INFORMATION TECHNOLOGY AND THE COMPANY PERFORMANCE IN THE SECTOR OF SERVICES

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Abstract
Presently, the weight of services sector is increasing in all economies and represents the main element of the gross domestic product in the developed countries. Consequently, in the last decennia, this sector captured the interest of researchers, both in academic and business media. Information Technology (IT) represents one of the most dynamic factors contributing to the technical progress in the design, process and supply of all categories of services. The theoretical and practical investigations already demonstrated the potential of the Information Systems adoption and implementation, to improve the organization performances (efficiency, productivity, organization competitiveness and development etc.). However, this potential is not always fully valued. The best performances could be achieved when the IT investments are aligned with internal capabilities and organizational processes within company strategy. The aim of this contribution is to review main published studies investigating the direct and indirect potential effects of IT on company performance in the service sector. There are also addressed issues regarding the measurement difficulties of the IT impacts on organization performance and the limitations generated by the service diversity and the fast dynamics of their market.

Keywords: *IT infrastructure, IT capabilities, information system, IT business value, Services*

JEL Classification: *IT Management M15, Information and Knowledge, Communication D83; Industry Studies: Services: General L800; Information and Internet Services L860;*

1. Introduction

The global competition and the increased volatility of the marketplaces have as main consequences the shortening of the products and service lifecycle, the tightening of performance standards and increased pressure on service customization. To face these challenges, the management of organizations put an increased emphasis on the role of information systems (IS). The IS evolved from the initial phase of automate back-office accounting functions and data provider supporting managerial decisions, to modern complex structures comprising hundreds of applications and databases networks, running on geographically distributed hardware platforms. As the private business investment in IT grew continuously, attaining in the last decade around 50% of all invested capital (according to Gu and Jung, 2013), the impact of this investment on business performance (IT business value) has become a matter of high interest. The objective of this work is to review the main published studies regarding the effect of IT investments on the firm performance (IT business value), with emphasis on the domain of services.

The first section is giving an introduction on IT infrastructure particularities, the second one is dedicated to the review of the literature approaching the IT business value and the third section presents the conclusion and several considerations. As terminology, we note that, even they are often used interchangeably, there is a difference of content between the IS and IT. IT is considered as the ensemble of means necessary to process, transmit and storing information, whereas IS represents a set of integrated software and procedures using IT to support business goals (Paschke et al., 2008).

2. IT resources, IT infrastructure (ITI) and ITI capabilities (ITIC)

Generally, the resources and capabilities are considered as two distinctive and tightly interrelated infrastructure components of a company. The *IT infrastructure* is defined by Weil and Vitale (2002) as the ensemble of four resources: *IT Components* (computers, printers, database software packages, operating systems, and scanners), *Human IT Infrastructure* (the human intelligence, experience, skills and standards used to integrate the IT components into services that business people can understand and use), *Shared IT Services* (a set of services that users can understand,

use and share, to conduct their business) and *Shared and Standard Applications* (stable applications such as human resource management, budgeting and accounting etc.). This internal IT infrastructure is linked to public infrastructures (such as the Internet and telecommunications networks) and to external industry-based infrastructures (such as bank payments systems, airline reservations systems, and automotive industry supply chain networks). The infrastructure of shared services is used to develop and run the business applications used inside the organization.

The connectivity to the data and applications of IT infrastructure can be defined in terms of the so-called 'reach and range'. 'Reach' refers to locations that can be accessed via the infrastructure, while 'range' determines the level of functionality that can be shared across each level of 'reach'.

The *ITI capability* is defined by Broadbent et al. (1999) as a combination of functionality (the ITI services offered firm-wide) and connectivity (identified by the infrastructure reach and range features). Bharadwaj (2000) defines the ITIC of an organization as "its ability to mobilize and deploy the IT based resources in combination or co-present with other resources and capabilities". Xianfeng et al. (2008) categorized the ITIC by *sharing capability*, (described in terms of "reach and range), *service capability* (ability to answer the firm business demands) and *flexibility* (the potential of the ITI to adapt to the new demands). Chen et al. (2014) consider the IT capability as a construct with six dimensions: *IT infrastructure, IT business partnerships, business IT strategic thinking, IT business process integration, IT management and external IT linkage.* As will be shown in the following paragraphs, the ITIC is predominantly considered as one of the main factors insuring the conversion of the IT investments into economic and strategic advantages for the firm.

3. IT/IS investments and firm performance

The main aspects regarding the business value of IT investments are common both for goods and services. Therefore, we'll present firstly the studies investigating the general issues valid for both entities, and thereafter, some specific aspects regarding the services.

