment. As my research is going to use the information-transaction-interaction-customization dimensions of e-commerce capabilities, the most similar research models' results are summarized in Table 3.

Table 3 Some similar research studies' results
(*0,05 < p < 0,1; **0,01< p <0,05; *** p<0,01)

Authors	**Profitability (ROA or gross margin or value added)**	**Inventory turnover**	**Sales revenue per employee**
Zhu (2002)	modell R^2: 0,361*** e-ker. R^2: 0,104		modell R^2: 0,379*** e-ker. R^2: 0,251**
Zhu – Kraemer (2004)	modell R^2: 0,140 e-ker. R^2: -	modell R^2: 0,412** e-ker. R^2: 0,458*	
Marono-Cerdan – Soto-Acosta (2007)	modell R^2: 0,891*** e-ker. R^2: 0,252***		

While the technology acceptance (TAM) literature is rarely connected to the IT business value research directly, I strongly believe that IT usage and the factors affecting usage and user behavioral intentions in e-commerce (see e.g. Gefen et al., 2003) are the key to create real return on investment. This is also the reason why I plan to include usage into my

research model as an intermediary variable between e-commerce capabilities and firm performance.

3. RESEARCH DESIGN AND METHODOLOGY

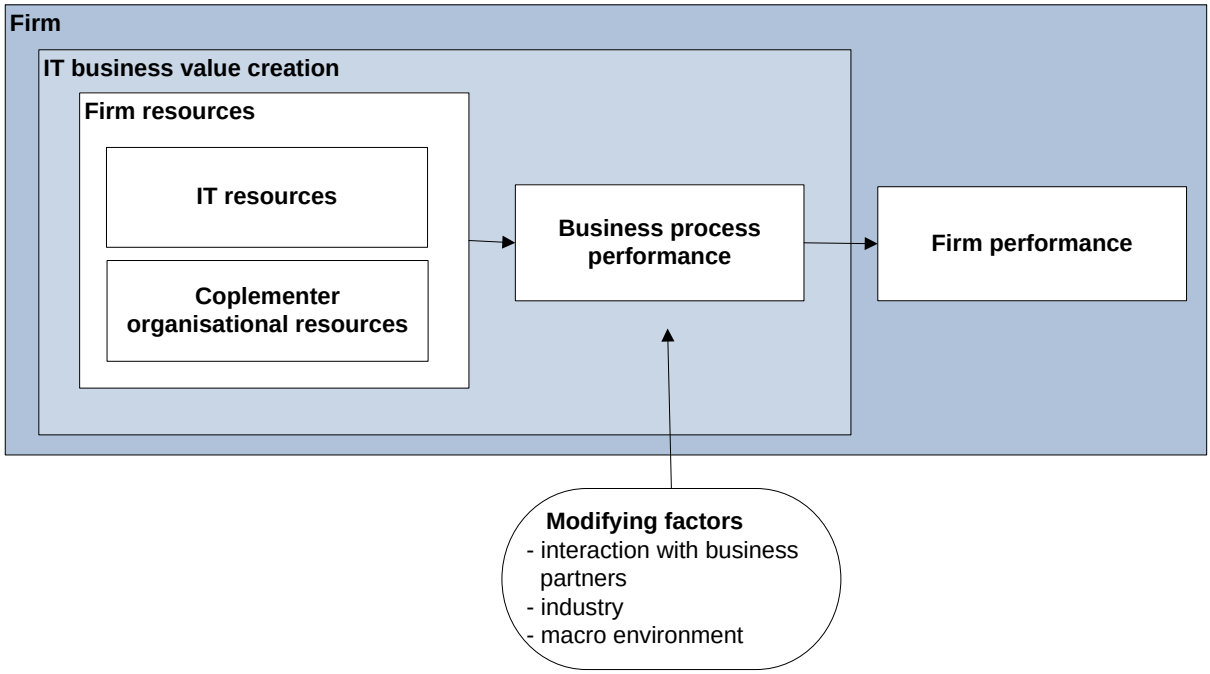
3.1 Research Model

The resource-based view has been chosen to act as theoretic framework for my research on the field of e-commerce value creation in Hungary[2]. While the main critics of RBV focus on the elusive concepts and criteria, the limits of its theoretical and managerial usefulness (see more: Kraaijenbrink et al., 2010; Foss – Knudsen, 2003; Priem – Butler, 2001), its empirical benefits outweigh the disadvantages:

