

Abdelkader, Berrich; Abed, Benkaddour

Article

The effect of information technology on competitive advantage of firm: The role of environmental uncertainty

The International Journal of Management Science and Information Technology (IJMSIT)

Provided in Cooperation with:

North American Institute of Science and Information Technology (NAISIT), Toronto

Suggested Citation: Abdelkader, Berrich; Abed, Benkaddour (2016) : The effect of information technology on competitive advantage of firm: The role of environmental uncertainty, The International Journal of Management Science and Information Technology (IJMSIT), ISSN 1923-0273, NAISIT Publishers, Toronto, Iss. 22, pp. 16-39

This Version is available at:

<https://hdl.handle.net/10419/178831>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

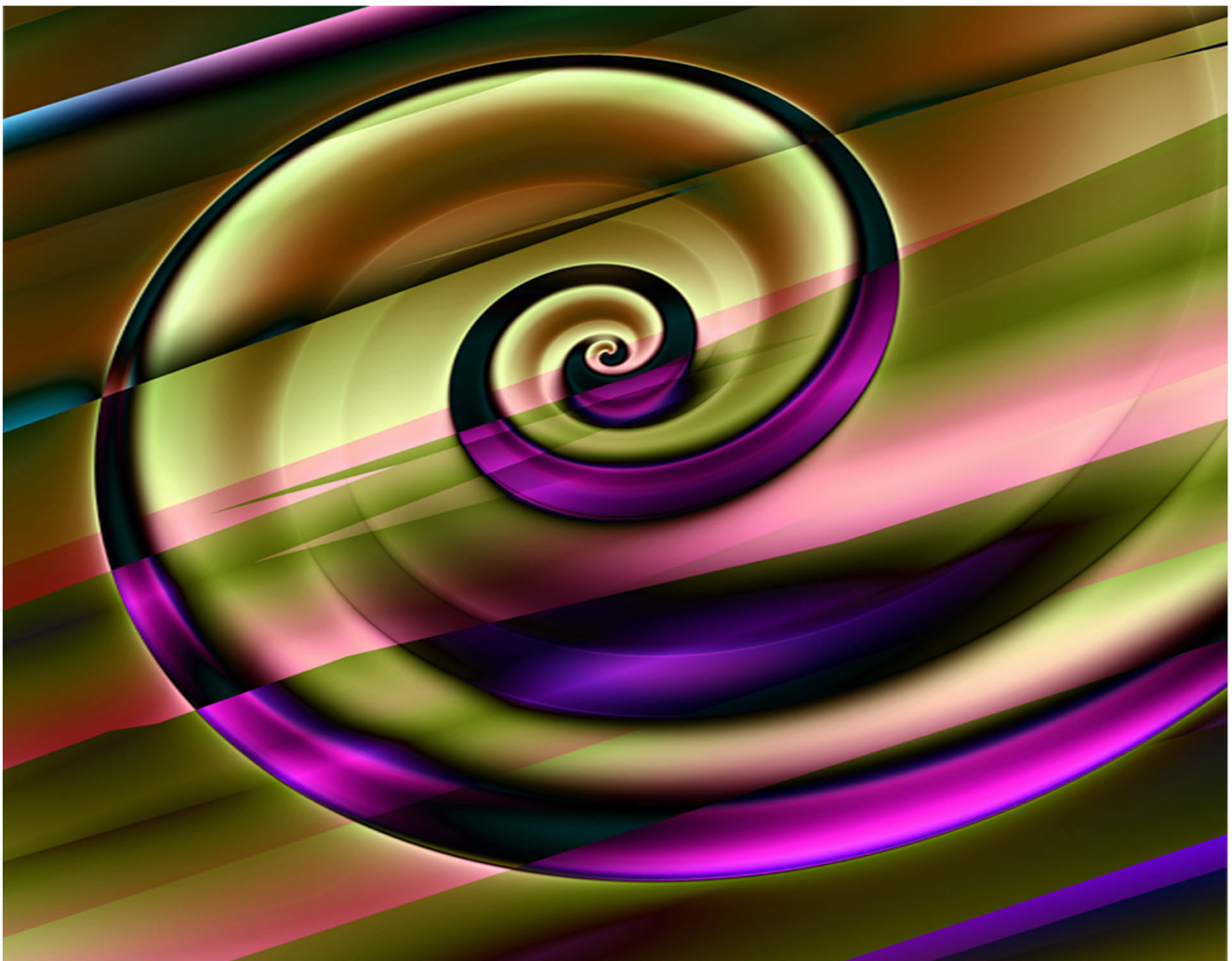
If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

An official publication of The North American
Institute of Science and Information Technology

ISSN:1923-0265

INTERNATIONAL JOURNAL OF

Management Science and Information Technology



NAISIT
PUBLISHERS **III**

www.naisit.org

The International Journal of Management Science and Information Technology (IJMSIT)

NAISIT Publishers

Editor in Chief

J. J. Ferreira, University of Beira Interior, Portugal, Email: jjmf@ubi.pt

Associate Editors

Editor-in-Chief: João J. M. Ferreira, University of Beira interior, Portugal

Main Editors:

Fernando A. F. Ferreira, University Institute of Lisbon, Portugal and University of Memphis, USA

José M. Merigó Lindahl, University of Barcelona, Spain

Vanessa Ratten, La Trobe University, Melbourne, Australia

Assistant Editors:

Cristina Fernandes, Polytechnic Institute of Castelo Branco, Portugal

Jess Co, University of Southern Queensland, Australia

Marjan S. Jalali, University Institute of Lisbon, Portugal

Editorial Advisory Board:

Adebimpe Lincoln, Cardiff School of Management, UK

Aharon Tziner, Netanya Academic College, Israel

Alan D. Smith, Robert Morris University, Pennsylvania, USA

Ana Maria G. Lafuente, University of Barcelona, Spain

Anastasia Mariussen, Oslo School of Management, Norway

Christian Serarols i Tarrés, Universitat Autònoma de Barcelona, Spain

Cindy Millman, Business School -Birmingham City university, UK

Cristina R. Popescu Gh, University of Bucharest, Romania

Dessy Irawati, Newcastle University Business School, UK

Domingo Ribeiro, University of Valencia, Spain

Elias G. Carayannis, Schools of Business, USA

Emanuel Oliveira, Michigan Technological University, USA

Francisco Liñán, University of Seville, Spain

Harry Matlay, Birmingham City University, UK

Helen Lawton Smith, Birkbeck, University of London, UK

Irina Purcarea, Adjunct Faculty, ESC Rennes School of Business, France

Jason Choi, The Hong Kong Polytechnic University, HK

João Ricardo Faria, University of Texas at El Paso, USA

Jose Vila, University of Valencia, Spain

Kiril Todorov, University of National and World Economy, Bulgaria

Louis Jacques Filion, HEC Montréal, Canada

Luca Landoli, University of Naples Federico II, Italy

Luiz Ojima Sakuda, Researcher at Universidade de São Paulo, Brazil

Mário L. Raposo, University of Beira Interior, Portugal

Marta Peris-Ortiz, Universitat Politècnica de València, Spain

Michele Akoorie, The University of Waikato, New Zealand

Pierre-André Julien, Université du Québec à Trois-Rivières, Canada

Radwan Karabsheh, The Hashemite University, Jordan

Ricardo Chiva, Universitat Jaume I, Spain

Richard Mhlanga, National University of Science and Technology, Zimbabwe

Rodrigo Bandeira-de-Mello, Fundação Getulio Vargas – Brazil
Roel Rutten, Tilberg University - The Netherlands
Rosa Cruz, Instituto Superior de Ciências Económicas e Empresariais, Cabo Verde
Roy Thurik, Erasmus University Rotterdam, The Netherlands
Sudhir K. Jain, Indian Institute of Technology Delhi, India
Susana G. Azevedo, University of Beira Interior, Portugal
Svend Hollensen, Copenhagen Business University, Denmark
Walter Frisch, University of Vienna, Austria
Zinta S. Byrne, Colorado State University, USA

Editorial Review Board

Adem Ögüt, Selçuk University Turkey, Turkey
Alexander B. Sideridis, Agricultural University of Athens, Greece
Alexei Sharpanskykh, VU University Amsterdam, The Netherlands
Ali Kara, Pennsylvania State University -York, York, USA
Angilberto Freitas, University of Grande Rio, Brazil
Arminda do Paço, University of Beira Interior, Portugal
Arto Ojala, University of Jyväskylä, Finland
Carla Marques, University of Trás-os-Montes e Alto Douro, Portugal
Carla Pereira, University of Beira Interior, Portugal
Cem Tanova, Çukurova University, Turkey
Cristiano Tolfo, Universidade Federal de Santa Catarina, Brazil
Cristina S. Estevão, Polytechnic Institute of Castelo Branco, Portugal
Dario Miocevic, University of Split, Croatia
Davood Askarany, The University of Auckland Business School, New Zealand
Debra Revere, University of Washington, USA
Denise Kolesar Gormley, University of Cincinnati, Ohio, USA
Dickson K.W. Chiu, Hong Kong University of Science and Technology, Hong Kong
Domènec Melé, University of Navarra, Spain
Dina Miragaia, University of Beira Interior, Portugal
Emerson Mainardes, FUCEPE Business School, Brazil
Eric E. Otenyo, Northern Arizona University, USA
George W. Watson, Southern Illinois University, USA
Gilnei Luiz de Moura, Universidade Federal de Santa Maria, Brazil
Jian An Zhong, Department of Psychology, Zhejiang University, China
Joana Carneiro Pinto, Faculty of Human Sciences, Portuguese Catholic University, Lisbon, Portugal
Joaquín Alegre, University of Valencia, Spain
Joel Thierry Rakotobe, Anisfield School of Business, New Jersey, USA
Jonathan Matusitz, University of Central Florida, Sanford, FL, USA
Kailash B. L. Srivastava, Indian Institute of Technology Kharagpur, India
Karin Sanders, University of Twente, The Netherlands
Klaus G. Troitzsch, University of Koblenz-Landau, Germany
Kuiran Shi, Nanjing University of Technology, Nanjing, China
Liliana da Costa Faria, ISLA, Portugal
Luiz Fernando Capretz, University of Western Ontario, Canada
Lynn Godkin, College of Business, USA