A potential framework largely used to analyze the IT investments effects on firm performance is the resource-based view (RBV) of the firm. Following this theory, the assessment of firm strengths should start internally, by identifying a set of unique resources that could help it to achieve competitive advantage. The IS of the firm and its ITI capabilities were identified by an important number of studies as one of the main resources that could bring competitive advantage to the firm (Hitt and Brynjolfsson, 1996; Bharadwaj, 2000; Melville et al., 2004; Rivard et al., 2004; Wade and Hulland, 2004; Breznik (2012); Gu and Jung, 2013). In the studies approaching the subject of IT business value, the firm performance was considered under many different aspects.

An important number of studies considered indicators of the basic business process performance (so called intermediate process level measures) such as productivity, profit, cost reduction etc. (Bharadwaj, 2000; Devaraj and Kohli, 2003; Mithas et al., 2011 and 2012). Other studies used organizational level performance measures such as competitive position or market share value (Mata, 1995; Hitt and Brynjolfsson, 1996; Dehning and Richardson, 2002; Agan, 2011; Ceccobelli et al., 2012). Alternatively, the firm performance is sometimes defined by *the firm efficiency* (an internal standpoint, defined by cost reduction and productivity enhancement) or *the firm effectiveness* (denoting the achievement of objectives in relation to external environment and attainment of competitive advantages) (Melville et al., 2004).

Other studies, synthesizing the two definitions, define the IT business value by its impacts at both the intermediate process level and the organization-wide level (Melville et al., 2004; Addas and Pinsonneault 2007; Gu and Jung, 2013). Also, besides the productivity and profitability measures of firm performance, some studies are explicitly including measures of product or service quality in evaluation of the performance (Abugabah et al., 2009; Gu and Jung, 2013). An important number of studies analyzing the business value of IT/IS, are emphasizing the important role of the integration between the ITI capabilities and other organizational capabilities (Bharadwaj, 2000; Melville, 2004; Gu and Jung, 2013), as well as the importance of the alignment of IT objective to the business objectives of the company (Feeny & Willcocks, 1998; Tallon and Kraemer, 2003; Ness, 2005; Aversano et al., 2012).

A particular category of studies are investigating special factors regarding human IT resources: the individual behavior of personnel, its tool experience and readiness to learn new tools (Strong D.M., 2002; Abugabah et al., 2009; Bradley J., 2009).

Nevertheless, besides the works bringing arguments for the positive role of IT/IS investments, there are also different opinions. Carr (2003) argues that IT cannot provide differential advantage, being omnipresent, increasingly inexpensive and accessible to all firms, because it is the exclusivity that can generate competitive advantage. Apparently, such opinions originate from the reduction of the IT infrastructure to the basic resources (hardware and standard software) and common applications, by neglecting the organization ability and IT capability to specifically exploit these resources.

Several published studies and their main findings, regarding the business value of IT/IS investments, are synthesized in the Table 1.

Business value of IT/IS investments in service sector

At our knowledge, the number of published studies dedicated particularly to the assessment of IT/IS business values in the sector of services is relatively small. In one of these studies Anderson et al. (1997) analyzed the interrelationships between customer satisfaction, as a measure of quality and firm performance, differentiating among the goods and services. The authors distinguish two different qualities: (i) *customization* quality (that meets customer needs) and (ii) *standardization* quality (defined as *free of deficiencies*). Achieving both high productivity and customer satisfaction appears possible only when standardization of quality is feasible for producers and satisfactory for customers. However, when customer satisfaction is more dependent on particular characteristics, the productivity and customer satisfaction are more likely to be in conflict. The authors underline that "the inseparability of production and consumption, as well as intangibility of services, make standardization of quality more difficult and costly to improve, while maintaining customization quality".

Therefore, in the case of services, it should be found the best compromise (tradeoff) between customer satisfaction and productivity. Appropriate applications of IT may help a firm to become more productive and effective in satisfying its customers (setting-up a single process to produce a broader variety of products meeting a wide variety of customer needs).

Referring to the particularities of IT/IS service companies, Feeny & Willcocks (1998), underlined the strategic importance of three long-term challenges for IT company: the design of IT, delivery of IT services, and strategic alignment and business vision. In order to be competitive, the companies must retain the capacity to continuously adjust their positioning in each area, adapting their business strategy, IT infrastructure (platforms etc) for delivering IT services appropriate for market demands.