- RBV helps to answer both the first and the second question of IT business value: concerning the existence and the process of IT business value creation;
- RBV sets out a clear – but sometimes indirect – link between resources and sustainable competitive advantage through a well defined, financially measurable dependent variable;
- with its internal focus RBV facilitates the identification, specification and classification of information systems resources, and also handles tangible and intangible resources the same way;
- using its competitive advantage criteria IS resources can be compared with one another and with non-IS resources (Wade – Hulland, 2004, p. 109-110.);
- while RBV accepts the commodity-like features of technology, it also allows complementary firm (human, management or business) resources to produce competitive advantage (Zhu – Kraemer, 2002);
- empirical evidence suggests, that RBV's explanatory power is higher than contingency theory's in the case of strategic or revenue-focused IT investments (Wonseok - Pinsonneault, 2007);
- as RBV is one of the mainstream theories in IT (value) research, it serves as a common language and facilitates comparison of results.

[2] Appendix A presents some statistics about the Hungarian e-commerce market..

Figure2. General model of IT value creation in the RBV framework
(based on Dehningh – Richardson, 2002 and Mellville et al., 2004)

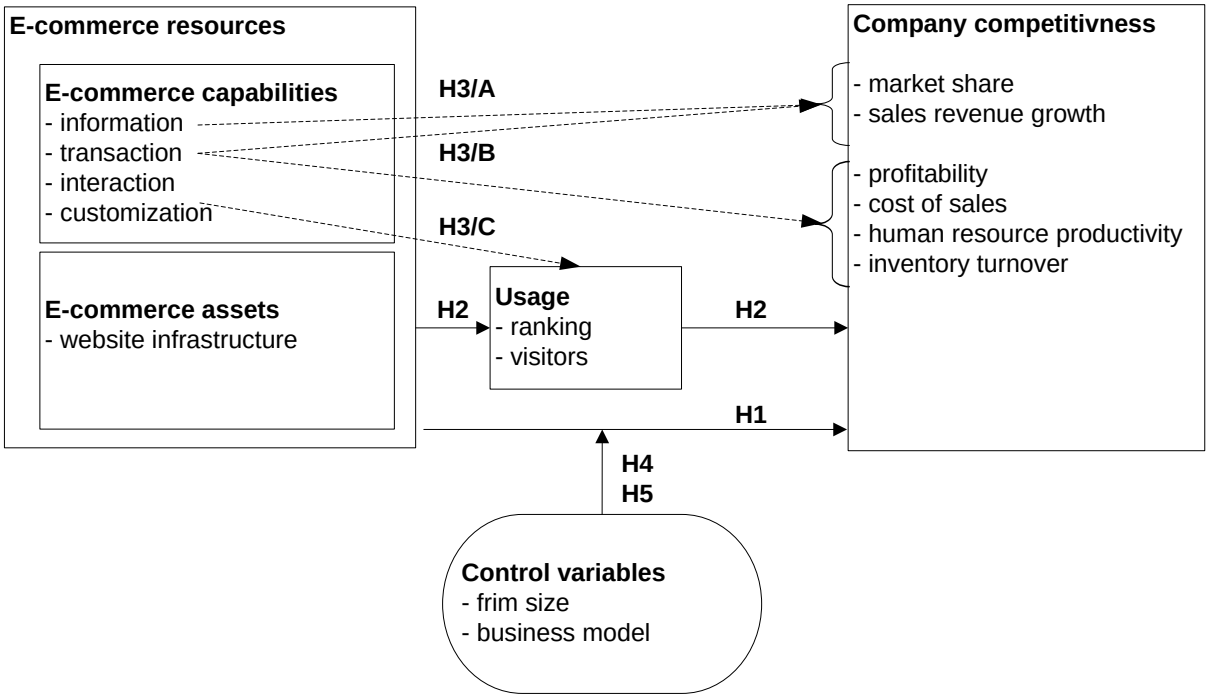


The basic model of resource-based view of IT business value creation is outlined in Figure 2. Some researchers have already explored the specific field of e-commerce value creation on RBV foundations, the models of Zhu – Kraemer (2002); Zhu (2004) and Marono-Cerdan – Soto-Acosta (2007) are the most similar to mine. My model (see Figure 4) fits into the general framework but uses e-commerce specific concepts and adds a new intermediate variable:

- The two IT resource categories in the model are e-commerce assets and e-commerce capabilities. The former category includes website infrastructure; while e-commerce capabilities are conceptualized through observable website functions (information-transaction-interaction-customization, see Zhu, 2004). I do not extend my research to organizational context, because of the large sample and my intention of using public data sources.
- Website usage is going to be the new mediator between the e-commerce resources and firm performance, explaining their potential relationship. The inclusion of usage into the IT business value research model is not unique (see Zhu – Kraemer, 2005), but e-commerce RBV literature has not adopted this concept yet.

3.2 Hypothesis Building

Figure 3. Research model and hypotheses



Based on the presented theoretic background, my forthcoming research is designed to test the following hypotheses in the Hungarian environment (as also illustrated by Figure 3):