Maggie Chunhui Liu, University of Winnipeg, Canada
Marcel Ausloos, University of Liège, Belgium
Marge Benham-Hutchins, Texas Woman's University, Denton, Texas, USA
María Nieves Pérez-Aróstegui, University of Granada, Spain
Maria Rosita Cagnina, University of Udine, Italy
Mayumi Tabata, National Dong Hwa University, Taiwan
Micaela Pinho, Portucalense University and Lusíada University, Portugal
Paolo Renna, University of Basilicata, Italy
Paula Odete Fernandes, Polytechnic Institute of Bragança, Portugal
Paulo Rupino Cunha, University of Coimbra, Portugal
Peter Loos, Saarland University, Germany
Pilar Piñero García, F. de Economía e Administración de Empresas de Vigo, Spain
Popescu N. Gheorghe, Bucharest University of Economic Studies, Bucharest, Romania
Popescu Veronica Adriana, The Commercial Academy of Satu-Mare and The Bucharest University of Economic Studies, Bucharest, Romania
Ramanjeet Singh, Institute of Management and Technology, India
Ricardo Morais, Catholic University of Portugal
Ruben Fernández Ortiz, University of Rioja, Spain
Ruppa K. Thulasiram, University of Manitoba, Canada
Soo Kim, Montclair State University, Montclair, NJ, USA
Wen-Bin Chiou, National Sun Yat-Sem University, Taiwan
Willaim Lawless, Paine College, Augusta, GA, USA
Winston T.H. Koh, Singapore Management University, Singapore

The International Journal of Management Science and Information Technology (IJMSIT)

NAISIT Publishers

Issue 22 - (Oct-Dec 2016)

Table of Contents

- 1 **ORGANIZATIONAL EFFECTIVENESS OF DATA CENTERS - A FOUNDATION FOR EFFECTIVE CLOUD ARCHITECTURES**
AJAY AHUJA, Indian Institute of Technology (IIT) Delhi, India
- 16 **THE EFFECT OF INFORMATION TECHNOLOGY ON COMPETITIVE ADVANTAGE OF FIRM: THE ROLE OF ENVIRONMENTAL UNCERTAINTY**
BERRICH ABDELKADER, High School of Commerce , Algeria
BENKADDOUR ABED , Faculty of Economic, Commerce, and Management Sciences, Algeria
- 40 **ENTREPRENEURSHIP AND EDUCATION IN THE EUROPEAN UNION - STUDENTS' PERCEPTION ON THE SUBJECT**
HELENA I. B. SARAIVA , Polytechnic Institute of Guarda , Portugal
VÍTOR M. S. GABRIEL , Polytechnic Institute of Guarda , Portugal
- 59 **PROBABILISTIC AND DETERMINISTIC DATA LINKAGE FOR DATA GOALS MODEL IN RELATION TO THE ORGANIZATION GOALS**
TENGGU ADIL TENGGU IZHAR, Universiti Teknologi MARA , Malaysia
TORAB TORABI, La Trobe University, Australia
M. ISHAQ BHATTI, La Trobe University, Australia

This is one paper of
The International Journal of Management Science and
Information Technology (IJMSIT)
Issue 22 - (Oct-Dec 2016)

The effect of information technology on competitive advantage of firm: the role of environmental uncertainty.

BERRICH Abdelkader

PhD in Economic Sciences
Professor in High School of Commerce
Algeria

Email: a_berriche@esc-alger.dz

BENKADDOUR Abed

Magister in Marketing
PhD Student in Economic Sciences
Faculty of Economic, Commerce, and Management Sciences.
University of Algiers 3

Email: benkaddourabed2@gmail.com

Abstract:

The aim of this study is to assess the relationship between IT and the competitive advantage of firms. Beside the adoption of Resource-Based View (RBV) as a theoretical framework, this work tries to find out the moderation effect of environmental uncertainty, as a contextual variable in the relationship between IT and competitive advantage of firm.

Using data from 36 Algerian firms and multiple regression analysis with *Process Macro*, the regression analysis show no moderation effect of environmental uncertainty in the relationship between IT and competitive advantage (even the model is statistically significant), probably due to the small sample size adopted.

Finally, this work drives its importance from the multiple dimensions adopted in measuring IT from IS literature, which is compatible with the complementarity of resources that leads to competitive advantage of firms according to Resource-Based View. Moreover, even the small dataset used in this study, this last contribute to the field of research when it try to explain competitive advantage of the firm from inside (resources) and outside (environment) perspectives.

Keywords: Information technology, IT infrastructure, IT technical skills, IT business partnership, competitive advantage, environmental uncertainty.

I. Introduction:

Information technology (IT) has become an essential element of firm capability and a source of sustainable competitive advantage. Although it is widely accepted that IT resources contribute to performance and future growth potential of the firm, the empirical results of the relationship between IT investments and firm performance is still ambiguous (Bharadwaj *et al.*, 1999).

Some scholars claim IT can be a source of competitive advantage and its impact can be either direct or indirect (Swamidass and Kotha, 1998). But in the other hand, there is a widely held belief among the management community that any performance advantage granted by IT is short lived because computer-based information systems (IS) are easily replicated (Dehning and Stratopoulos, 2003). According to Carr 2003, IT investments can't lead to competitive advantage, because IT is becoming a commodity (with an increased availability and decreased cost). Some even argue that IT has a negative impact on firm performance and thus on the created competitive advantage (Breznik, 2012).

In addition, new technologies, global competition, and increased customer demands are forcing organizations to reconsider how they can take advantage of IT resources (Marinagi *et al.*, 2014). So the most successful companies at present are those that have a firm grasp of their IT potential and are leveraging that potential as much as possible. Companies can no longer differentiate themselves strictly by products and price as was the age-old practice, but now have to be more creative. The use of IT as a competitive weapon and also as a strategic weapon will be that new differentiation tool (Bobb and Harris, 2011).

In this paper, we explore moderation effect of environmental uncertainty in the relationship between IT and competitive advantage of 36 firms at three regions of Algeria: Algiers, Blida, and Chlef.

II. Theoretical background:

II-1. Competitive advantage definition:

Competitive advantage is perhaps the most widely used term in strategic management, yet it remains poorly defined and operationalized. Ma (2000) makes three observations regarding competitive advantage and conceptually explores the various patterns of relationship between competitive advantage and firm's performance, namely: (i) competitive advantage does not equate to superior performance; (ii) competitive advantage is a relational term; and (iii) competitive advantage is context-specific.

In spite of the vast conceptual and empirical study conducted on the notion of competitive advantage, Flint and Van Fleet (2005) nonetheless argue that there is no clear definition of competitive advantage (CA) that is applicable in general term i.e. applicable in any dimension or criteria (Che ROSE *et al.*, 2010).

According to Barney (1991), a firm is said to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors.

Porter says "competitive advantage is at the heart of a firm's performance in competitive markets" and goes on to say that purpose of his book on the subject is to show "how a firm can actually create and sustain a competitive advantage in an industry—how it can implement the broad generic strategies." Thus, competitive advantage means having low costs, differentiation advantage, or a

successful focus strategy (Porter, 1980). In addition, Porter argues that “competitive advantage grows fundamentally out of value a firm is able to create for its buyers that exceeds the firm’s cost of creating it” (Rumelt, 2003).

On the other hand, according to Besanko *et al.* (2000), when a firm earns a higher rate of economic profit than the average rate of economic profit of other firms competing within the same market, the firm has a *competitive advantage* in that market. They also carefully define economic profit as “the difference between the profits obtained by investing resources in a particular activity, and the profits that could have been obtained by investing the same resources in the most lucrative alternative activity.”

Ma (1999), support that a firm’s competitive advantage often arises from one or more of the following three sources: (i) ownership-based which refers to any assets or factors under a firm’s possession from which this firm could gain an upper hand *vis-à-vis* its rivals in better serving customers; (ii) proficiency-based that refers to the knowledge, competence, and capabilities of a firm which enable it to conduct its business processes more effectively and/or efficiently than do rivals; (iii) access-based which means the possibility of a firm enjoys competitive advantage over rivals because it has more superior access to the factor markets, i.e. resource input, and/or product market, i.e. customers than do rivals or it has such access that is at all available to rivals.

According to resource-based view of the firm (Wright *et al.*, 1993), competitive advantage can only occur in situation of firm resource heterogeneity and firm resource immobility, and these assumptions serve to differentiate the resource-based view from the traditional strategic management model “industry structure model of Porter (Porter, 2007), for example”.

II-2. Information technology definition:

The concept of Information Technology (IT) is central to the Information Systems discipline. The diverse capabilities of this technology and its pace of evolution are at the core of the information systems management problem. In view of this centrality, according to Bakopoulos (1985) it is surprising that we do not have a definition or characterization of information technology in terms that allow us to compare and contrast systems and generalize results across studies.

IT refers to a wide range of computerized technologies that enables communication and the electronic capturing, processing, and transmission of information. These technologies include products and services such as desktop computers, laptops, hand-held devices, wired or wireless intranet, business productivity software, data storage and security, network security etc (Binuyo & Aregbeshola, 2014).