Emphasizing the role of IT in the overall domain of services in USA, Triplett and Bosworth (2003) indicate that **"**Regardless of the definition of IT and the definition of IT-intensity ...the most intensive IT industries in the U.S. economy are overwhelmingly services industries". The authors found that IT investment in the sector of services was associated with a rapid productivity increase, and the IT positive influence on labor productivity in the services industries, started before 1995. In a companion paper (Bosworth and Triplett, 2007), the same authors are bringing new data accenting the role of IT/IS in the sector of services. They identified that 80 % of the total contribution of IT to cumulative increase of USA labor productivity, after 1995, arises from IT's contribution in the services industries. Similar statements regarding the role of IT in service industries are released by the Asian Productivity Organization (http://www.apo-tokyo.org/productivity/mp_006.htm): "The role of ICT in service industries is two-fold. First, it provides an enabling technological platform to create and launch new service products...Second, by providing a cost-effective, time-efficient, borderless medium to store, present, and transmit information.... Service industries can be a leading sector driving productivity growth and development if ICT can be successfully assimilated and exploited". Besides this category of studies, there are also more reticent opinions regarding the role of IT/IS in the sector of services.

From a statistical analysis referring to the OECD countries, Wölfl (2003) found that, in the service sector can not be found indications for a positive correlation between the use of ICT and productivity growth. These different results in the evaluation of IT business value could be explained by differences in the methodologies and data used for measurement of services productivity (van Ark, 2004). Further studies are therefore necessary in order to develop unitary analysis frameworks and to draw definite conclusions regarding the role of IT in the sector of services.

4. Conclusions

The majority of published works investigating the business value of IT/IS investments indicate that IT resources represent a strategic asset for the firm, irrespective of the industry (goods or services). However, valorizing the potential of these resources involves the development of special IT managerial and technical capabilities inside the firm, the alignment of IS objective to those of the business and integration of IT capabilities with non-IT organizational capabilities. In the sector of services, when customer satisfaction is more dependent on particular characteristics, the productivity of the firm and customer satisfaction are not congruent.

In such conjectures, appropriate applications of IT may help to develop processes able to produce a broader variety of products, meeting a wide variety of customer needs.

A relatively smaller number of studies investigating the IT value of the firm, evidenced also less-conclusive or even negative results.

These are explained by the complexity of the problem, its specificity for each firm, and dependence on the methodology used. Therefore further researches in this field are necessary, in the aim of developing new and better conceptual models, explaining the mechanisms of IT resource influence on firm performances.