H1: There is a positive relationship between firm level e-commerce capabilities and the company's competitiveness.

This first hypothesis is the basic translation of the resource-based view's main research question into the field of e-commerce value creation. Based on the different operationalization of the concept of competitiveness, we can test the following sub-hypotheses:

H1/A: There is a positive relationship between firm level e-commerce capabilities and the company's profitability.

H1/B: There is a positive relationship between firm level e-commerce capabilities and the company's market share.

A positive relationship between the aggregate measure of e-commerce capability and profitability margin or revenue-based market share measures is expected, and its absence would show the intangibility of the e-commerce effect or the lack of the effect's sustainability.

H2: Website usage is a significant intermediate variable explaining the relationship between e-commerce capabilities and firm competitiveness.

According to my assumptions, there is a strong positive relationship between e-commerce capabilities and customer perception or usage of the website, and as a next step usage can be easily linked to the performance of the website, especially through sales statistics. Including usage as an intermediary variable could extend our understanding of the e-commerce value creation process.

H3: Different milestones in the e-commerce capability building process have different effects on firm level financial performance.

This hypothesis is mainly based on professional intuition and is planned to be tested based on the different levels of e-commerce development.

H3/A: Creating information e-commerce capabilities from nothing is related to revenue growth.

H3/B: Upgrading basic information e-commerce capabilities to a transaction level is related to both revenue growth and sales efficiency.

H3/C: The interaction and customization capabilities are not directly related to the bottom-line financial performance of the firm, while these capabilities can have a direct effect on usage.

The first steps of e-commerce development is usually building information capabilities, using the company web-site as a marketing tool – this way affecting the firm performance mainly through the sales volume. (H3/A) On the other hand an effective transactional e-commerce function works as a new sales channel, and its positive effects should be seen in the sales revenue and in the cost of administration and sales or inventory turnovers as well. (H3/B) On the contrary, interaction and customization capabilities concentrate mainly on building a loyal customer base, they are more like future options or intangible assets, their effect on the company performance is more strategic, future-centric and elusive. (H3/C)

H4: Relationship between firm level e-commerce capabilities and company's competitiveness changes with firm size.