IT is the combination of telecommunication and computing to obtain, process, store, transmit and output information in the form of voice, picture or text. This includes the following (ITL Education Solution Limited, 2006):

- ❖ Software applications and operating systems;

- ❖ Web-base information and application such as distance learning;
- ❖ Telephones and means of telecommunications;
- ❖ World Wide Web;
- ❖ Electronic devices such as photocopiers.

Furthermore, Tansey (2003), distinguish between a broad modern sense and narrow sense of IT. The first one encompass both computing and telecommunication technologies, but the second refer principally to computing and “ICTs” to refer to information and communication technologies more generally.

According to Reynolds (2010), an organization’s defined a set of IT hardware, software, and networks is called its **IT infrastructure**. An organization also requires a staff of people called **IT support organization** to plan, implement, operate, and support IT. In many firms, some or all technology support may be outsourced to another firm.

Finally, as Porter and Miller (1985) said, IT is more than just computers. Today, IT must be conceived of broadly to encompass the information that businesses create and use as well as a wide spectrum of increasingly convergent and linked technologies that process the information. In addition to computers, then, data recognition equipment, communications technologies, factory automation, and other hardware and services are involved.

Based on IS literature we divided IT into four categories: IT infrastructure, IT technical skills, IT managerial skills, and IT partnership quality. In the following a short definition of these categories:

- IT infrastructure: Broadbent and Butler (1997), define IT infrastructure as “the base foundation of IT capability, delivered as reliable services shared throughout the firm and coordinated centrally, usually by the information systems group”;
- IT technical skills: this IT skills refer to the expertise needed to build and use IT applications (Dehning and Stratopoulos, 2003).
- IT managerial skills: technical skills are not the only skills required to build and use IT applications. A second broad set of skills are managerial skills. In the case of IT, managerial skills refer to management’s ability to conceive, develop, and exploit IT application, in order to support and enhance other business functions (Mata *et al.* 1995).
- IT-business partnership: or IT-business alignment refers also to applying IT in an appropriate and timely way, in harmony with business strategy, goals and needs (Luftman, 2000). In other words, it refer to the extent to which the IT mission, objectives, and plans support and are supported by, the organization mission, objectives, and plans (Reich and Benbasat, 2000).

II-3. Environmental uncertainty definition:

The nature of the relationship between an organization and its environment has always been a hot topic in management research, and the construct of

environmental uncertainty has been a focus to most of this inquiry. However, the definition of environmental uncertainty made by scholars was still inconsistent (Wu, 2010). Ashill and Jobber (2013), define uncertainty as: “the inability to predict the state of the external environment due to lack of information”. Also, Krishnan and Martin (2006), define environmental uncertainty as: “a changes in economic conditions faced by an organization that outside of its control and hard of anticipate”.

Moreover, uncertainty may be viewed in a binary way. It is either that the environment is certain and therefore can be easily predicted, or it is uncertain and therefore extremely difficult to predict. But this view clearly underestimates uncertainty. There is a lot in between uncertainty and certainty. Following is a framework for determining the extent of uncertainty (Jabnoun *et al.* 2003):

- Low uncertainty: In this situation, changes in the environment affecting the uncertainty factors are low (that is, low environmental dynamism). Also, there are few elements influencing the uncertainty factors (low level of complexity). In this situation, for instance, changes in consumer tastes are low, possibly due to there being few factors influencing demand (an uncertainty dimension). Typically, because of the low level of uncertainty, predicting the future is easy in this circumstance. And, the management team is aware of the possible states of occurrences and can encode probabilities in each of the states.
- Moderate uncertainty: This situation combines high complexity and low dynamism or low complexity and high dynamism.
- High uncertainty: In this situation the environment is highly complex and dynamic and the interconnections between the components of the environment and the organization are unclear. This high level of uncertainty makes decision making difficult. The telecommunications industry, for instance, is facing several uncertainties relating to technology, demand, government regulations, and a host of other macroenvironmental variables. All these uncertainties interrelate in capricious ways making it virtually impossible to predict the environment and develop plausible strategic decisions.

II-4. Previous studies on the relationship between IT and competitive advantage:

In a series of articles and two books, Strassman (1990) presents the results of his findings and the findings of several other studies. The conclusion he draws is that there is no identifiable association between expenditures on IT and profitability, and this relation has not changed for more than 20 years. This phenomenon called “*IT productivity paradox*” (Brynjolfsson, 1993) or “*Solow paradox*” (Robert Solow said: “*You can see the computer age everywhere but in the productivity statistics*” (Isbell, 2001).

Naturally, the value of IT has become undisputed at the macro level, yet at the micro level the question of whether IT can provide benefits to firm performance remains unsettled (Breznik, 2012).

In a content analysis of fourteen published case study Neo (1988) founded that it is important for an organization's existing system using IT for competitive advantage. This study confirms the importance of customer needs and management support as factors facilitating the use of IT for competitive advantage.

By investigating the relationship between IT and firm performance, Powell and Dent-Micallef (1997) found that IT alone has not produced sustainable performance advantage in retail industry. But that some firms have gained advantages by using IT to leverage intangible, complementary human and business resources such as flexible culture, strategic planning–IT integration, and supplier relationships. The results of this study support the resource-based approach, and emphasize the importance of the complementarity of firm resources (with IT) for reaching and sustaining competitive advantage.

Also, Bhatt *et al.* (2005), distinguished between value, competitive, and dynamic capabilities as three distinct types of capabilities. Within each type, they identified specific capabilities, such as quality of IT infrastructure, IT business experience, relationship infrastructure, and intensity of organizational learning. The result shown that the quality of IT infrastructure did not have any significant effect on competitive advantage, while the quality of IT business expertise and the relationship infrastructure (competitive capabilities) did. The results of the study also indicate that the intensity of organizational learning (dynamic capability) was significantly related to all of the capabilities. These results point to the importance of delineating capabilities such as relationship infrastructure that can facilitate differentiation in the marketplace, and dynamic capabilities such as organizational learning as an important antecedent to IT capability building.

Bharadwaj (2000), taking the resource-based view, developed the concept of IT as an organizational capability and empirically examined the direct association between IT capability and firm performance. Results indicated that firms with high IT capability tended to outperform firms with low IT capability on a variety of profit- and cost-based performance measures (Bullón, 2009).

Pavlou (2006), taking the dynamic capability view to describe how IT can be strategically used as a source of competitive advantage in rapidly changing environments. They posited that IT competence influences competitive advantage through the key mediating variable of resource reconfigurability. Results of their research indicated that IT does not have a direct impact on performance but has an indirect impact through a set of other factors. Thus, the effective use of IT can have differential performance outcomes, especially if directly applied to the development of dynamic capabilities.

Binuyo and Aregbeshola (2014), assessed the impact of IT on the performance of South African Banking Sector using annual data over the period 1990-2012 published by Bankscope – World banking information source. The findings of the study indicated that the use of IT increases return on capital employed as well as return on assets of the South African banking industry. The study recommends that banks emphasize policies that will enhance proper utilization of existing IT equipment rather than additional investments.

The resource-based view (RBV) asserts that firms gain and sustain competitive advantages by deploying valuable resources and capabilities that are inelastic in supply (Ray *et al.*, 2004). Wade and Hulland (2004) defined IT resources as assets and organizational competencies that are available and useful in detecting and responding to market opportunities and threats. IT competencies are defined as a firm's knowledge, skill, and experience (Prahalad & Hamel, 1990), while IT capabilities are defined as the ability of the firm to acquire, deploy, and leverage its IT investment in combination with other resources and capabilities as well as to support and enhance its distinctive competencies and skills in other business functions in order to achieve business objectives through IT implementations (Zhang, 2005). These IT assets, per se, do not add value by themselves. Instead, it is due to the usage that is given in its value chain to grasp market opportunities that affects a firm's competitive advantage.

Liang *et al.* (2010), conducted a meta-analysis on 42 studies to examine how different factors in RBV affect performance. It was found that the mediated model that includes organizational capabilities as mediators between organizational resources and firm performance can better explain the value of IT than the direct-effect model without organizational capabilities. Also, technology resources can improve efficiency performance but may not enhance financial performance directly.

Weill (1992) reported that high investment in IT was associated with high firm performance in the valve manufacturing industry. Furthermore, Li and Ye (1999), founded that IT investments have a stronger positive impact on financial performance when there are greater environmental changes, more proactive company strategy, and close CEO/CIO ties.

Based on the industry structure approach of Porter (Porter, 2007), Dehning *et al.* (2005), concluded that IT has the potential to alter the forces determining the attractiveness of an industry and as a result affect the industry level of profitability. *Ceteris paribus*, a change in industry profitability change firm value in the same direction.

Focused on IT/business alignment, Madadipouya (2015), confirmed that if IT is well aligned to the business, it can support a variety of strategic objectives, including redesign of innovative applications and business processes. It also links organizations with their business partners and facilitates sharing

information. Costs can dramatically be reduced as well and acquiring of competitive intelligence can be fully supported.

Wang *et al.* (2006), failed to found a relationship between virtual integration of firms with its suppliers and gaining cost advantage.

By analyzing a data set containing the IT budgets of over 400 large and mediumsized U.S. corporations, Mitra and Chaya (1996), concluded that higher IT investments were associated with lower average production costs. They also founded that larger companies spend more on IT as a percentage of their revenues than smaller companies.

Building on Technical efficiency analysis of IT investments, Shao and Lin (2002), proved the existing of a significant favorable impact of IT on technical efficiency and in turn, lead to productivity growth.