Table 1. IT/IS Investments and firm performance

Authors	Firm performance	IT/IS	Main results
Hitt and Brynjolfsson (1996)	- Return of assets; Return on equity; Sales growth; Market share; IT stock/employees;	IT stock (computer capital plus 3 times IS labor).	IT investments can increase the firm productivity and contribute to consumer benefit, by better services and lower prices, but this is not necessarily improving profitability.
Bharadwaj (2000)	- firm profit factors; - cost-based indicators.	IT infrastructure; Human IT resources and IT enabled intangibles.	IT/IS has role of organizational capability , created by the synergy between IT and other organizational resources. An empirical analysis evidenced a significant association between superior IT capability and superior firm performance.
Dehning and Richardson (2002)	- Return on assets; - Market share value.	- IT spending; - IT strategy - IT management/ capability.	(i) The stock market is reacting positively to announcements of IT related expenditures, strategic IT investments or investments in IT management capability. (ii) Generally, there is a positive relation between IT spending and the market value of the company. (iii) On the average, IT is merely contributing to increase the productivity than the profitability of the firm. (iv) Increasing the IT management capability increases the profitability potential of the firm and its competitive advantages.
Dedrick et al., (2003)	All factors influencing firm productivity and firm profitability	IT infrastructure and IT human resources investments	Greater investment in IT is associated with greater productivity growth. The wide range of performance of IT investments among different organizations can be explained by complementary investments in organizational capital such as decentralized decision-making systems, job training, and business process re-design. IT is an enabler of organizational changes that can lead to additional productivity and financial gains.
Kohli and Devaraj (2003)	Variables influencing firm productivity and profitability	IT capital, IT infrastructure and IT human resources investments	The study examines the structural variables that affect IT payoff through a meta-analysis of 66 firm-level empirical studies between 1990 and 2000. The findings seem to depend on the sample size, data source (firm-level or secondary), industry type (goods or services), the choice of the dependent variables, type of statistical analysis and whether the study adopted a cross-sectional or longitudinal design.
Melville et al. (2004)	- Efficiency of specific business processes; - Organization performance (productivity, efficiency, profitability, market value, competitive advantage etc.)	- Technical IT infrastructure capabilities; - Human IT infrastructure capabilities.	It was developed an integrative model, explaining the potential business value of IT (not tested). The model includes elements of three domains: focal firm, the competitive environment and the macro-environment. IT is a valuable resource, but its business value is depending upon internal and external factors, like the complementary (non-IT) resources of the firm, the trading partners and the competitive environment.
Lim et al., (2004)	- Market measures (firms share value on the market); - Accounting measures.	IT investment; IT spending; IT staff expenditures.	(i)There is positive a relation between IT investment and firm performance; (ii) There are not arguments for the assertion that relation between IT investment and firm performance differs between an early period (1990 – 1995) and a more recent period (1996-2001); (iii) There is a positive relation between IT investment with market measurements; (iv) The IT intensive using industry has more positive IT payoffs than non information-intensive industry; (v) Small firms have statistically more positive IT payoffs than the large firms.
Addas and Pinsonneault (2007)	Variables defining firm profitability and its market value.	− IT infrastructure capabilities; - IS business partnerships;	The performance of the firm is mainly influenced by five IT capabilities: (i) IT-business partnerships (ii) Business-IT strategic thinking; (iii) IT management; (iv) IT infrastructure; (v) Solutions delivery.
Lui and Piccoli (2009)	Customer satisfaction and derived firm advantages	ITI and its technical and human capabilities;	The authors investigate the advantages of the IT-enabled customer service systems (IS providing supplementary customer services). Their main attributes are data quality and IS quality.
Coltman et al. (2009) Reimann and Schilke (2010).	- Return on investment; - Cost reduction; - Level of repeat business with valuable customers.	- IT infrastructure; - Human IT capabilities	It is investigated the interdependence between IT, customer relationship management (CRM) and firm performance. CRM has the greatest impact on firm performance when IT resources are combined with organizational capabilities and the firm objectives jointly emphasize customer intimacy and cost reduction.
Mithas et al. (2011)	Customer-focused performance; financial and market performance (revenue, profits, market position, cash-to-cash cycle time, earnings per share); organizational effectiveness (time to market, level of innovation).	Information Management Capability (information quality, data connectivity, IT infrastructure flexibility)	It is developed a conceptual model linking IT-enabled information management capability with the firm performance. This link is mediated by three organizational capabilities: customer management capability, process management capability, and performance management capability. The information management capability has a significant role in improving the three business related capabilities of the firm, and through these, the overall firm performance.
Agan (2011)	- financial performances; - operational and customer-based firm performance.	Technical IT capabilities; Human IT infrastructure capabilities.	The study demonstrates that the integration of supply chain is a higher level capability of the firm, created by cross-functional integration of operations capabilities (partner selection, collaboration, learning and human resources), IT capabilities and marketing capabilities (customer orientation and competitor orientation) in order to achieve competitive advantage.
Ceccobelli et al (2012); Dimelis and Papaioannou (2011)	Labor productivity ;	- Information technology and communication capital;	The authors analyzed comparatively the effect of IT growth on industry productivity in the US and EU countries. The growth contribution of IT was significantly positive in both regions. IT capital has a potential to increase the productivity, and the differences in this area may contribute to the widening the productive gap among EU countries and between EU and USA.
Ada et al. (2012)	Firm productivity, labor productivity, value added, cost reduction. Return on assets, return on equity, revenues, profitability, sales and sales growth, net income.	IT infrastructure and IT human resources investments	IT's impact on firm performance is positive in various conditions. Firm size moderates the relationship between IT and firm-level outcomes in almost all of the cases (large firms get more benefits from IT than small firms).The industry type (i.e., service or manufacturing) have also a moderating effect on firm performance. The same moderating effect was identified for firm performance measures (i.e., productivity and profitability).

Authors	Firm performance	IT/IS	Main results
Breznik (2012)	Competitive advantage	ITI and all its capabilities	In a review paper, the author is investigating the effect of IT investments on the competitive advantage of the firm. Even most research indicates a positive impact of IT on competitive advantage, some research has been inconclusive or even evidenced a negative relationship.
Gu and Jung (2013)	Revenue, cost, profitability and competitive advantage.	IS capabilities (IS planning, IS flexibility, acquisition, development, operation, and support). IS qualities, satisfaction and usefulness	It was developed a global model integrating the RBV theory with the IS success model of DeLone and McLean, in order to provide a more comprehensive view of IS (IT) effects on firm performance. Besides the IS resources and capabilities, some beneficial IS effects could be generated by the synergies between IS and other organization resources (complementary resources).
Abouzeedan and Busler, 2006; Consoli (2012); Tarutė and Gatautis (2014); Lim and Trim (2014)	Productivity and profitability	General IT infrastructure	These studies are investigating the issue of IT business value in SMEs. IT investments can improve overall, financial and operational performance of SMEs, if used appropriately. Having a flexible IT infrastructure positively influences the competitive advantage of the firm. However SMEs are facing with important factors limiting their access to IT: high initial investment and difficulty in the access to credit; lacks of skilled staff and coherent strategy for assimilate the dynamic technology.

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