H5: Relationship between firm level e-commerce capabilities and company's competitiveness is different for pure e-tailer and bricks-and-clicks companies.

Considering the organizational context of e-commerce I plan to examine the moderating effect of firm size and business model. Especially the difference between

traditional companies also selling on-line (bricks-and-clicks) and the pure play e-tailers could be very interesting.

3.3 Research Plan

Table 4. Main characteristics of the research plan, using the system of Kauffman - Weill (1989)

Motivation	Focus	Caveats
> Purpose *Are the e-commerce resources associated with improved operational efficiencies or competitive advantage?* > Approach *Exploratory* > Theory base *Resource-based view*	> Unit of analysis *Firm (ICT retail industry)* > Locus of value *Firm level financial performance* > Data collection *E-commerce data: web crawlers* *Usage: ranking databases* *Financial data: secondary analysis of national databases*	> Measures *multiple measures for E-commerce resources, Usage and Financial Performance* > Data analysis *correlation and regression analysis, lineal structural equations, paired sample statistical test* > Organizational context *Firm size and retail model*

The main characteristics of the research are the following:

- **Population and sample**: I started with the population of Hungarian companies that are required to publish their annual report and submit it to the Ministry of Justice and Law Enforcement. With 34% of the retail company websites enable online shopping (KSH, 2008), retail is a traditionally e-commerce intensive sector, from which I chose an IT intensive subsector: ICT retail industry, selling hardware, software and telecommunication equipment. According to Hungarian market studies (Kis, 2009) ICT retail is one of the most popular e-commerce industry, along with book retail, travel or insurance services, but it is one of the less researched areas.
- **Conceptualization and operationalization**: Most of the core constructs, definitions and measures will be taken from previous research literature mentioned at the model building section.
    - *E-commerce resources*: I conceptualize firm level e-business resources as e-commerce capabilities and website infrastructure. E-commerce capabilities are measured by the widely used four-grade scale of (1) information, (2) transaction, (3) interaction and (4) customization. Similar concepts are used by other researchers, like: information-transaction-communication (Miranda – Banegil, 2004; Marono-Cerdan – Soto-Acosta, 2007); information-transaction-interaction-integration (Mojzes – Talyigás 2000; Zhu, 2002; Zhu

– Kraemer, 2004). Also similar e-commerce capabilities are measured by European and national ICT surveys (information-transaction-customization, see KSH, 2008). The 4 core capabilities are measured by the occurrence of a set of e-commerce-related key-words, where the list of keywords is based on previous research, expert interviews and tested on a small sample. E-commerce infrastructure is measured by some qualitative characteristics of the on-line system like type of the web-server and hosting quality.

- *Usage*: As there's no usage database for my sample, I have to use some proxy metrics estimating popularity of these websites. I plan to use public ranking databases for this purpose, where ranking criteria can be activity-based, reference-based or opinion-based (Lo – Sedhain, 2006). These could be the best accessible information sources concerning to website usage, even knowing that some of them are biased by the user community (Alexa rank) or based on references and links instead of real usage metrics (Google PageRank) or is very indirectly related to usage (SEO Score).
- *Competitiveness and financial measures*: The RBV theory usually operationalizes the competitive advantage construct in terms of above industry average profitability (see Clemons – Row, 1991 or Piccoli-Ives, 2005). The IT RBV literature uses many different metrics of competitiveness, what could also be the cause of inconclusive empirical results of the field. (Dao et al., 2007) Based on the system of traditional financial multiples (see Virág, 1996), the most common RBV performance categories (Aral – Weill, 2007) and the most popular metrics in the e-tailing industry (Zhuang – Lederer, 2003) I chose 3 types of financial metrics to represent the competitiveness and financial performance of the companies: (1) market metrics like revenue growth and market share, (2) profitability metrics like EBIT per sales, (3) efficiency metrics like inventory turnover, indirect cost of administration and sales or human resource productivity.