Clemons and Kimbrough (1986), argued that many applications of IT are, in fact, strategic necessities. Such systems radically change cost structures, relative bargaining power, or the basic of competition to an extent where most competitors are compelled to imitate them. However, because competitors often imitate them or otherwise respond before customers change their behavior, these systems confer competitive advantage. For these two authors, many IT applications that have been examined in financial services, retail banking, and distribution systems have proved to be strategic necessities.

Applying theories of strategic positioning and the resource-based view, Kuettner and Schubert (2012), presents findings from 10 case studies and evaluates to what extent the value contribution from IT investments can lead to (sustainable) competitive advantage. According to these two authors, all of the case studies report value contribution and a state of process excellence, but the competitive advantages are found to be only temporary.

Mata *et al.* (1995), develops a model using RBV. This model was applied to four attributes of IT - capital requirements, proprietary technology, technical IT skills, and managerial IT skills – which might be sources of sustained competitive advantage. Theses researchers found that managerial IT skills were the only one of these attributes that can provide sustainability.

According to Ross *et al.* (1996), some firms generate competitive advantage from their IT capabilities, not from their IT applications. Specifically, a firm delivers value from IT by building and leveraging three assets: highly competent IT human resources, a reusable technology infrastructure, and a strong IT-business partnership.

Broadbent *et al.* (1999), defined more intensive IT infrastructure capability as a combination of more IT infrastructure services and more reach and range. According to these two authors, more extensive IT infrastructure capability was found in firms where: (i) products changed quickly; (ii) attempts were made to identify and capture synergies across business units; (iii) there was greater integration of information and IT needs as part of planning processes; and (iv)

there was greater emphasis on tracking the implementation of long term strategy.

Pereira (1999), evaluate the relationship between SAP technology and sustained competitive advantage, based on RBV. To gain a firm a sustained competitive advantage using SAP technology, Pereira gives two conditions: (i) in addition to an acquisition of a high level of technical expertise, a firm should change in the organizational culture from rewarding individual brilliance to encouraging project teams; (ii) it is preferable to modify the business processes of the firm to fit the capability provided by the SAP system, rather than modify the SAP system to fit the reengineered business processes of the organization.

Ray *et al.* (2005), based on RBV to assess the relationship between IT and the performance of customer service process. These authors founds that tacit, socially complex, firm-specific resources explain variation in process performance across firms and that IT resources and capabilities without these attributes do not. in addition, the shared knowledge between IT and customer service units in the firm is a key IT capability that effect customer service process performance. In another study of Aduloju *et al.* (2014), IT was divided into three components: IT infrastructure, IT technical skills, and IT spending. These three components found that they have a weak relationship with customer service performance. The authors recommend that IT resource must be accompanied by a judicious mix of management, economic, and human resources, in order to realize benefits from IT investments.

Byrd (2001), found that IT infrastructure flexibility acts as an enabler of the core competencies which in turn, gives to a firm sustained competitive advantage.

In addition, Hidding (1999), emphasize the importance of extending strategy theory to better understand the sustainability of IT-based advantage, by taking into account dynamics of competition and different speeds of changes.

Pham and Jordan (2009), assess the relationship between IT resources and business performance. This relationship is studied at both aggregate and detail level, in order to know which resource has the most effect on performance. The results show that IT human resource and IT infrastructure affect business performance, while the effect of IT partnership was not significant.

Using a Novel dataset on almost 260 German Manufacturing firms, Mahr and Kretschmer (2009), found that IT use and decentralization were complements in firms exploring new products and markets, while IT and centralization are complementary in firms exploiting cost advantages in established product-market domains.

Also, Brynjolfsson and Hitt (1996), used a firm-level data on several components of IT spending for 1987-1991. The dataset included 367 large firms which generated approximately 1.8 trillion dollars in output in 1991. The results indicated that IT spending has made a substantial and statistically significant contribution to firm output. The authors found that the gross marginal product

(MP) for computer capital averaged 81% for the firm in the sample. Also, they found that the MP for computer capital is at least as large as the marginal product of other types of capital investment and that, IS labor spending generates at least as much output as spending on non-IS labor and expense.

From the studies presented above we can conclude that there are an inconsistency in the results about the relationship between IT and competitive advantage. According to some researchers like: Brynjolfsson (1991); Brynjolfsson (1993); Brynjolfsson and Hitt (1998); Dedrick and Kraemer (2001); Dehning and Richardson (2002); Stratopoulos and Dehning (2000); Davaraj and Kohli (2003) the failure of getting a consistency results in IS literature about the relationship between IT investment and competitive advantage (or why some authors found no IT-based advantage), is due to the following reasons:

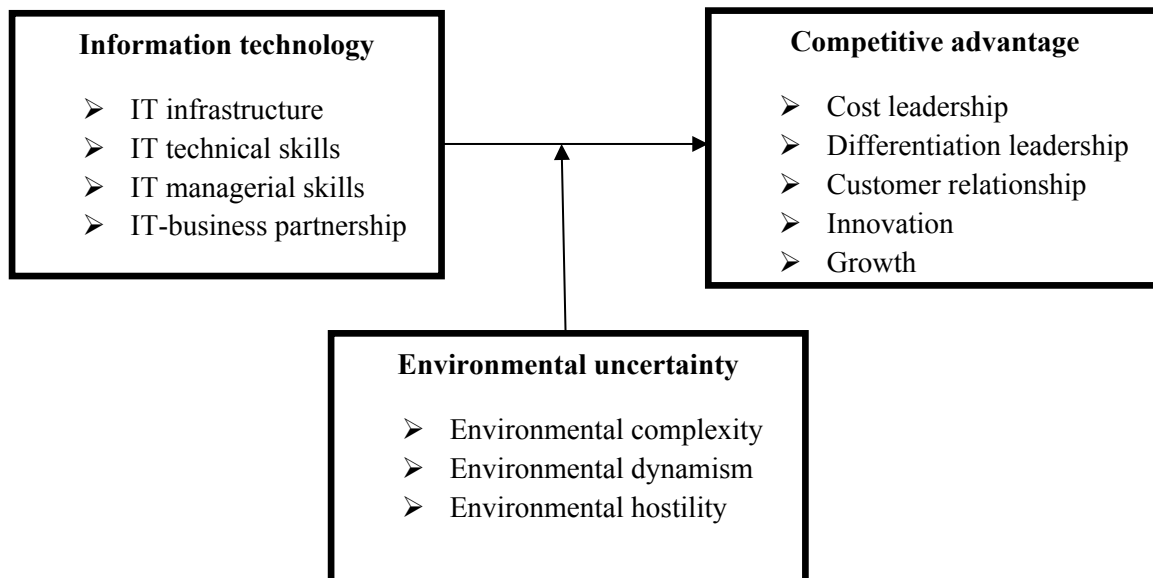
- ❖ Lack of availability of data that have been overcome in the early 1990s, by a dataset enabled researchers to look at the IT investment behavior of a large number of firms;
- ❖ The benefit from IT can take several years to show up on the bottom line, so a cross-sectional data limits the ability to examine the lag effects as well as causal connections between IT adoption and competitive advantage;
- ❖ Limited set of control variables that account for extraneous factors such as market conditions. Furthermore, moderating variables such as business process reengineering (BPR) can have an impact on the linkage;
- ❖ Measurement errors of IT capital due to rapid price and quality changes, and failure of economic statistics to measure qualitative improvements in the output of service industries;
- ❖ management practices, which had not yet evolved to take advantage of the potential of the technology;
- ❖ The difficult of separating IT resources and capabilities from the other resources and capabilities inside the firm.

I. Research design:

Understanding and determining the effects of IT resources on firms' competitive advantage is one of the most complex issues that the majority of the business and information system executives face when they are confronted with IT investments and with building, integrating, and reconfiguring IT capabilities to cope with market opportunities or threats that lead to the undermining of superior performance (Bullón, 2009). In most firms, information technology business projects are assessed through analysis of IT investments per se and not through their IT capabilities (Santhanam & Hartono, 2003). Even though the link between IT and competitive advantage has been extensively examined (Pavlou & El Sawy, 2006; Ravichandran & Lertwongsatien, 2005), there is still a debate about the strategic role of IT (Carr, 2003), which may intensify in

turbulent environments (Pavlou *et al.*, 2004). The figure 1 below shows the research model.

Figure (1): the research model.



III-1. Hypotheses:

The computation capability, information processing speed, and connectivity of computers and Internet technologies can considerably enhance the efficiency of a business process, as well as communications and collaboration among the people responsible for its management, implementation, and maintenance (Holsapple & Wu, 2009).

Among studies that have addressed the relationship between IT capability and competitive advantage, we can mention the work of Lin (2007), who found that both IT capability and human capital investment contributes directly to the overall value-creation performance of banking firms. But according to Lin, A firm’s IT capability should be seen as an integral tool for creating economic value instead of a business infrastructure that makes business operations efficient. Further, Sambamurthy *et al.* (2003), propose that IT investments and capabilities influence the firm’s ability to launch ‘‘many and varied competitive actions and that, in turn, these competitive actions are a significant antecedent of firm performance. Also, Bharadwaj (2000), found that firms with high IT capability tend to outperform a control sample of firms on a variety of profit and cost-based performance measures. Mazidi *et al.* (2014), used the service-profit chain approach of Heskett *et al.* (1994), to confirm that IT capability is one of the factors influencing the relationships in the chain (between employees’ attitudes and behaviors, employees’ behaviors and customers’ impressions, and customers’ impressions and revenue growth).

On the other hand, Ravarini (2010), found that all the three components of IT capability (IT technical skills, IT managerial skills, and IT relationship assets)

have a positive influence on business performance. Byrd and Turner (2001), focused on the important characteristic of firm's IT infrastructure which is flexibility. According to whom there is a positive relationship between flexible IT infrastructure and competitive advantage. Also, Chen (2012), found that Business intelligence (BI) and IT infrastructure flexibility are major sources of organizational agility, and this last partially mediates the effects of BI and IT infrastructure flexibility on an organization's competitive advantage. Farther, Jabbouri and Zaharia (2015), conclude that IT infrastructure have a significant effect on organizational performance, through core competencies which includes presented skills, knowledge and experience of human resources. Moreover, Yaghoubi *et al.* (2011), found that IT infrastructure (network and human resources) have an important role in establishing knowledge management (knowledge creation, knowledge sharing, and knowledge application). In addition, Byrd *et al.* (2008), conclude that the positive firm performance may be derived directly from an organization's superior IT infrastructure, as well as indirectly, through its enabling impact on the firm's Logistics Information System.

Also, Copeland and McKenney (1988), in their study about the evolution of airline reservation systems, argued that establishing technical competence was a necessary requirement for gaining competitive advantage. Mata *et al.* (1995) assert that technical IT skills are indispensable for the effective use of IT, but do not possess the characteristics required to be a source of sustainable competitive advantage. "Technical IT skills ...are usually not heterogeneously distributed across firms..." and "...even when they are ...they are typically highly mobile". This mobility is due to the codifiable nature of technical IT skills, making them easy to transfer among organizations (Mata *et al.*, 1995, P. 498).

But according to Bobb and Harris (2011), even if a company has the requisite technical skills, this is not sufficient for a company to have a sustainable competitive advantage. Managerial skills are a necessary addition to ensure a sustainable competitive advantage. Literature supports that managerial capabilities influence the way technology is developed, deployed, and used in organizations, and leads to distinct implementation effects (Yuan *et al.*, 2006). Without management skills, the full potential of IT for a firm cannot be realized. Compared to technical skills, managerial IT skills require a longer time to develop. Arguably, managerial skills are innate skills and simply not teachable (Bilgihan *et al.*, 2011). Mata *et al.* (1995), considered IT managerial skills as the only component from the IT resources that have a relationship with sustained competitive advantage.

According to Masa'deh *et al.* (2010), the omission of IT-business strategic partnership (also known as strategic alignment), among the reasons why they are non-conclusion, in the outcomes of empirical studies assessing the causal links between IT investments and competitive advantage. Also, Al-Majali (2011), developed a causal model illustrating the relationship between strategic

alignment antecedents, strategic alignment and sustainable competitive advantage. By conducting 172 survey questionnaires with public shareholding firms in Jordan, the results show strong evidence for the impact of the following variables: leadership, service quality, value and belief, IT managerial resources and IT implementation success, on IT-business strategic alignment. Moreover, the results show also a strong evidence for the impact of IT-business strategic alignment on sustainable competitive advantage. Furthermore, in a report conducting by Harvard Business Review Analytic services (2015), the organizations that are able to gain competitive advantage should successfully integrate digital technologies into their business. However, doing so requires a substantial reinvention of IT processes, new platforms, and a strong partnership between business and IT management.

Drawing from the literature, the following hypothesis is proposed:

Hypothesis 1: there is a significant effect of IT on competitive advantage of the firms in the sample.

On the other hand, Liao and Hu (2007) founds that environmental uncertainty was a vital factor during the knowledge transfer, this last contribute in developing firm's core competence and then their own competitive advantage. However, the authors founds that environmental uncertainty could hinder knowledge transfer and lead firms under study to develop knowledge by themselves. Also, based on Resource-Based View Aragón-Correa and Sharma (2003) concluded that certain dimensions of the general business environment (uncertainty, complexity, and munificence) moderate the relationship between dynamic capability of a proactive environmental strategy and competitive advantage. Furthermore, Zahra (1996), used environmental uncertainty as moderating variable in the relationship between technology strategy and financial performance. Among the most important findings of this work, we can list the following: (a) pioneering was highest among firms whose environments are highly dynamic, moderately hostile, and moderately heterogeneous; (b) the broadest technological portfolios was existing among firms whose environments are characterized by moderate dynamism, high heterogeneity, and moderate or low hostility; and (c) the environment was a quasi-moderator of the technology strategy-performance relationship. In addition, Calantone *et al.* (2003), assessed the effects of environment turbulence on new product development and strategy planning, and founds that the paths from innovativeness to strategic planning and from risk taking to new product development speed are significantly greater in highly turbulent environments. Moreover, Kearns and Lederer (2004), analyzed the impact of environmental uncertainty on IT focus and the use of IT on competitive advantage. By using data for 161 firms, the researchers found a positive and significant impact of the environmental uncertainty on business dependence on IT and the two strategic information systems planning practices (IT participation in business planning and the alignment between the IT and the business plans), and between the environmental uncertainty and the use of IT for

competitive advantage. Additionally, Choe (2003), concluded that the perceived environmental uncertainty has an indirect effect on information system strategic applications through the facilitators of alignment. The author found also that environmental uncertainty, a high level of strategic applications and well-arranged facilitators of alignment can contribute more to the improvement of performance comparing than in less or stable environment.

Moreover, there are some studies used environmental uncertainty as moderating variable. For example, Bstieler (2005), evaluate the moderation effect of environment uncertainty in the relationship between new product development and time efficiency. This study finds that a higher degree of technological uncertainty moderates the relationship between development process, project organization and time efficiency. In addition, Qi *et al.* (2011), found significant moderating effect of environmental uncertainty on the relationships among competitive strategy, supply chain strategy, and business performance.

However, Hoque (2004), found no significant relationship between environmental uncertainty and organizational performance through management's choice of non-profit measures. Also, the study of Eisingerich *et al.* (2010), revealed a negative relationship between the environmental uncertainty and the positive effects of network strength on cluster performance.

Drawing from the literature, the following hypothesis is proposed:

Hypothesis 2: There is a significant moderating effect of environmental uncertainty on the relationship between IT and competitive advantage of the firm in the sample.

¹²

firms in Jordan, the results show strong evidence for the impact of the following variables: leadership, service quality, value and belief, IT managerial resources and IT implementation success, on IT-business strategic alignment. Moreover, the results show also a strong evidence for the impact of IT-business strategic alignment on sustainable competitive advantage. Furthermore, in a report conducting by Harvard Business Review Analytic services (2015), the organizations that are able to gain competitive advantage should successfully integrate digital technologies into their business. However, doing so requires a substantial reinvention of IT processes, new platforms, and a strong partnership between business and IT management.

Drawing from the literature, the following hypothesis is proposed:

Hypothesis 5: There is a significant positive relationship between IT-business partnership and competitive advantage of the firms in the sample.

III.2. Sample and population:

The first step in testing the above hypotheses was to choose the population to analyze. This study focuses on IT, so the Algerian companies chosen are those that have at least IT unit (to testing the technical and managerial skills of IT personnel). The questionnaire survey (which is the instrument of the study) was

conducted during a period from September 2015 to January 2016. We used both mailed and hand delivered questionnaire to 300 firms. In total, 37 surveys were returned (from 37 firms) with one was considered as invalid (more than 5 questions unanswered), with an effective response rate of 12.33%.

III-3. Measures:

This section describes the scales used to measure IT, environmental uncertainty, and competitive advantage. All the variables were measured on five-point Likert scale ranging from 1 – strongly disagree to 5 – strongly agree.

Information technology: this construct has been divided into four scales:

1. IT infrastructure: the scale include 6 items, the first 5 items was adapted from Tippins and Sohi's (2003) scale, and the last item was generating using the scale proposed by Ravichandran and Lertwongsatien (2005) (with some modifications).
2. IT technical skills: the scale of IT technical skills was generated using 13 items proposed by Byrd *et al.* (2006), but with simplifying and giving examples to some complex items.
3. IT Managerial skills: the scale was adapted from Mata *et al.* (1995) scale, and includes 4 items.
4. IT-business partnership: this scale was generated using 10 items, 9 items was adapted from Ravichandran and Lertwongsatien's (2005) scale, while the last one was adapted from Chen *et al.* (2014) scale (with some modification).

Environmental uncertainty: this construct has been divided into three scales:

1. Environmental hostility: this scale was adapted from Kekwaletswe and Musangu (2011), and includes 5 items.
2. Environmental dynamic: the scale was generated using 4 items from Teo and King (1997).
3. Environmental complexity: the scale include 3 items adapted from Bechor *et al.* (2010).

Competitive advantage: the scale of competitive advantage was generated using some of the items from the scales proposed by Ashish (2007); Li *et al.* (2006); Bratić (2011); Powell (1992); and Agha (2012).

III-4. Reliability and validity:

Reliability and validity are the two basic properties of empirical measurements. Reliability concerns the extent to which an experiment, test, or any measuring procedure yields the same results on repeated trials. Validity is the degree to which an instrument measures what it purports to measure. Reliability is a necessary but not a sufficient condition for validity (Ruland *et al.*, 2007). The most popular approach is the internal consistency reliability coefficient **Cronbach alpha**. According to George and Mallery (2003), we have a good internal consistency when the value of Cronbach alpha higher than 0.7 (Gliem and Gliem, 2003). The results of internal consistency test using *IMB SPSS Statistics version 22* is shown on the table below.

Table (1): Cronbach alpha of the constructs after and before deleting some items.

<i>The constructs</i>	<i>Cronbach's alpha values</i>	
	<i>Before deleting items</i>	<i>After deleting items</i>
IT infrastructure	0.737	0.766 (one item deleted)
IT technical skills	0.905	-
IT managerial skills	0.876	-
IT-business partnership	0.808	-
Environmental hostility	0.680*	-
Environmental dynamic	0.732	-
Environmental complexity	0.624	0.728 (one item deleted)
Cost leadership	0.732	-
Differentiation leadership	0.680	0.717 (one item deleted)
Customer relationship	0.896	-
Innovation	0.846	-
Growth	0.825	-

From the table above we can conclude that is an acceptable internal consistency to the majority of constructs (where the value of Cronbach's alpha exceeds 0.7).