- **Data collection**:
  - *Primary data collection:* Web crawlers (see Chakrabarti, 2003) were created to explore the sampled websites and their e-commerce capabilities, using given key word sets and automated search mechanisms.
  - *Secondary data sources*: For usage measurement I plan to use some public website rankings as proxies, like Google PageRank and Alexa rank, using SEOQuake application as a data collection tool. Website infrastructure and quality data is based on the Wois website's public database (whois.domaintools.com). The financial data comes from public national sources (Ministry of Justice and Law Enforcement) and from business databases like 'Complex Céginfó'.

- **Analysis**: The adequate analytic method has to be chosen by the nature of the different hypotheses.

Table 5. Hypotheses and analytic methods

No.	Hypothesis	Analytic options
H1	There is a positive relationship between the firm level e-commerce capabilities and the company's competitiveness.	> correlation analysis > regression analysis > comparison to similar studies
H2	The website usage is a significant intermediate variable explaining the relationship between e-commerce capabilities and firm competitiveness.	> total and partial correlation coefficients > linear structural equation modeling
H3	Different milestones in the e-commerce capability building process have different effects on the firm level financial performance.	> correlation analysis > subsample analysis > paired sample analysis
H4	The relationship between the firm level e-commerce capabilities and the company's competitiveness changes with firm size.	> total and partial correlation coefficients > paired sample analysis
H5	The relationship between the firm level e-commerce capabilities and the company's competitiveness is different for pure e-tailer and bricks-and-clicks companies.	> paired sample analysis

- **Time frame**: As the research focus on the year 2009, the crawler-based data collection has to be done in the first months of 2010, this way representing the year-end state of e-commerce capabilities. Since the annual financial data about 2009 does not become public before June 2010, the merging of e-commerce and financial data cannot be started before the autumn of 2010. Data analysis and report writing are the key assignments for the winter 2010-2011. (See timeline and milestones in Appendix B.)

4. SUMMARY

In my research I analyze one outward-facing aspect of corporate IT systems: e-commerce, from the perspective of IT value creation. With the help of the resource-based view, I can ask questions about both the existence and process of e-commerce value creation, and also compare my Hungary-specific results to some similar empirical studies in Western Europe and USA. While my research concentrates on the ICT retail industry, it also has the advantage to fully explore the characteristics of this specific, e-commerce intensive segment.

I expect to see a positive correlation between market share and e-commerce capabilities, while I am not sure to see the same relationship in terms of profitability. Strong prize competition and the information advantage of customers would probably eat up the profit of the e-tailers, their efficiency advantage is competed away, but maybe firms with combined sales channels would not suffer from this phenomenon. I strongly believe that the introduction of usage measures is going to help us explaining either the existence or the lack of value creation. On the other hand, I think it is not going to be easy to confirm the dissimilar effects of the step-by-step e-commerce capability development. Size is expected to be strong modifying factor as the position of the dominant top 3-5 companies (strengthened by network effects) cannot easily be challenged, especially not without strong search optimization.

On the whole, I expect to see the e-commerce value creation of Hungarian companies more clearly, and to confirm or confute some of the myths regarding this phenomenon.