III-5. Results and discussion:

To assess the effect of IT on competitive advantage, using environmental uncertainty as moderator variable, we will utilize *Process Macro* from Hayes (2013), which can be added to IBM SPSS version 22. The results of the multiple regression analysis will be displayed according to leech *et al.* (2015). The results show a significant interaction where: $F(3, 32) = 4.4281$, $P\text{-value} = 0.0103$ (less than the level of significant 5%). Also, it notes that the model explains about 45% of the variation in competitive advantage of firms under study ($R\text{-square} = 0.4547$). On the other hand, the results show a significant positive relationship between IT and competitive advantage when environmental uncertainty is low (where $b = 0.659$, confidence interval of 95% equal $[0.2071, 1.1108]$, $T\text{-test value} = 2.9708$, with $P\text{-value} < 0.05$). However, when there is an average environmental uncertainty the relationship between IT and competitive advantage will not be significant (where $b = 0.3666$, confidence interval of 95% equal $[-0.273, 0.7605]$, $T\text{-test value} = 1.8956$, with $P\text{-value} > 0.05$). In addition, when environmental uncertainty is high the relationship between IT and competitive advantage will not be significant (where $b = 0.0741$, confidence interval of 95% equal $[-0.5132, 0.6615]$, $T\text{-test value} = 0.2572$, with $P\text{-value} > 0.05$).

The other results of multiple regression analysis are shown in the table below:

* Even in this case alpha's cronbach value was less than 0.7, which means a questionable internal reliability, but if we delete any item the value of alpha's cronbach will decrease.

Table (2): Summary of the multiple regression results with process macro.

<i>Variables</i>	<i>b_i</i>	<i>SEB</i>	<i>t-test</i>	<i>p-value</i>
IT	0.3666 [-0.0273, 0.7605]	0.1934	1.8956	> 0.05
Environmental uncertainty	0.3143 [-0.1012, 0.7297]	0.2040	1.5409	> 0.05
IT* Environmental uncertainty	-0.5598 [-1.2213, 0.1017]	0.3248	-1.7238	> 0.05
Constant	3.92 [3.7281, 4.1115]	0.0941	41.6448	<0.05

From the table above we can conclude that IT has no significant effect on competitive advantage, and the environmental uncertainty has no significant moderating effect in the relationship between IT and competitive advantage. This findings leads to the rejection of the two previous hypotheses.

Furthermore, even this work tried to avoid the most criticism addressed to RBV, which is the internal-oriented (resources of the firm) in explaining the competitive advantage of firm, by adopting a contextual variable (environmental uncertainty). The results of this work are in opposition with many previous studies. For example, Santhanam and Hartono (2003), who found that firms with superior IT capability, will enjoy a sustainable competitive advantage. Also, Li and Ye (1999), who concludes that IT investment have a strong positive impact on financial performance when there are a greater environmental changes.

Although, our findings are consistent with some previous works, such Zehir *et al.* (2008) who found that IT, organizational learning, and firm innovation has no effect on firm performance when using multiple regression. But the effect of these variables on firm performance will appear when they used the regression analysis of each variable separately.

In addition, the results of this work came to confirm some previous ideas, which include the following: (i) *IT productivity paradox* (Brynjolfsson, 1993), which means that it is hard to prove any relationship between IT investment and organizational performance or competitive advantage; (ii) *Strategic necessity hypothesis* which indicates that IT is critical for organizations, however it can't per se leads to competitive advantage, only when it is accompanied with a strategic change (Clemons and Row, 1991); (iii) *IT doesn't matter*, which refer to the impossibility for making variation between firms using only IT, because this last became a commodity (Carr, 2003).

Finally, there are some explanations for the lack of any significant effects in regression analysis, we will be summarized as follows:

- ❖ **The small sample size:** according to Kohli and Davaraj (2000), the sample size has an important role in the possibility of finding any relationship between IT and competitive advantage or organizational performance;

- ❖ **Cross-sectional data:** when taking into account that the benefits from IT can take several years to appear (time lag) (Brynjolfsson and Yang, 1996), so using a cross-sectional data maybe the reason behind the failure to find IT-based competitive advantage.

III-6. Conclusion and limitation:

Using data from 36 Algerian firms, we tried to assess the effect of IT on competitive advantage, by using environmental uncertainty as moderating variable. However, we failed to prove the validity of the two hypotheses listed above.

Despite the importance of this study in using variables from inside and outside firms to explain the competitive advantage, it still suffering from some limitations. First, the small sample size adopted in this study (which was caused by numerous reasons as the difficulty of finding Information systems department in Algerian companies, or even IT unit; the non-responding of most of companies when using mailed-questionnaire; ...etc) do not allow us to use some statistical methods, used in similar studies like: Partial Least Square techniques (PLS) (Ravichandran and Lertwongsatien, 2005), which is a better tool comparing to the first generation of statistical tools (like ordinary OLS). Second, as with all cross-sectional research proving the causal relationship between IT and competitive advantage is inappropriate according to some authors like: Tippins and Sohi, 2003. Finally, we didn't use any controlling variable in this work, like: Industry type, firm's age, or firm's size, although most of these variables can be observed frequently in information systems literature (Cakmak and Tas, 2012).

IV. References:

1. Adekunle Oluwole Binuyo and Rafiu Adewale Aregbeshola (2014), "**The impact of information and communication technology (ICT) on commercial bank performance: evidence from South Africa**", *Problems and Perspectives in Management*, Volume 12, Issue 3, PP. 59-68.
2. Ahmad Reza Karimi Mazidi *et al.* (2014), "**The impact of information technology capability on firm performance: A focus on employee-customer profit chain**", *Iranian Journal of Management Studies (IJMS)*, Volume 7, Number 1, January, PP. 95-120.
3. Anandhi Bharadwaj (2000), "**A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation**", *MIS Quarterly*, Volume 24, Issue 1, PP. 169-196.
4. Anandhi S. Bharadwaj *et al.* (1999), "**Information technology effects on firm performance as measured by Tobin's q**", *Management Science*, Volume 47, Issue 7, July, PP. 1008-1024.
5. Andreas B. Eisingerich *et al.* (2010), "**How can clusters sustain performance? The role of network strength, network openness, and environmental uncertainty**", *Research policy*, Volume 39, Issue 2, March, PP. 239-253.
6. Andrew F. Hayes (2013), "**The process macro for SPSS and SAS**", Available at: <http://processmacro.org/index.html>, access at: 04/08/2016.
7. Anil Bilgihan *et al.* (2011), "**Information technology applications and competitive advantage in hotel companies**", *Journal of Hospitality and Tourism Technology*, Volume 2, Number 2, PP. 139-154.
8. Ashish A. Thatte (2007), "**Competitive advantage of a firm through supply chain responsiveness and SCM practices**", *Theses and Dissertations*, University of Toledo.
9. Aurelio Ravarini (2010), "**Information technology capability within small-medium enterprises**", *Doctoral Thesis*, School of Computer and Security Science, Faculty of Computing, Health and Science, Edith Cowan University, Perth, Australia, October.