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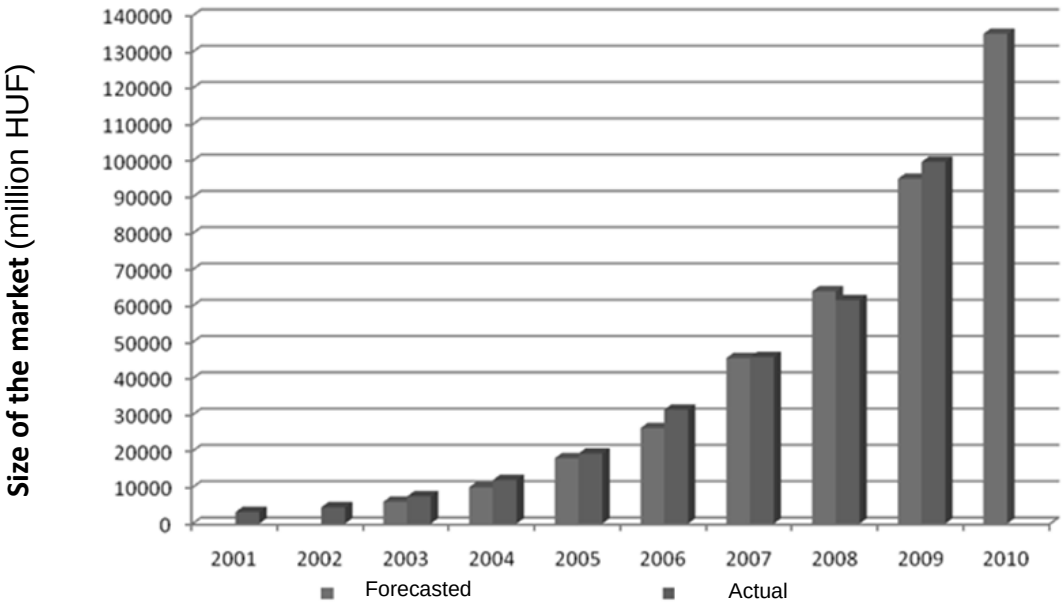
APPENDIX A – THE HUNGARIAN E-COMMERCE MARKET IN NUMBERS

Some key statistics about the Hungarian e-tailing market (Kis, 2009; GKIeNET, 2010):

- The size of the online retail market was about 225 million EUR in 2008 and 350 million EUR in 2009 (not including tourism and financial services; see Figure 5). In 2008 it meant 1 % of the total retail market.
- 72% of the total e-tailing revenue has been realizes through pure play e-tailers and 25% of it through brick-and-clicks. The average transaction value has been around 40 EUR in 2009.
- There were 2700 webshops present on the Hungarian market in 2009, but 90% percent of their sales was realized by the largest players with above 1000 visitors per day and yearly 4 million EUR gross revenue.
- In 2008 about 750 000 user, 20% of the population using internet, has bought something on the internet during the last year

Figure 4: Total sales of Hungarian webshops, 2001-2010 (GKIeNET, 2010)
(not including tourism and financial services)



The SME segment is especially relevant for my research as most of the companies in my sample belong to this category. The following statistics reveal some characteristics of the e-commerce usage of the Hungarian SMEs (Nemeslaki, 2007, p. 54.):

- The online procurement is more popular than online sales.

- 50% of the SMEs tend to realize an increase in the number of customers due to e-commerce applications.
- Firm size is positively correlated with the complexity of e-business solutions, but smaller firms are more positive about the effect of e-commerce solutions.

The following tables include some key statistics about the website and e-commerce penetration amongst Hungarian companies.

Table 6: Internet presence of Hungarian companies

	Drótos – Szabó, 2001	*KSH, 2008*	*KSH, 2008*	*KSH, 2008*	*KSH, 2008*
Presence on the internet	**2000**	**2005**	**2006**	**2007**	**EU avarage 2007**
The company does not have internet access	42,3%	23,8%	21,9%	15,0%	7,0%
The company does have internet access, but no website	30,3%	38,1%	38,3%	39,7%	30,0%
The company does have a website with only information functions	24,0%	33,6%	29,7%	30,4%	63,0%
The company has a website with business transaction functions	3,4%	4,5%	10,1%	14,9%	

Table 7: E-commerce capabilities of Hungarian corporate websites (based on KSH, 2008)

E-commerce capabilities	2005	2006	2007
Information	33,5%	37,5%	39,4%
Transaction	4,5%	10,1%	14,9%
Interaction	4,3%	2,8%	2,6%
Customization	1,9%	2,7%	2,0%

APPENDIX B – RESEARCH TIMELINE AND MILESTONES