10. Benjamin B. M. Shao and Winston T. Lin (2002), “**Technical efficiency analysis of information technology investments: a two-stage empirical investigation**”, *Information & Management*, Volume 39, PP. 391-401.
11. Blaize Horner Reich and Izak Benbasat, “**Factors that influence the social dimension of alignment between business and information technology objectives**”, *MIS Quarterly*, Volume 24, Number 1, March, PP. 81-113.
12. Boon Siong Neo (1988), “**Factors facilitating the use of Information Technology for competitive advantage: An exploratory study**”, *Information & Management*, Volume 15, Issue 4, PP. 191-201.
13. Bou-Wen Lin (2007), “**Information technology capability and value creation: Evidence from the US banking industry**”, *Technology in Science*, Volume 29, PP. 93-106.
14. Bruce Dehning and Theophanis Stratopoulos (2003), “**Determinants of sustainable competitive advantage due to IT-enabled strategy**”, *Journal of Strategic Information Systems*, Volume 12, PP. 7-28.
15. Bruce Dehning *et al.* (2005), “**Information technology investments and firm value**”, *Information & Management*, Volume 42, PP. 989-1008.
16. C. K. Prahalad and Gary Hamel (1990), “**The core competence of the corporation**”, *Harvard Business Review*, Volume 68, Issue 3, PP. 79-91.
17. Catherine Marinagi *et al.* (2014), “**The impact of information technology on the development of supply chain competitive advantage**”, *Procedia- Social and Behavioral Sciences*, Volume 147, August, PP. 586-591.
18. Cemal Zehir *et al.* (2008), “**The impact of information technology practices and organizational learning on firm innovation and performance**”, *Journal of Global Strategic Management*, Volume 4, December, PP. 24-37.
19. Clyde W. Holsapple and Jiming Wu (2009), “**A resource-based perspective on information technology, knowledge management, and firm performance**”, In: Yogesh K. Dwivedy *et al.*, “**Handbook of research on contemporary theoretical models in information systems**”, *Information Science Reference*, Hershey, New York, P. 303.
20. Cornelia Ruland *et al.* (2007), “**Reliability and validity issues related to tailored patient assessments: A case study**”, *Journal of Medical Internet Research*, Volume 9, Number 3, Jul-September.
21. David Besanko *et al.* (2013), “**Economics of strategy**”, 6th Edition, *John Wiley & Sons*.
22. Diana Bratić (2011), “**Achieving competitive advantage by SCM**”, *IBIMA Business Review*, vol. 2011, PP. 1-13.
23. Dmaithan A. AL-Majali (2011), “**Antecedents of IT-business alignment factors in influencing sustainable competitive advantage**”, *Doctoral Thesis*, College of Arts and Sciences, University of Utara Malaysia.
24. Duncan G. Copland and James L. McKenney (1988), “**Airline reservations systems: Lessons from history**”, *MIS Quarterly*, Volume 12, Number 3, September, PP. 353-370.
25. Eric Brynjolfsson (1993), “**The productivity paradox of information technology: Review and assessment**”, *Communication of the ACM*, Volume 36, Number 12, December, PP. 66-77.
26. Eric Brynjolfsson (1993), “**The productivity paradox of information technology: Review and assessment**”, *Communication of the ACM*, Volume 36, Number 12, December, PP. 66-77.
27. Eric Brynjolfsson and Lorin Hitt (1996), “**Paradox lost? Firm-level evidence on the returns to information systems spending**”, *Management Science*, Volume 42, Issue 4, April, PP. 541-558.
28. Eric Brynjolfsson and Lorin M. Hitt (1998), “**Beyond the Productivity Paradox: Computers are the Catalyst for Bigger Changes**”, *Communication of the ACM*, Volume 41, Number 8, PP. 49-55.
29. Eric Brynjolfsson and Shinkyu Yang (1996), “**Information technology and productivity: A review of literature**”, *Advances in Computers, Academic Press*, Volume 43, PP. 179-214.
30. Eric K. Clemons and Steven O. Kimbrough (1986), “**Information systems, telecommunications, and their effects on industrial organization**”, *ICIS 1986 Proceedings, Paper 27*, Available at: <http://aisel.aisnet.org/icis1986/27>
31. Eric T. G. Wang *et al.* (2006), “**A virtual integration theory of improved supply-chain performance**”, *Journal of Management Information Systems*, Volume 23, Number 2, PP. 41-64.
32. Erik Brynjolfsson (1993), “**The productivity of information technology: Review and assessment**”, *Communication of the ACM*, Volume 36, Number 12, December, PP. 66-77.
33. Ferdinand Mahr and Tobias Kretschmer (2009), “**Performance effects of aligning information technology with organization and product market strategy**”, *Paper Presented at the Summer Conference*, Copenhagen Business School, Frederiksberg, Denmark, 17 – 19th June, PP. 18-19.
34. Francisco J. Mata *et al.* (1995), “**Information technology and sustained competitive advantage: A resource-based analysis**”, *MIS Quarterly*, Volume 19, Number 4, December, PP. 487-505.

35. Ganesh D. Bhatt *et al.* (2005), “**Types of information technology capabilities and their role in competitive advantage: An empirical study**”, *Journal of Management Information Systems*, Volume 22, Issue 2, PP. 253-277.
36. Gautam Ray *et al.* (2004), “**Capabilities, business process, and competitive advantage: Choosing the dependent variable in empirical tests of the Resource-Based View**”, *Strategic Management Journal*, Volume 25, PP. 23-37.
37. Gautam Ray *et al.* (2005), “**Information technology and the performance of the customer service process: A resource-based analysis**”, *MIS Quarterly*, Volume 29, Number 4, December, PP. 625-652.
38. George W. Reynolds (2010), “**Information technology for managers**”, *Course Technology Cengage Learning*, Boston, MA.
39. Gezinus J. Hidding (1999), “**Sustaining strategic advantage in the information age**”, *Paper Presented at The Proceedings of the 32nd Hawaii International Conference on System Sciences*, 5-8th January.
40. Grover S. Kearns and Albert L. Lederer (2004), “**The impact of industry contextual factors on IT focus and the use of IT for competitive advantage**”, *Information & Management*, Volume 41, Issue 6, September, PP. 899-919.
41. Hao Ma, “**Creation and preemption for competitive advantage**”, *Management Decision*, Volume 37, Number 3, 1999, pp. 259-266.
42. Hao Ma, « **Creation and preemption for competitive advantage** », *Management Decision*, Volume 37, Number 3, 1999, pp. 259-266.
43. Harvard Business Review Analytic Services (2015), “**Rethinking the IT/business partnership to drive digital innovation**”, *Harvard Business Review*, White Paper, September.
44. ITL Education Solutions Limited (2006), “**Introduction to information technology**”, *Pearson Education India*.
45. J. Alberto Aragón-Correa and Sanjay Sharma (2003), “**A contingency Resources-Based View of proactive corporate environmental strategy**”, *Academy of Management*, Volume 28, Number 1, PP. 77-88.
46. James L. Heskett *et al.* (1994), “**Putting the service-profit chain to work**”, *Harvard Business Review*, Volume 72, Number 2, March-April, PP. 164-174.
47. Jay B. Barney (1991), “**Firm resources and sustained competitive advantage**”, *Journal of Management*, Volume 17, Number 1, PP. 99-120.
48. Jeanne W. Ross *et al.* (1995), “**Developing long-term competitiveness through information technology assets**”, *Sloan School of Management*, Working Paper, Number 3878, Massachusetts Institute of Technology, Cambridge, December.
49. Jerry Luftman (2000), “**Assessing Business-IT maturity**”, *Communication of the Association for Information Systems*, Volume 4, Article 14, December.
50. Jong-min Choe (2003), “**The effect of environmental uncertainty and strategic applications of IS on a firm’s performance**”, *Information & Management*, Volume 40, Issue 4, March, PP. 257-268.
51. Joseph A. Gliem and Rosemary R. Gliem (2003), “**Calculating, interpreting and reporting Cronbach’s alpha reliability coefficient for Likert-type scales**”, *Paper presented at the Midwest Research to Practice Conference in Adult, Continuing, and Community Education*, Columbus, Ohio, Ohio State University, PP. 82-88.
52. Kasra Madadipouya (2015), “**A review on the strategic use of IT applications in achieving and sustaining competitive advantage**”, *International Journal of Managing Public Sector Information and Communication Technologies (IJMP ICT)*, Volume 6, Number 2, June, PP. 21-30.
53. Leslie M. Bobb and Peter Harris (2011), “**Information technology and information systems: Its use as a competitive and strategic weapon**”, *The Journal of Global Business Management*, Volume 7, Number 2, August.
54. Lidija Breznik (2012), “**Can information technology be a source of competitive advantage**”, *Economic and Business Review*, Volume 14, Number 3, PP. 251-269.
55. Lidija Breznik, “**Can information technology be a source of competitive advantage**”, *Economic and Business Review*, Volume 14, Number 3, 2012, PP. 251-269.
56. Ludwig Bstieler (2005), “**The moderating effect of environment uncertainty on new product development and time efficiency**”, *Journal of Product Innovation Management*, Volume 22, Issue 3, May, PP. 267-284.
57. Luis A. Bullón (2009), “**Competitive Advantage of Operational and Dynamic Information Technology Capabilities**”, *Journal of CENTRUM Cathedra*, Volume 2, Issue 1, PP. 86-107.
58. Man Zhang (2005), “**Information technology capability, organizational culture, and export performance**”, *Doctoral Dissertation*, College of Business and Economics, Washington State University, May.

59. Marianne Broadbent and Carey Butler (1997), “**Managing information technology infrastructure capability for international business operations**”, *Paper presented at the Pacific Asia Conference on Information Systems (PACIS)*, Paper 57.
60. Marianne Broadbent *et al.* (1999), “**Strategic context and patterns of IT infrastructure capability**”, *Journal of Strategic Information Systems*, Volume 8, PP. 157-187.
61. Michael E. Porter (1980), “**Competitive strategy: Techniques for analyzing industries and competitors**”, with a new introduction, *The Free Press*, New York, 1980.
62. Michael E. Porter (2007), “**Understanding Industry structure**”, *Harvard Business School*, Case: 9-707-493, August.
63. Michael E. Porter and Victor E. Miller (1985), “**How information give you competitive advantage**”, *Harvard Business Review*, Volume 63, Number 4, July-August, PP. 149-160.
64. Michael J. Tippins and Ravipreet S. Sohi (2003), “**IT competence and firm performance: Is organizational Learning a missing link?**”, *Strategic Management Journal*, Volume 24, PP. 745-761.
65. Michael J. Tippins and Ravipreet S. Sohi (2003), “**IT competency and firm performance: Is organizational learning a missing link?**”, *Strategic Management Journal*, Volume 24, Issue 8, August, PP. 745-761.
66. Michael Wade and John Hulland (2004), “**The Resource-Based View and information systems research: Review, extension, and suggestions for future research**”, *MIS Quarterly*, Volume 28, Number 1, March, PP. 01-36.
67. Mingfang Li and L. Richard Ye (1999), “**Information technology and firm performance: Linking with environmental, strategic and managerial contexts**”, *Information & Management*, Volume 35, Issue 1, January, PP. 43-51.
68. Naceur Jabnoun *et al.* (2003), “**Environmental uncertainty, strategic orientation, and quality management: A contingency model**”, *Quality Management Journal*, Volume 10, Issue 4, October, PP. 17-31.
69. Nada Ismaeel Jabbouri and Ibrahim Zaharia (2015), “**The effect of IT infrastructure on organizational performance via core competencies: Empirical study in Iraqi banks**”, *Journal of Islamic and Human Advanced Research*, Volume 5, Number 1, PP. 01-11.
70. Nancy L. Leech *et al.* (2015), “**IBM SPSS for intermediate statistics**”, Fifth Edition, *Routledge Taylor & Francis Group*, New York.
71. Nicholas J. Ashill and David Jobber (2013), “**The effects of the external environment on marketing decision-maker uncertainty**”, *Journal of Marketing Management*, DOI: 10.1080/0267257X.2013.811281.
72. Nicolas G. Carr (2003), “**IT doesn't Matter**”, *Harvard Business Review*, Volume 81, Number 5, May, PP. 29-33.
73. Nicolas G. Carr (2003), “**IT doesn't Matter**”, *Harvard Business Review*, Volume 81, Number 5, May, PP. 29-33.
74. Nour-Mohammed Yaghoubi *et al.* (2011), “**Information technology infrastructures and knowledge management: Towards organizational excellence**”, *Computer and Information Science*, Volume 4, Number 5, September, PP. 20-27.
75. Patrick M. Wright *et al.* (1993), “**Human resources and sustained competitive advantage: A resource-based perspective**”, *Center for Effective organizations*, G 93-19 (239), November.
76. Paul A. Pavlou (2006), “**IT-Enabled Competitive Advantage: The Strategic Role of IT on Dynamic Capabilities in Collaborative Product Development Partnerships**”, *Dissertation Summary*, Marshall School of Business, University of Southern California.
77. Paul A. Pavlou and Omar A. El Sawy (2006), “**From IT Leveraging Competence to Competitive Advantage in Turbulent Environments: The Case of New Product Development**”, *Information Systems Research*, Volume 17, Issue 3, September, PP. 198-227.
78. Paul A. Strassman (1990), “**The Business Value of computers: An executive's guide**”, *The Information Economics Press*, New Canaan, Connecticut.
79. Paul M. Swamidass and Suresh Kotha (1998), “**Explaining manufacturing technology use, firm size and performance using a multidimensional view of technology**”, *Journal of Operations Management*, Volume 17, PP. 23-37.
80. Paul Pavlou *et al.* (2004), “**Linking Information technology and dynamic capabilities: The elusive dancing partners?**”, *The International Conference on Information systems (ICIS) 2004 Proceedings*, Paper 85.
81. Peter Weill (1992), “**The role and value of information technology infrastructure: Some empirical observations**”, *Sloan School of Management*, Massachusetts Institute of Technology, Working Paper, Number 3433-92, May.

82. Pinar Irlayici Cakmak and Elcin Tas (2012), “**The use of information technology on gaining competitive advantage in Turkish contractor firms**”, *World Applied Sciences Journal*, Volume 18, Number 2, PP. 274-285.
83. Ra'ed Masa'deh *et al.* (2010), “**Investing a causal model of IT-business partnership and competitive advantage**”, *Paper presented at the 14th IBIMA Conference on Global Business Transformation Through Innovation and Knowledge Management*, Istanbul, June 23-24th.
84. Raduan Che ROSE *et al.* (2010), “**A review of the relationship between organizational resources, competitive advantage and performance**”, *The Journal of International Social Research*, Volume 3, Number 11, Spring, PP. 488-498.
85. Rajiv Kohli and Sarv Davaraj (2000), “**Measuring information technology payoff: A meta-analysis of structural variables in firm-level empirical research**”, *Information Systems Research*, Volume 14, Issue 2, PP. 127-145.
86. Rajiv Kohli and Sarv Davaraj (2003), “**Measuring information technology payoff: A meta analysis of structural variables in firm-level empirical research**”, *Information Systems Research*, Volume 14, Issue 2, PP. 127-145.
87. Rathika Santhanam and Edward Hartono (2003), “**Issues in linking information technology capability and firm performance**”, *Management Information Systems Quarterly*, Volume 27, Issue 1, PP. 125-153.
88. Ray M. Kekwaletswe and Luka M. Musangu (2011), “**Strategic information systems planning and environmental uncertainty: An empirical assessment**”, *International Journal on Computer Science and Information Systems*, Volume 6, Number 3, PP. 1-16.
89. Rekha Krishnan and Xavier Martin (2006), “**When does trust matter to alliance performance?**”, *Academy of Management Journal*, Volume 49, Number 5, PP. 894-917.
90. Rex Eugene Pereira (1999), “**Resource view theory analysis of SAP as a source of competitive advantage for firms**”, Volume 30, Issue 1, Winter, PP. 38-46.
91. Richard P. Rumelt (2003), “**What in the world is competitive advantage?**”, *The Anderson School UCLA*, Working Paper, Number 2003-105, August 5, 2003.
92. Roger Calantone *et al.* (2003), “**The effects of environment turbulence on new product development and strategy planning**”, *The Journal of Product Innovation Management*, Volume 20, Issue 2, March, PP. 90-103.
93. Sabah Agha *et al.* (2012), “**Effect of core competencies on competitive advantage and organizational performance**”, *International Journal of Business and Management*, Volume 7, Number 1, January, PP. 192-204.
94. Sabyasachi Mitra and Antoine Karim Chaya (1996), “**Analyzing cost-effectiveness of organizations: The impact of information technology spending**”, Special Section: Strategic and Competitive Information Systems, *Journal of Management Information Systems*, Volume 13, Issue 2, PP. 29-57.
95. Shaker A. Zahra (1996), “**Technology strategy and financial performance: Examining the moderating role of the firm's competitive environment**”, *Journal of Business Venturing*, Volume 11, Issue 3, May, PP. 189-219.
96. Shu-Hsien Liao and Ta-Chien Hu (2007), “**Knowledge transfer and competitive advantage on environmental uncertainty: An empirical study of the Taiwan semiconductor industry**”, *Technovation*, Volume 27, Issue 6-7, June-July, PP. 402-411.
97. Shu-Ling Wu (2011), “**Impact of environmental uncertainty on human resource flexibility**”, *Paper Presented at the International Conference on Business and Economics Research*, Kuala Lumpur, Malaysia.
98. Stephan D. Tansey (2003), “**Business, information technology and society**”, With the contributions of Geoffrey Darnton and John Wateridge, First published, *Routledge Taylor and Francis Group*, London.
99. Steven B. Isbell (2001), “**The new economy, Solow paradox, and economic history**”, *Essays in Economic and Business History*, PP. 253-264.
100. Suhong Li *et al.* (2006), “**The impact of supply chain management practices on competitive advantage and organizational performance**”, *The International Journal of Management Science*, Volume 34, PP. 107-124.
101. T. Ravichandran and Chalerm Sak Lertwongsatien (2005), “**Effect of Information systems resources and capabilities on firm performance: A resource-based Perspective**”, *Journal of Management Information Systems*, Volume 21, Number 4, Spring, PP. 237-276.
102. Tamir Bechor *et al.* (2010), “**A contingency model for estimating success of strategic information systems planning**”, *Information & Management*, Volume 47, Number 1, PP. 17-29.
103. Terry A. Byrd (2001), “**Information technology, core competencies and sustained competitive advantage**”, *Information Resources Management Journal*, Volume 14, Issue 2, PP. 27-36.

104. Terry Anthony Byrd and Douglas E. Turner (2001), “**An exploratory examination of the relationship between flexible IT infrastructure and competitive advantage**”, *Information & Management*, Volume 39, Issue 1, November, PP. 41-52.
105. Terry Anthony Byrd *et al.* (2006), “**The impact of IT personnel skills on IS infrastructure and competitive IS**”, In: Mehdi Khosrow-Pour (ed.), “**Advanced topics in information resources management**”, Volume 5, IDEA Group Publishing, London.
106. Theophanis Stratopoulos and Bruce Dehning (2000), “**Does successful investment in information technology solve the productivity paradox?**”, *Information & Management*, Volume 38, PP. 103-117.
107. Thi Lien Pham and Ernest Jordan (2009), “**Information technology resources and business performance: An Australian context**”, *Asian Pacific Management Review*, Volume 14, Number 4, PP. 407-426.
108. Thomas C. Powell (1992), “**Strategic planning as competitive advantage**”, *Strategic Management Journal*, Volume 13, Number 7, October, PP. 551-558.
109. Thomas C. Powell and Anne Dent-Micallef (1997), “**Information technology as competitive advantage: The role of human, business, and technology resources**”, *Strategic Management Journal*, Volume 18, Issue 5, May, PP. 375-405.
110. Thompson S. H. Teo and Williams R. King (1997), “**Integration between business planning and information systems planning: an evolutionary-contingency perspective**”, *Journal of Management Information Systems*, Volume 14, Number 1, Summer, PP. 185-214.
111. Tim Kuettner and Petra Schubert (2012), “**IT-based competitive advantage: A cross-case comparison of business software usage**”, *Procedia Technology*, Volume 5, PP. 181-189.
112. Ting-Peng Liang *et al.* (2010), “**A Resource-Based perspective on information technology and firm performance: A meta-analysis**”, *Industrial Management & Data Systems*, Volume 110, Number 8, PP. 1138-1158.
113. V. Sambamurthy *et al.* (2003), “**Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms**”, *MIS Quarterly*, Volume 27, Number 2, June, PP. 237-263.
114. Yang Chan *et al.* (2014), “**IT capability and organizational performance: The roles of business process agility and environmental factors**”, *European Journal of Information Systems*, Volume 23, PP. 326-342.
115. Yannis J. Bakopoulos (1985), “**Toward a more precise concept of information technology**”, *SLOAN School of Management*, Working Paper, Number 1677, Cambridge, Massachusetts.
116. Yinan Qi *et al.* (2011), “**The impact of competitive strategy and supply chain strategy on business performance: The role of environmental uncertainty**”, *Decision Science*, Volume 42, Issue 2, May, PP. 371-389.
117. Yu-Lan Yuan *et al.* (2006), “**The role of information technology use in American convention and visitors bureaus**”, *Tourism Management*, Volume 27, Issue 2, April, PP. 326-341.
118. Zahirul Hoque (2004), “**A contingency model of the association between strategy, environmental uncertainty and performance measurement: impact on organizational performance**”, *International Business Review*, Volume 13, Issue 4, August, PP. 485-502.